



VR-Forces 5.1 Release Notes

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Systems Supported and System Requirements

For information about platform and system support, see the Product Specifications & Dependencies page on the MAK website at: <https://www.mak.com/mak-one-specs>. You can also find them in the Third-Party Licenses section of the Preface in the user guide and help.

For hardware requirements, see <https://www.mak.com/mak-one/support/help/hardware-recommendations>.

Compiler Compatibility on Windows

MAK provides versions of product releases that have been compiled with different versions of Microsoft Visual C++. MAK ONE products built with VC 14 and later are binary compatible and will work together. When you run MAK ONE products together on the same computer, for example, VR-Vantage and VR-Forces, we strongly recommend that you run versions compiled with the same compiler or binary compatible compilers.

Disk Space Requirements

A full installation of VR-Forces requires approximately 6 GB of disk space (plus 2 GB for the *VR-Forces Developers Guide*, installed separately on Windows) and an additional 69.8 GB for the complete makData 18 package, including the supplemental data package.

The makData Package

VR-Forces 5.1 is compatible with the makData 18 package. MAK applications can share the same data package. For instructions on installing the data, see "[The makData Package](#)" in the *VR-Forces Users Guide*.

 The MAK data package contains data that VR-Forces requires. See the *Installing VR-Forces* chapter of the users guide.

License Manager

VR-Forces 5.1 uses FLEXlm 11.17.1. You must install the license management software to run VR-Forces.

The MAK License Manager files are not part of the VR-Forces installer. You can download them from the MAK ONE Product Downloads page (<https://www.mak.com/mak-one-downloads>).

Installation of the license manager is covered in the *MAK ONE Installation Guide*, available online at <https://mak.com/mak-one-installation-guide>. Support is also available at <https://www.mak.com/mak-one/support/portal>.

New Features and Major Changes

VR-Forces 5.1 has the following new features and updates.

- Removed support for HLA 1516 (IEEE 1516-2000) and HLA 1.3.
- VR-Forces now requires the NETN FOM (NATO Education and Training Network Distributed Simulation Federation Object Model) and uses it for default communication. It is an extension of the RPR FOM 2.0, allowing other federates using pure RPR FOM to interoperate with VR-Forces. (The old 2.0 publication (and non-NETN publication in VR-Forces) will not work.)
- VR-Forces also uses an implementation of the new IFF classes that have been developed for RPR FOM 3.0, which MAK has modified to work with RPR FOM 2.0 (and therefore they work with the NETN FOM).
- To account for the "flatter" menu structure of Windows 10 and Windows 11, the Start menu links to VR-Forces and its associated applications now display the version information. The documentation and tools are in versioned subfolders, and there are also versioned shortcuts on the Start menu to access the folders.
- You now install PDBs, which supply data to inform the callstack.log file, are now installed using an executable. This is easier than manually unzipping and putting the files in the `./bin64` directory.
- All MAK ONE *log* and *dmp* files are now saved in a central location. The default is `C:/MAK/logs`, which you can change by using the `MAK_LOG_DIR` environment variable to specify a different path.

Scenarios and Plans

- Improved the functionality for Plans:
 - The Plan dialog box shows triggers more effectively. They now display below the main plan block, providing you with a better view of any triggers in the plan. You can expand a trigger to display the actions included and see what will happen if the trigger occurs.
 - When a simulation is running, the new default is that you can view the Plan dialog box but not make changes to the plan. You can make changes by clicking the Unlock button in the dialog box, but VR-Forces will warn you that editing a plan while the simulation is running can lead to undesired behavior. This helps you decide whether you really want to make changes while the scenario is running. You may edit a plan at any time while the simulation is paused.
 - If there are open plans that you have not saved when you save the scenario, VR-Forces now prompts you to decide whether to save those changes before saving the scenario.

Refer to the help, the *VR-Forces First Experience Guide*, or the [Writing Plans](#) chapter of the *VR-Forces Users Guide* to learn how to use the updated Plan dialog box.

- There is a new condition that you can test with a conditional statement: Entity in Range of Target. This checks whether the entity that is testing for that condition is within range of the target that you specify.
- You can now specify that plans in a synchronization matrix span two or more phases, allowing one phase to end and the next phase to begin while the entity or unit continues to perform its plan. See the Synchronization Matrix section of the help or the [Synchronization Matrix](#) chapter in *Section VII. Plans* of the *VR-Forces Users Guide* for details.
- All of the example scenarios that ship with VR-Forces are now in a subfolder, `./userData/scenarios/Sample`. This separates them from any scenarios that you save in the `./userData/scenarios` folder. Also, some outdated scenarios were removed.
- Improved the Import Scenario Objects feature and updated the documentation to more clearly reflect what is imported and what is not. The reorganized dialog box presents the options more clearly. UUIDs are now preserved unless you choose to import duplicate objects, in which case new UUIDs are assigned.
- The Show on Quick Launch Toolbar option in Scenario Events is now enabled by default. Typically, users want to be able to kick off events manually, therefore it is more practical for that to be standard.
- The Quick Launch toolbar is now a panel, displaying the text of the Event Title of a scenario event or the name of the global plan. This allows users to easily see what each event does. In addition, a scenario event's Label text is now used as the tooltip text. By default, the Quick Launch Panel displays as a tab with the Command Panel.

Order of Battle

- When you add a simulation object to an OOB using the Order of Battle Panel, you can now specify a label for it in the Add to Order of Battle dialog box. You can also add or edit labels for simulation objects that are already in the OOB using the Edit Name / Object Type dialog box. A common use for labels is as a human-readable tag when the name (marking text) must be a Uniform Resource Name (URN) for other federates.

New and Updated Tasks and Sets

- You now create a separate Entity Control Panel for each entity that you want to command. This allows you to open panels for multiple entities at the same time, giving you quick access to each of them.
- Improved the method for selecting multiple simulation objects for a task or set. The selection stays active until you right-click or select another option, allowing you to select multiple objects one at a time or by using **Ctrl** or **Shift**. (In VR-Forces 5.0.x, users had to click the Select Object button before selecting each object.)

When you click the Remove button to unselect one of the objects you previously chosen, the next object in the list is highlighted, allowing you to easily remove multiple objects by continuing to click the Remove button. The ability to add entities that do not currently exist in the scenario is now in a context menu instead of add button.

- Parameters that include specifying a location or waypoint have been improved to allow more flexibility.
- The new Attached set data request allows you to attach tactical graphics to entities. You can specify the graphic's orientation relative to the entity or the world. You can also use it to detach a tactical graphic from an entity.
- The Activation set data request has a new check box, Ignore Year, enabling you to use the Use Date and Time of Day option as only month, day, and time, ignoring the year. This causes the activation to occur at the same time of any year. One use case is that you can import older scenario objects without modification, using them for modern training. The date on any tactical graphics would then apply to whatever year your scenario is set in.
- You can now assign Radio tasks to the Tower Radio simulation object. This allows it to send tasks, sets, and messages to other entities in the scenario.

Engagement

- There are new Fire At, Fire Ballistic Gun, and Fire Missile Launcher tasks for weapon systems that support direct fire. Older platform-specific weapon tasks (such as Fire At Target and Fire TOW at Target) have been deprecated in favor of those using the new unified system. See "Engagement Tasks for Entity-Level Scenarios" in the Tasks section of the *VR-Forces Users Guide* or the help.
- VR-Forces now supports loiter munition systems. Using the new Loiter Munition tasks, you can task a launcher to fire a loiter munition, and you can also task loiter munitions themselves.
- Lasing has been enhanced to simulate the trajectory of the laser beam, factoring in line of sight and range. In cases where the beam is obstructed, the obstructing object becomes the point where the laser designator displays, influencing the targeting of weapons searching for that designator. If the target is beyond the range of the laser designator, the spot does not display.

When an entity lases one side an entity, for example, the direction of the laser is considered and weapons can only target the designated spot if they have line of sight to it. If the weapon does not have visibility to that side of the entity, the weapon cannot target it.

- The Lase and Fire Guided Missile task causes an entity to first lase a target location or simulation object and then fire a laser-guided missile at it.
- The Fire Laser Guided Missile task causes an entity equipped with laser-guided missiles to launch a missile without lasing the target object or location. The intended use is for firing the missile at a target that another entity is lasing. Optionally, you can cause the entity to fire the missile without a laser designator.

Air Domain

- Aerodromes and runways have changed from previous releases, and the controls for those terrain features have been significantly improved. See "Aerodromes" in the Terrain section of the *VR-Forces Users Guide* or help for details.
- With the changes to aerodromes and runways, there are new and adjusted tasks for landing fixed-wing aircraft. You no longer need to publish aerodromes to the network to have entities take off from or land on runways and aerodromes.
 - The Takeoff On Runway and Land On Runway tasks have changed to use the new runways. The Takeoff On Route and Land On Route tasks are provided for when you simply want to use a route. They also support old scenarios that were created with the previous version of aerodromes and runways, which are now points and routes.
 - Instead of Fixed Wing Land At Aerodrome, there is now a Land At Airport task. The Land at Airport Near Location has changed to accommodate the new aerodromes.

For more information on these tasks, refer to the [Movement Tasks for Entity-Level Scenarios](#) chapter in the Tasks section of the *VR-Forces Users Guide* or help.

- The Base set data request allows you to assign an aerodrome to an aircraft, and the Return To Base task sends that aircraft back to the assigned aerodrome.

You can also assign an aircraft to a base from the Edit dialog box for that entity. There must be an aerodrome in the terrain.

- Aircraft configured with the Fixed Wing VTOL movement system can perform the new Takeoff (Vertical), Land (Vertical), and Hover tasks. If the model is configured for it, such as the CV-22B or MV-22B Osprey, articulated parts move realistically.
- There are new features to simulate IFF. VR-Forces implements the NETN FOM, based on RPR FOM 2.0, with IFF extensions from RPR FOM 3.0. If you use HLA Evolved, use the FOM provided by MAK.
 - The IFF set data request has been improved to be more representative of real-world IFF usage.
 - The new IFF Interrogate and IFF Sweep Interrogate tasks allow aircraft entities to check IFF codes enabled by other entities. Detected modes display in the interrogating entity's Object Console. The IFF Interrogate task interrogates a single entity, while IFF Sweep Interrogate interrogates multiple entities within the specified range.

The IFF Interrogate task also allows you to enable lethal interrogation for Mode 5. If the target of the interrogation has Mode 5 available but has not enabled it, the interrogated entity briefly displays a **V** in the Plan View and the Object Console indicates it was a lethal interrogation.

These tasks belong to a new category for immediate tasks that can be executed without abandoning a plan.

- The Fly Loiter Pattern movement task has been updated. The pattern previously known as Racetrack is now Hold Pattern, which is intended for use as a civilian air-traffic-control hold pattern. The new Racetrack pattern is designed for military

aircraft. See the task description in the help or the [Movement Tasks for Entity-Level Scenarios](#) chapter of the *VR-Forces Users Guide* for details. The underlying scripts were rewritten to take advantage of the behavior engine.

- The Follow Entity task for fixed-wing aircraft has changed so that the follower's position offset from the leader does not change when the leader changes its roll or pitch. This means that the majority of formation-flight use cases work as desired, with aircraft staying in the same vertical position relative to their leader. It also means that "airshow" formations no longer roll as a formation when the leader rolls.
- The Aircraft Lighting set data request now allows you to publish the lighting information for interior lights and HDU lights (which are for air refuel platforms) in addition to the aircraft lights that were supported in earlier releases. The 3D visuals on the fixed-wing model reflect the lighting if the model is configured with those lights.
- The new Extend Towed Array Decoy and Retract Towed Array Decoy tasks allow entities with the Towed Array Decoy system to extend and retract a towed array decoy. The model must be configured with the articulated part to visualize the task.

Ground Domain

- The new Ground Vehicle Lighting set data request allows you to publish the lighting information for ground vehicle entities. The 3D visuals on the model reflect the lighting if the model is configured with those lights.

Surface Domain

- Surface watercraft now publish their AIS (automatic identification system) data and you can see it in the new AIS page of the Information dialog box. The new AIS Data set data request allows you to define that data for surface entities to simulate tracking them more realistically.
- The new Keep Station movement task for surface and subsurface watercraft allows you to specify that a watercraft maintain a specific distance and position relative to the current position of another watercraft.

Units

- Many unit behaviors were reworked to be more functional.
- There are now comments in the `./data/simulationModelSets/EntityLevel/scripts/squad-assault.lua` file that describe the US Army documentation used to create the script, providing more context.

Aggregate-Level

- Aggregate-level simulation objects now show task visualizations that they did not before, such as for movement tasks.

Simulation Objects

- The Objects List now shows counts at the high level (Friendly, Opposing, Neutral, and so on) to indicate how many simulation objects are under that level. (The count does not include items hidden by Fog of War.)
- The expand/collapse state of units in entity-level scenarios is now saved as part of the scenario. When a scenario is loaded, if you have the saved scenario on your computer, the expand/collapse state of any unit in that scenario is restored.
- You can now adjust the accuracy of simulated munitions by editing the error probability parameters in the Simulation Object Editor's new Firing tab. See "[Creating and Editing Munitions](#)" in the *VR-Forces Users Guide* or help.
- Using the new Appearance field in the Simulation Object Editor's Physical tab, you can specify the default appearance for simulation objects, which will be used when users create that object in a scenario. For example, you might want a launcher to always start in the raised position. See "[Specifying a Default Appearance](#)" in the *VR-Forces Users Guide* or help.
- The TOW Launcher on the M2 Bradley IFVs now defaults to the stowed position, rather than deployed.
- If you select more than 20 simulation objects and then open the Multiple Object Information window, it now displays only the first 20. There is a button at the bottom of the window that allows you to load more.
- There are now options in the **Objects > Decorations** submenu to remove the pins for all entities (radar coverage, range rings, sensor contacts, task visualizations, or track histories).
- You can now create aircraft and ship objects as background "clutter" using the Aircraft and Ship Clutter Area objects. These areas use dashed lines to distinguish them from other areal tactical graphics and the clutter entities have the force of the area you draw. See the [Generating Traffic \(Pattern of Life\)](#) chapter in the Simulation Objects section of the *VR-Forces Users Guide* or help.

If you have any scenarios that include the deprecated features for creating civilian aircraft—the Air Traffic Area or a global plan with Generate Air Traffic from Flight Plans—you must edit them to use the new Aircraft Clutter Area (or spawn/sink points) instead.

- Subsurface entities can now use TLAM Cruise Missile system while submerged.
- When creating and editing a simulation object, you can now snap the object to a grid. When you click and move the mouse to position the object:
 - For altitude, use **Ctrl+Alt**.
 - For heading, press **Ctrl+Shift**.
 - For pitch, press **Ctrl+Alt+Shift**.

It is 5 meters of elevation or 15 degrees of heading or pitch. This helps you position objects more precisely, such as props.

New Simulation Objects

- Aircraft:
 - Fixed-wing aircraft: AN-12 Cub, Ababil-2 UAV, Airbus 319, Airbus 321-232, Airbus 330-200, Airbus 330-300, Antanov An-124 Condor, B-1B Lancer, Baykar Bayraktar TB2, Beechcraft MC-12, Boeing 737-400, Boeing 737-800, Boeing 767-300, Breguet 1150 Atlantic 2, CASC CH-5 Rainbow, Diamond DA40 Diamond Star, EP-3E ARIES II, Embraer ERJ 170-200, F-15A Eagle, F-15C Eagle, F-15E Strike Eagle, F-15EX Eagle II, F-35A Lightning II, F-35B Lightning II, F-35C Lightning II, HC-130J, IAI Eitan (Heron TP), KC-767A, MiG-23MS Flogger E, RC-135S Cobra Ball, RC-135U Combat Sent, RC-135VW Rivet Joint, Saab 2000 AEW&C, Shaanxi Y-8, Shenyang J-16 Flanker, Switchblade 300, Switchblade 600, U-28A Draco, XQ-58A Valkyrie.
 - Rotary-wing aircraft: Alpha 800 UAV, AH-64D Apache, Bell 412, Bell V-280 Valor, FLIR Black Hornet PRS, Ka-52 Hokum B (Alligator), Mi-26 Halo, Mi-38T, Mikrokopter Okto XL, UH-1Y Venom.
- Space: DSCS3 Satellite.
- Ground entities:
 - Military vehicles: 2A18 D-30 Howitzer, 2S31 Vena, 2S34 Khosta, 2S7M M-1975 Malka, AN/PED-1 LLDR, BMP-2M AFV, ASTROS II Mk6 MLRS, Akash Rajendra Radar, Akash SAM TEL, Amphibious Combat Vehicle (ACV), ASTROS II Mk6 MLRS, BM-21 2B17 MLRS, BM-27 9P140 Uragan MLRS, BM-30 Smerch MLRS, BRDM-2 9P148 Konkurs/Spandrel, BRDM-2 KPVT HMG, BREM-D ARV, BTR-82A APC, BVP M-80, Challenger 3 MBT, D-20 Howitzer, EBRC Jaguar Recon Vehicle, HQ-16A Command Post, HQ-16A TEL, HQ-16A Target Searching Radar, HQ-16A Tracking Guidance Radar, HQ-6A TEL (HQ-64), HS M09 BOV-3, Iron Dome Unit Control (BMC), Iron Dome Launcher, EL/M-2084 Iron Dome Radar, K-16 Bumerang APC, Kamaz 6350, Kurganets-25 IFV, LAV 6 ACSV, Leopard 2A4, Luna-M 9K52 FROG-7 TEL, M-ATV MRAP, M104 Wolverine HAB Abrams, M1064 Mortar Carrier, M114 Howitzer, M1140 HIMARS ATACMS MLRS, M116 Howitzer, M1278 L-ATV-GP, M1283 General Purpose APC, M142 HIMARS MLRS, M88 Hercules Medium Recovery Vehicle (MRV), M1A2 SEP V3 Abrams, MAN HX60, MSVS SMP Load Handling System, MSVS SMP Material Handling Crane, MSVS SMP Material Repair Truck, MSVS SMP Truck, MT-LB SNAR-10M Pantera, Nimr Hafeet Multi Purpose Combat Vehicle (MPCV), PHZ 89 MLRS, Peugeot P4, Puma IFV, R-166 Communication Vehicle, RBS 70 MANPAD, RBS 90 MANPAD, RT-M2 RAIADO Mortar, Renault Kangoo Van, Ridgeback PPV MRAP, SA-12 Polyana D4 ASU (9S52), SA-17 Grizzly BUK-M2 Command Post (9S510), SA-17 Grizzly Chair Back Engagement Radar (9S36), SA-3 P-15 Flat Face (1RL13), SA-5 Gammon Odd Pair Radar (PRV-13), SAMP/T Missile Reload Truck (MRT), SAMP/T Multifunction Radar (MRI), SAMP/T TEL, SPYDER Command Control Unit (CCU), SPYDER Missile Firing Unit (MFU), Shahab-3 MRBM TEL, Sherpa Light Special Forces Vehicle (VLFS), Sprut-B 2A45M AT Gun, Switchblade 300 Launcher, T-62MV MBT, TLVS MEADS Radar, TLVS MEADS TEL, Trigger Light Tactical Vehicle (LTV), Type 59 (M1954) Howitzer, Type 66 Howitzer, Type

- 95 PGZ95 SPAAG, Type 96 (ZTZ96) MBT, Ural 43203 Command Vehicle, Ural 4206, VBL MILAN ATGM, VBMR Griffon APC, VW Worker Truck, YLC-2V Surveillance Radar, YLC-4 Surveillance Radar, YLC-6 Surveillance Radar, ZBL-08 (Type 08) IFV.
 - Civilian: Caterpillar 345BL Excavator, Mack Granite Truck with Cab, School Bus.
- Watercraft:
 - Surface: Admiral Gorshkov Class Frigate, Alvaro de Bazan Class Frigate, Anzac Class Frigate, Berlin Class Oiler, Cougar Class Patrol Boat, Defiant Class Patrol Boat, Gepard Class Frigate, Gerald R Ford Class Carrier, Harry Dewolf Class Patrol Boat, Hobart Class Destroyer, Houdong (Tondar) Class, Hunter Class Frigate, Protecteur Class Support Ship, Resolve Class Auxiliary Ship, Tide Class Oiler, Type 052C Luyang II Class Destroyer, Type 052D Luyang III Class Destroyer, Type 22 Houbei Class Patrol Boat, Type 903 Fuchi Class Support Ship, Wave Class Oiler.
 - Subsurface: AN/SLQ-48 Mine Neutralization System, Seawolf Class Submarine.
- Human: Australian Soldier Base, Australian Soldier Driver, Fireman, Hazmat Civilian Level A, Hazmat Civilian Level B, Hazmat Civilian Level C, Russian Soldier 9K11 AT-4 Spigot, Russian Soldier AK47, Russian Soldier GP-30, SWAT Breacher, SWAT Officer, SWAT Riot Shield.
- Units
 - Ground: ATGM Section (RUS Kornet-D Tigr), Field Artillery Battery (RUS) 2S1, Field Artillery Headquarters Section (RUS), Field Artillery Platoon (RUS) 2S1, Field Artillery Section (RUS) 2S1, Mechanized Battalion (US Army M2), Mechanized Company (RUS), Mechanized Company (US Army M2), Mechanized Headquarters Company (USA), Mechanized Headquarters Section (USA).
 - Human: Mechanized Platoon (RUS BMP2), Mechanized Platoon (USA Army M2), Mechanized Rifle Squad (RUS), Mechanized Rifle Squad (USA Army), Motorized Section (Irregular Technical), Rifle Fire Team (RUS AT), Rifle Fire Team (RUS SA), Rifle Fire Team (RUS), Rifle Fire Team (USA Army AT), Rifle Headquarters Section (RUS), Vehicle Crew (RUS) Notional.
- Cultural Features: Command Post Tent, TACAN Ground Station.
- Terrain simulation effect objects: Crawl Nav Edge, Direct Movement Nav Edge.
- Munitions: Kestrel HEAT, Kestrel HESH, M982 155mm Excalibur, PG-7VL HEAT.

Simulation Object Editor

- The layout of the Simulation Object Editor's objects list has changed to be similar to the new Create Object Palette mentioned above. The new folder structure also shows counts of the simulation objects.
- Each simulation model set now has (at the same level as ammunitionParams.mtl) an enumerations file that can list user-defined enumerations. This replaces the VRF-User-Enumerations file concept (which was at the settings level). The enumerations

file is specified in the SMS file and is loaded from each SMS.

You can still specify your own enumerations at the settings level, which are shared among all of your SMSs. Any weapon range enumerations that you add using the SOE are added at the SMS level.

- You can now see a munition detonation. In the Munitions tab, select the munition and then click the new Detonate button (💣) in the upper right-hand corner of the 3D display. The Display Detonations dialog box opens. Select the detonation type you want to see and then click the Detonate button.
- You can now preview the particle systems associated with a vehicle's weapon systems. Simply click the weapon's Fire button (🔥) in the Articulated Parts section of the Physical tab.
- If a system or an entity can have a range ring associated with it, there is now a setting that allows you to select from the predefined range rings (read from the *VRF-Enums.xml* file). You can add new range rings that are saved to a *VRF-User-Enums.xml* file to be used as custom names. You can edit these names in the file after adding them; the pre-defined names cannot be edited through the SOE.
- When you choose to Assign Tags Based on Visuals, you can now filter the Select Visual Models list by category as well as by selecting specific models.
- You can now enable or disable the buoyancy model for entities that support it. Click the Visual Effects button (🔧) and then select the check box.
- The Configure Embarkation feature has been improved.
 - There is now an Apply button, which allows you to save intermittently while you configure embarkation.
 - In the 3D views (Stealth and XR), you can now select from one of the views (top down, perspective, and various sides). This allows you to look at the model in a way that helps you easily see where the embarkation slots, ingress points, and egress points are positioned.
 - The labels for the positions of ingress and egress points are now the same as for slots: Forward, Right, and Up. (These represent the X, Y, and Z positions of points.)
 - You can now adjust the near clipping plane in the Stealth view, which allows you to see inside a vehicle when defining the slots.
 - When no posture is specified for a lifeform's slot, all animations are available. (If there is a specified posture, the list is still filtered by the posture to list only animations appropriate for that posture.)

See "Configuring Embarkation" in the *VR-Forces Users Guide* or help to learn about these features.

Modeling

- Some users do not need all of the model sets, and those users might want to disable the sets they are not using. For example, some users only need the 2D model set and never looks at the 3D models. The new `--disableModelSets "#"` command-

line option allows you to specify the sets you want to disable: 3D model set (0), colorized models (1), minimap (4), or 2D icons model set (5). You can also specify multiple model sets by separating them with commas. For example, `--disableModelSets "0, 1"` disables the 3D and XR (colorized) model sets.

- Added the ability to swap out the texture on a model in the configuration. This allows for a single model to have different appearances, which helps to manage runtime performance and data by sharing content.
- Added visual support for air refuel platforms to turn HDU lights on and off.
- Added support for land platforms to control left and right indicator lights as well as emergency lights.
- Added visual support for more maritime light types including warning and safety lights, distress beacons and strobes, upper deck flood lights, anchor lights, wave off lights, not under command lights, restricted ability to maneuver (RAM) lights, fishing with nets lights, fishing with lines lights, and mine hunting lights. (Previously, support existed for interior lights, navigation lights, and spot lights.)

Also added visual support for light types that allow for control of the lights' intensity: flight deck lights, horizon bar lights, glide path indicator lights, and so on. There are fictional surface vessels in the MAK Test SMS that MAK created solely to demonstrate these features.

- Radar arrays can now automatically rotate based on the configuration in a metafile. This has been set up for the surface watercraft that are included in MAK data 18.
- Horizon bars on surface vessels can now articulate such that they mimic the horizon of the world when the vessel rocks on the ocean surface. This articulation works only when the horizon bar lights are turned on.
- There is now an Exhaust Plume visual type. You can use this to configure model definitions and also choose whether to display it in the Observer Settings.

The exhaust plume can be enabled or disabled based on the state of the powerplant bit. Particles are realistically affected by windspeed and direction as well as the movement of the ship. The Arleigh Burke-class Destroyer is configured to display exhaust plumes.

User Interface

- The old Simulation Object and Tactical Graphics Palettes have been combined into the new and improved Create Object Palette. You can create entities, cultural features, tactical graphics, simulation effect objects, and more, all from one palette. See the VR-Forces help, *VR-Forces Users Guide*, and *VR-Forces First Experience Guide* to learn how to use the new Create Object Palette.
- You can now specify whether you want to see the speed for aircraft as the ground speed (GS), indicated airspeed (IAS), true airspeed (TAS), and Mach number (MACH).
- You can now display a velocity indicator for air entities. When displayed, the line shows the relative speed of air entities, allowing you to rapidly assess the velocity of entities relative to each other. The faster the entities are moving, the longer the

line. At this time, the indicator points in the same direction as the entity's heading.

- Rotating 2D icons to the simulation object's heading now works only for aircraft and munition entities by default. Other platforms do not rotate when you enable the Rotate Entity Military Standard Symbols to Heading setting.

There is a new attribute for the Military Symbology Icon definition, `rotateicontoheading`, in the Entity Definition Editor. You can set this for entities to override the Rotate Entity Military Standard Symbols to Heading setting, allowing you to specify that non-airborne entities will rotate or prevent airborne entities from rotating.

- When simulation objects are close together in the Plan View, their labels can sometimes overlap. You can now rotate the label through four cardinal positions by selecting the object and then doing one of the following:
 - Open the context menu and then choose **Rotate Label**.
 - Press **Alt+Shift+S**.

Continue cycling the label until it displays as desired.

- The Symbol Decoration Settings page in Display Settings now allows you to control what labels and visualizations display for each model set. Previously, it applied only to the 2D model set; the labels in the 3D model set were not configurable.

You can also specify whether labels and visualizations display all of the time or only when you mouse over simulation objects.

There are more options for visualizations. For example, air entities in the Stealth and XR views can now show a heading indicator, velocity indicator, and a height line. The latter is a narrow white line that is different from the height above terrain line. Heading and velocity indicators are colored for the force of the entity.

- You can now choose whether to display the labels for embarked entities. Select Embarked Entity Labels from the Settings menu, click the  icon on the Display Settings toolbar, or press **Ctrl+L**.
- There are new color controls for 2D map views (Plan View), which helps you see tactical graphics and other overlay information more clearly. The color controls include adjustments for grayscale invert, contrast, brightness, and color mix. You can enable and disable color controls using the icon located on the Display Settings toolbar () or through the Display Settings.
- You can now create a range line by pressing the middle mouse button. This is useful when you want to quickly check the distance and bearing between two points.
- Range lines now have a setting that allows you to control whether they round up to a higher unit (for example, meters to kilometers). The default is on (to round up), which is the current default behavior. If you do not want to round up, edit `OverlayRangeLine` in the Model Definition Editor and set `AreSmartDistanceForMeasurementTextEnabled` to false. This allows you to make accurate measurements.
- The organization of pages in Display Settings that are in both VR-Vantage and VR-Forces are now consistent across both applications.

- There are now height lines that display below route tactical graphics and entity track histories. These lines display in regular intervals along the routes and tracks, pointing towards the earth to help you see where they are positioned relative to the terrain. You can configure the height lines using the Visual Model Editors dialog box.

To enable or disable the height lines, use the Enable Height Lines Along Routes check box in the Tactical Graphic Display Settings or the Height Lines check box in the Track History Settings.

- The location entry widget in the Create dialog box for simulation objects now starts as a single, read-only line. You can expand it to manually enter the desired location.
- The default display for system time is now Coordinated Universal Time (UTC, also called Zulu time).
- You can now resize the undocked Quick Launch Toolbar horizontally. This allows you to see all of the text for events that have long names.

Tactical Graphics

There are many changes for tactical graphics to support MIL STD 2525D and APP6-D. More changes are coming in future releases.

- Most tactical graphics now default to be the color of the force with which they are associated. For friendly forces, you have the option to display them as either black or white. Other forces' tactical graphics display as their defined color.
- Text on linear tactical graphics is now aligned with the segment it is adjacent to. Text for areas is now in the center. Some areal tactical graphics show more information than they did in previous releases, such as altitude and the time during which the graphic is active. In addition, areal tactical graphics are now projected onto the terrain, including any fill patterns. This last helps users spatially identify the areas in 3D.
- Text on tactical graphics is now hidden when the observer is at an altitude such that the text is longer than the adjacent line segment or shape. The text on larger tactical graphics is visible at higher altitudes than the text on smaller ones.
- If you experience performance issues when hiding and showing tactical graphics in scenes with a large number of them, you can choose to make them invisible when hiding them. (The default behavior is to destroy and recreate them.) To configure tactical graphics to be invisible when hidden instead of destroyed, clear the new Delete Tactical Graphics on Hide check box in Tactical Graphics Display Settings.
- The new tactical graphics for minefields—antitank, antitank with antihandling device, antitank wide area, antipersonnel, decoy, decoy fenced, and unspecified—use standard fill patterns to differentiate the type of mines in the minefield. They also display appropriate text on the outlines of the areas.
- The new tactical graphics for Ditch and Fortified Ditch conform to MIL STD 2525D.
- There is also support for other 2525D tactical graphics, which include:

- Airspace control. Air Control Point, Air-to-Air Restricted Operations Zone, Base Defense Zone, Fighter Engagement Zone, High-Density Airspace Control Zone, Identification Friend-or-Foe (IFF) Off Line, Identification Friend-or-Foe (IFF) On Line, Low-level Transit Route, Minimum-risk Route, High (Altitude) Missile Engagement Zone, Low (Altitude) Missile Engagement Zone, Restricted Operations Zone, Safe Lane, Short-Range Air Defense Engagement Zone, Special Corridor, Standard Use Army Aircraft Flight Route, Transit Corridor, Unmanned Aircraft (UA) Corridor, Unmanned Aircraft Restricted Operations Zone, Weapon Engagement Zone, Weapons Free Zone. In addition, the Joint Engagement Zone and Missile Engagement Zone tactical graphics have been updated.
 - Areal. Area of Operations, Assault Position, Assembly Area, Attack Position, Base Camp, Brigade Support Area, Corps Support Area, Detainee Holding Area, Division Support Area, Engagement Area, Forward Arming and Refueling Point, Guerrilla Base, Named Area of Interest, Objective Area, Refugee Holding Area, Target Areas (area, area of interest, rectangular, circular, smoke, and bomb).
 - Linear. Airborne Or Aviation Axis Of Advance, Bridgehead Line, Battlefield Handover Line, Bridgehead Line, Common Sensor Boundary, Coordinated Fire Line, Counterattack, Delay Line, Final Coordination Line, Fire Support Coordination Line, Forward Edge Of The Battle Area, Intelligence Coordination Line, Limit Of Advance, Line Of Departure, Line Of Departure Or Line Of Contact, Probable Line Of Deployment, Release Line, Restrictive Fire Line, One-way Traffic, Alternating Traffic.
 - Maneuver control and points: Ambush, Attack by Fire Position, CBRN Observation Outpost, Combat Outpost, Cover, Forward Observer Outpost, Guard, Outpost Unspecified, Reconnaissance Outpost, Screen, Sensor Outpost, Support by Fire Position.
 - Obstacle control measures: Block, Disrupt, Fix, Obstacle Belt, Obstacle Free Area, Obstacle Line, Obstacle Restricted Area, Obstacle Zone, Turn.
 - Other tactical graphics include: Planned Explosive State Of Readiness, Explosives, Explosives, State Of Readiness 2 (Armed But Passable), Roadblock complete (executed).
- Phase lines now conform to MIL STD 2525D.
 - Use the new Dome, Sphere, and Spherical Sector tactical graphics to define 3D areas in space: a full sphere, hemisphere, and a dome.
 - You can now draw sectors up to 360 degrees. The arc goes clockwise; if you draw counterclockwise, the arc comes around to the cursor position.

Coordinate Systems

- You can now see Global Area Reference System (GARS) grid lines in the Plan View. GARS is a standardized geospatial reference system developed by the National Geospatial-Intelligence Agency (NGA) for use across the U.S. DOD.

- When you want to work with multiple coordinate systems in the Plan View, the new Grid Line Selector toolbar allows you to rapidly toggle between grid line overlays. By default, it is set up to show DDM, GARS, or MGRS. You can customize the available coordinate systems in the Grid Lines Settings page of Display Settings.
- To declutter the window, geodetic and MGRS coordinates now default to displaying at the left and top edges of the window, no longer cluttering the terrain in the center of the window. (At a configurable altitude, the coordinates display as they did in previous releases. The default altitude is very high.)

Terrain and Navigation

- There are significant changes to aerodromes and runways. See "Aerodromes" in the Terrain section of the *VR-Forces Users Guide* or help for details.
- There are new Terrain simulation effect objects that allow you to create berms, ditches, and tank scrapes in dynamic terrain. Ditches and berms slow down opposing forces' advance. Tank scrapes allow you to create a place for tanks to take hull-down positions. You can also create craters on aerodromes and runways.

Information on configuring these objects is in the *Adding Content to MAK ONE Applications Reference Manual* and the help.

- For detonations of appropriate size near a vertex of a procedurally generated building, the buildings is replaced with a rubble model. This works for any osgEarth terrain using the osm.features.xml and the debris models provided in the MAK data package. For details, please see the *Adding Content to MAK ONE Applications Reference Manual* or the VR-Forces help.
- When you enable Navigation Lab debugging and there is an entity in the navigation area, you can click the Navigation Lab button in the NavArea information dialog box to launch Navigation Lab. If there is no entity using the navigation area, however, the navigation data is not loaded in the simulation engine (back-end) and you cannot use the button to open Navigation Lab. See the section on generating navigation data in the help or the [Generating Navigation Data](#) chapter in the *VR-Forces Users Guide*.
- There are major changes for terrain.
 - The new Procedural Engine 2.0 is a vast improvement over what existed before for procedural terrains used in earth (.earth) files. The new framework, configuration, and data are used to generate procedural imagery, ground cover, and the soil type information.
 - There are significant performance improvements for loading source-based terrains or terrains from the VR-TheWorld server.
 - There are many improvements to the performance of CDB terrains to support larger terrains.

For more information, see the *VR-Vantage 3.1 Release Notes*.

- There are new command-line options that you can use to limit the size of the textures that VR-Forces loads from an earth file:
`--limitEarthSplattingTextures`, `--limitEarthTerrainTextures`, and

--limitEarthVegetationTextures. These allow you to constrain the amount of GPU (video) memory used for *.earth* files. For each, you specify the width and height of the texture limit as a power of 2, for example, --limitEarthTerrainTextures "16". If you do not enter a power of 2, VR-Forces rounds it up to the next highest power of 2.

- The *./appData/settings/vrfSim/navigationProfiles.mtl* file has a new option called min-navigable-surface, which indicates the minimum size, in meters squared, of the surface area a section of the terrain must have before the generator will generate navigation data for it. The default is 10 m², which is reasonable for many terrains but can omit small rooms that are connected by dynamic doors to the larger terrain. By specifying smaller sizes, you can include areas like that.
- Procedural trees are supported in the VR-Forces back-end. You can also choose whether the simulation engine loads procedural trees from the terrain. In the *./appData/settings/vrfSim/terrainInterfaceConfig.mtl* file, edit the procedural_sim_vegetation_enabled parameter and set it to either True or False.
- VR-Forces now has the ability to read SMC (surface material code) or FID (DFAD feature ID) code in OpenFlight terrains to get the soil type information. Previously, VR-Forces assigned the soil type for FLT and FBX terrains using a *.surfChar.map* file, which mapped a texture to a soil type. Now it uses the *./appData/settings/vrfSim/smc_fid_soiltype_map.csv* file.

Weather

- Added support for the METOC FOM for weather, using the updated VR-Link weather module. The primary changes are how weather is published to the network. This works in both HLA Evolved and DIS.

Note that there is no support for the METOC overlap rules. Global weather always has the lowest priority, ensuring that local weather has priority.

Performance

- Made improvements to launch the VR-Forces GUI more quickly.
- The splash screen now remains visible until the main window is available. Additionally, simple messages display on the splash screen to report what is happening while you wait. This makes it clear that the application is launching.
- Reduced network traffic related to Lua scripts when loading a scenario. Previously, there was much more information sent about the Lua scripts. That caused a lot of data PDUs and, as a result, some information could be lost and the GUI would not know about Lua scripts in the sim engine.
- Updated the OpenFlight API to remove VC8 distributable dependencies.
- The application now checks whether your graphics card driver version changes—either to an older or newer driver—and automatically removes cached shaders and so on from the directory. This prevents an error about binary compatibility that users previously experienced, where the cached data became invalid due to the changed driver.

Configuration

- The About dialog box now includes more information about the versions of VR-Vantage and VR-Forces, specifically the branches where the code originated. This is useful for our MAK engineers when they provide you with support.
- You can now create rules for load balancing when you run multiple back-ends, which is useful for very large scenarios. Previously, the only choices were even or manual distribution, and you could manually move simulation objects from one back-end to another.
- When you place or move a simulation object, there are now small indicators that display temporarily before the simulation object is added to the scenario. This shows you that you were successful and that the application is working to load or move the object.

When you open a terrain or scenario, an indicator near the bottom right of the application window displays. This indicates what is loading.

Scripts and Lua

- ZeroBrane Studio, a lightweight Lua IDE, has replaced SciTE as the default editor for Lua scripts in VR-Forces, making them easier to create and edit. VR-Forces generates a configuration file for ZeroBrane Studio to support code completion and syntax highlighting features for all of the VR-Forces Lua API functions.
- When editing the parameters for a scripted task variable in a VR-Forces script, you can now select the Initialize from State Property check box to indicate that it is associated with a state property. If you do, you can enter the state property name. In the scripted task dialog, users will see the values for that state property.
- The sendReport Lua function now supports sending contact-position as part of the contact-info when sending a spot report. One example for using this is to allow for "incorrect" signal analysis or active deception from the sending entity.
- For Lua, added a new scriptDetonation to store information about the most recent detonation. Expanded the Lua interface for detonations to include additional information including Detonation Result and Burst Descriptor. Nothing was removed, ensuring this change is backward compatible.

API Changes

- You can now configure state properties in both the OPE and within sim components. You can also configure thresholds for state property updates to control how often the published data is updated. For more information, see "Publishing User-Created State Properties" in the VR-Forces Developer's Guide.
- To create remote control applications, instead of using the DtVrfRemoteController class, you can use the DtVrlinkVrfRemoteController class. This class is specialized to be able to initialize itself from a DtExerciseConn. This does the work of creating the DtCommunicationManager and DtVrlinkNetworkInterface from that exercise connection. If you want to use the DtVrfRemoteController, you must create a DtCommunicationManager and a DtVrlinkNetworkInterface, add it to the

communication manager, and then initialize the `DtVrfRemoteController` with that manager.

- There are now three embarkation states: `unembarked`, `embarkationRequested` (or `Pending`); and `fullyEmbarked`.
- The `DtRwSensorContactInfo`'s `detectionError` parameter has been replaced with `horizontalError` (an angle), `verticalError` (also an angle), and `rangeError` (distance). Out of the box, VR-Forces does not use these errors. They are available for plug-ins.
- Added API to allow for local overlay folder structure, and there is now an example `overlaryOrganization` to show how to use it. This functionality is not used in the system in general, however, is provided for developer usage.
- Added a callback mechanism that will be called when CGF is being deleted. The `DtCgf` can now notify plug-ins when it is about to be deleted. It does so by adding an `addCgfAboutToBeDestroyedCallback` to it.
- Added a new example for sending and receiving VR-Link interactions from the simulation engine.

For detailed information about the changes that affect the API, refer to Migration Guide section of the *VR-Forces Developers Guide*.

Documentation

- There is now HTML-based documentation for the parameters in the component descriptor and object parameter entries, which allows you to read some guidance on configuring `.sysdef` and `.ope` files. You can access it by opening `./doc/VRFsysdef_OPEParameterReference.html`. On Windows, you can also open the Start menu and then choose **MAK Technologies > VR-Forces Sysdef & OPE Parameter Reference**.
- Due to the limitations on installer size, the VR-Forces documentation is now included in a separate installer. Run the `doc.exe` installer after installing the runtime to get the developer guide and class doc, user help, users guide, the new reference mentioned above, and more. (These release notes are included in the runtime installer.)
- After you install the documentation, you can now access the locally installed VR-Forces HTML5 help using the VR-Forces Help shortcut in the Documentation folder of the installation.
- The HTML5 help is now available on the mak.com website as well.
- The VR-Forces Quick Reference Card has been removed from the end of the *VR-Forces Users Guide*. It is now a separate, easy-to-reference PDF included in the installation and available online on the [Product Specifications & Dependencies](#) for VR-Forces.

Fixed Bugs

Table 1. Fixed Bugs

Key	Summary	Release Notes	Fix Version/s
DIG-423	Appearance and Geometry windows change size of docked widget when switching between them.	Fixed issue where stacked/docked windows in Character Viewer would resize the dock container when switching between them.	DIG-IPB17, DIG-13.7
DIG-428	Dockable CV windows can't be resized in certain configurations.	Fixed layout issues that prevented users from resizing docked windows.	DIG-IPB17, DIG-13.7
DIG-534	Remove environment variable page from installer	The DIGUY environment variable is no longer needed to run the DI-Guy applications. Previously, it could cause issues when users had multiple versions of DI-Guy installed on a single machine. It has been removed from the installer. You can still set DIGUY variable if needed for your configuration. (If you have it set for a previous release, you should change or remove it, depending on where your DI-Guy SDK data is installed.)	DIG-IPB17, DIG-13.7
DIG-599	Script save button doesn't open save dialog to default location.	Saving scripts from Character Viewer now creates a user folder if it doesn't exist.	DIG-IPB17, DIG-13.7
DIG-655	A-Pose and null_pose should only show in action list for human characters.	Fixed issue where A-Pose and Null-Pose items were added to action list for non-human characters.	DIG-IPB17, DIG-13.7
DIG-660	Character Viewer's About box looking for wrong image filename.	Fixed issue with splash screen and About dialog box images not displaying when installed with VR-Vantage or VR-Forces.	DIG-IPB17, DIG-13.7
DIG-663	Character Viewer expands bottom panel instead of top if hand items and equipment UI isn't shown.	Fixed layout issues that occurred when hand items and equipment lists weren't shown for a given character.	DIG-IPB17, DIG-13.7
DIG-666	Character Viewer's aim widget is stretched out when locomotion widget not shown.	Fixed issue where Aim widget was distorted when the Animation Velocity widget was hidden.	DIG-IPB17, DIG-13.7
DIG-669	Pressing Alt+Tab causes skeleton to disappear from view.	Fixed bug where skeleton visualization would turn off with unrelated keyboard input.	DIG-IPB17, DIG-13.7
DIG-674	Human heads can be applied to animal characters - type validation broken.	Ensured that the application checks whether a head is compatible with a DI-Guy entity. This prevents human heads from being applied to animal entities.	DIG-IPB19, DIG-13.7

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
DIG-683	Unable to clear geometry nodes selected through Geometry Viewer.	Fixed selection logic to allow users to clear selections regardless of whether they selected them through the 3D View or the Geometry Viewer.	DIG-IPB18, DIG-13.7
DIG-688	Crash if skeleton initialization is delayed a frame.	Fixed issue where skeleton could remain uninitialized for a frame.	DIG-IPB18, DIG-13.7
DIG-698	DI-Guy log level setting doesn't adjust file logging.	Fixed issue preventing log level changes in the Character Viewer from applying to the log output written to the log file on disk.	DIG-IPB18, DIG-13.7
DIG-712	Fix scrubber in playback controls.	Added basic playback controls widget to Character Viewer.	DIG-IPB18, DIG-13.7
DIG-794	Logs from Character Viewer run from other MAK ONE products should go to MAK Shared Logs directory.	When you run the Character Viewer from a MAK ONE application (VR-Vantage, VR-Forces, VR-Engage), any LOG and DMP files are now saved in a central location. The default is C:/MAK/logs, which you can change by using the MAK_LOG_DIR environment variable to specify a different path.	DIG-IPB19, DIG-13.7
VRF-504	DI-Guys move forward while performing the DI-Guy walk back aiming animation	Fixed the motion direction configuration for action.	VRF-5.1
VRF-2193	During a riot, Riot Points can get multiple people inside of them	Added more variation to the points entities are likely to go to and the speed that they move there. This helps to prevent most instances of entities standing at the same Riot Point.	VRF-5.1
VRF-2585	SOE: Wrong axis range in coefficient tables	Fixed the calculation to return the correct value.	VRF-IPB16, VRF-5.1
VRF-3113	SOE: Derived AggregateLevel SMS doesn't inherit the XML files for equipment and such	In a derived SMS that has assemblies, the SOE now shows all assemblies from all SMS files. If the assemblies are only in the included SMS, it allows for promotion and modification. The promotion takes an exact copy of the base assembly. If the base assembly changes, it does not affect the promoted assembly.	VRF-5.1, VRF-IPB17
VRF-3684	Embarked entity can prevent the host entity from being detected.	Fixed an issue that could cause an entity with other entities embarked on it to block line of sight to itself.	VRF-5.1, VRF-IPB19
VRF-4012	Remove duplicate named Tactical Graphics overlay from saved scenarios	There is no longer a duplicate overlay displayed for scenarios shipped with VR-Forces.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-4017	Crash editing persistent tracks while scenario is playing	Fixed an issue that caused VR-Forces to crash when a user manually edited persistent tracks while the scenario was playing.	VRF-5.1
VRF-4409	Eliminate the obsolete movementChooser controller	Removed use of the "VRF" version of movement tasks, and removed parts of the movementChooser that translated base tasks to the VRF versions. For now, the movementChooser still exists to allow scenarios saved by VR-Forces 5.0 and earlier, where entities are already executing the tasks can correctly finish the tasks and send task complete reports on them.	VRF-IPB16, VRF-5.1
VRF-4555	Cars jump around when some observer visuals are changed	Fixed an issue that caused simulation objects to behave irregularly when some Visible Visual Types settings were changed.	VRF-5.1, VRF-IPB17
VRF-4639	Ground vehicles sometimes don't have track histories	Fixed an issue with the track histories to ensure that the lines are unbroken.	VRF-5.1, VRF-IPB17
VRF-4652	Task dialog entity selection should be based on selected entity	The filter in the parameters for the Fire at Target engagement task now defaults to all simulation objects. Previously it defaulted to Opposing Entities, even when assigning the task to an entity in the opposing force.	VRF-IPB16, VRF-5.1
VRF-4803	Update embarkation config doc	The Configure Embarkation feature has been improved. See VRF-4148, VRF-4357, and VRF-6795	VRF-5.1
VRF-4857	Windlevels need to print when strRep is called in weather command	The windLevels are now printed when calling the strRep function.	VRF-IPB16, VRF-5.1
VRF-4887	Adding item in SOE is sometimes confusing	Changed the color of editable cells in SOE tables to better indicate that users can enter values in them. Previously, it appeared the same shade as the window and therefore was indistinguishable from an uneditable field.	VRF-5.1
VRF-4904	Favorited loadout for an aggregate-level aircraft in the SOE cannot be un-favorited	Unselecting the loadout favorite star on the Combat page in the SOE for Aggregate-Level SMSs now removes any loadout that was previously marked as a favorite.	VRF-IPB16, VRF-5.1
VRF-4912	Should be allowed to disable submenu items in Set/Task menus	When you set a task or set to be disabled, it is hidden when the default is to hide disabled items. If you want to disable a menu item and not hide it, then either set the setting to not hide disabled items or post-process the right-click menu after the fact. Note that the right-click menu and main menu are the same; therefore, if one is affected, the other is, as well.	VRF-IPB16, VRF-5.1
VRF-4957	Follow with offset route really doesn't keep the distance specified	Improved the calculations to ensure that the follower maintains the correct distance over time.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5021	Ship runs aground path planning on S-57 terrain	On S-57 terrains, ships can now plan paths that avoid running aground.	VRF-IPB16, VRF-5.1
VRF-5131	Gumball and health charts should scale with icon	Previously, the attribute groups did not scale when increasing the observer's distance from the simulation object with those attribute groups. This has been fixed by adding the ability for DtValueBarAttribute, DtImageAttribute, DtQuadAttribute, and DtOutlineAttribute to LOD-out based on altitude. Also, made a change to DtFlatPrimitiveStyle and DtStippledPrimitiveStyle handling of sorted data to pick up needed data changes (and performance).	VRF-IPB16, VRF-5.1
VRF-5214	Some characters guns are poorly configured	Updated scenarios included with the application to ensure that human entities are using appropriate weapons. Previously, some human entities would run with weapons intended to be used while lying prone.	VRF-5.1, VRF-IPB19
VRF-5230	Errors regarding SpeedTrees in the SIM log	The message is now verbose instead of a warning. It is useful for seeing what plant models are not used by the simulation engine to check mappings.	VRF-IPB16, VRF-5.1
VRF-5264	Debug Simulation Terrain does not show the correct surface type with this terrain	When displaying terrains that include water, it now returns bodyOfWater as a value rather than undefined for the water to differentiate it from undefined soil types.	VRF-IPB16, VRF-5.1
VRF-5270	Handheld RPG not using its descriptor parameters	Changed the RPG controller to use the time-to-acquire parameter rather than a hard-coded value. Also, added a check to ensure that the target is acquired before firing. Changed human movement actuator to use pivot speed in OPE rather than a hard-coded value.	VRF-5.1, VRF-IPB17
VRF-5276	affected-by-counter-measures field on missile not shown in SOE	Added the field to the ballistic and regular missile UI parameter files.	VRF-IPB16, VRF-5.1
VRF-5368	Ships plans through some landmasses in S-57 terrain	Fixed the script to ensure that ships do not plan paths through landmasses.	VRF-IPB16, VRF-5.1
VRF-5384	Indefinite DI Animation leads to sinking DI-Guy in terrain.	There was an issue where a DI-Guy entity would sink into or rise above the terrain when tasked to perform the DI-Guy Animation "Aggressive Yelling" indefinitely. Fixed the clamping problem that caused this problem.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5388	Canceling Set DI-Guy Characteristics keeps changes	This is the expected behavior. The dialog box for the DI-Guy Characteristics set data request now has tooltips to indicate that this will happen.	VRF-IPB16, VRF-5.1
VRF-5406	2-pass DI-Guy loading doesn't actually save time anymore	Improved motion loading behavior when requesting metadata about action. Motions load only when the user requests metadata about the action if the metadata is not available.	VRF-5.1, VRF-IPB19
VRF-5414	3D icons for Spawn/Sink points are not working	Spawn and sink points are now able to be seen in Stealth observer mode.	VRF-5.1, VRF-IPB19
VRF-5421	Human move along controller creates temp waypoint with UUID, not unique name	When tasked to move along a route, a human entity's task includes creating temporary waypoints. It now displays a human-readable name for each of those waypoints rather than a UUID.	VRF-IPB16, VRF-5.1
VRF-5423	SOE save out visual files to SharedData instead of <SMS>\gui\visuals	Fixed to ensure that SMS-related files are saved to the correct directory.	VRF-5.0, VRF-IPB16, VRF-5.1
VRF-5434	Sync matrix summary doesn't show correct units	When users accept the default for a plan summary that includes units, the units in the plan now display in the Synchronization Matrix.	VRF-IPB16, VRF-5.1
VRF-5445	addFomClass example - setting the Other Attribute value lags behind	Fixed a number of issues in the example.	VRF-5.1
VRF-5455	Mouse cursor sometimes doesn't return to normal after selection	Cursor now resets after selection is complete.	VRF-IPB16, VRF-5.1
VRF-5456	addStateProperty example - the Set request to "Clear Accuracy Stats" does not work	Fixed how the stats are managed.	VRF-IPB16, VRF-5.1
VRF-5461	addTerrainFeatures and createTerrainDb examples should be removed	Removed outdated examples.	VRF-IPB16, VRF-5.1
VRF-5464	For runways, they have a submenu named Aerodrome right above a menu item of the same name	In the Set menu, moved runways' Aerodrome set data request under the Aerodrome submenu.	VRF-IPB16, VRF-5.1
VRF-5468	SOE: Text in the Unit Composition group box in the Movement tab has low contrast	Text in the Movement tab's unit composition list is improved.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5469	Missing icons from Quick Launch toolbar in some scenarios	Fixed the file path to ensure that quick launch icons display correctly for global plans.	VRF-IPB16, VRF-5.1
VRF-5480	Display Unit issues with some tasks	The parameters for some tasks were missing the unit measurements, so it was unclear what a user should enter as a value. This has been fixed. (Assume Coil Formation, Bounding Overwatch Successive Continuous, Visit Neighbor, Attack by Fire, Provide Suppressive Fire at Location, Provide Suppressive Fire at Object)	VRF-IPB16, VRF-5.1
VRF-5482	Corridor TGs on reloading scenario do not retain color info	Corridor tactical graphics now correctly preserve custom colors set by the user.	VRF-IPB16, VRF-5.1
VRF-5484	Tooltips in Engage From Soldier Firing Positions task mention a tank	The information in the dialog box for Engage From Soldier Firing Positions now matches the entities for which it is designed.	VRF-IPB16, VRF-5.1
VRF-5498	SIM: tactical march, headquarters gets stuck waiting for Go message	Updated the Lua script to ensure that Headquarters do not get stuck.	VRF-5.1
VRF-5499	"Counter Measure" should be spelled "Countermeasure".	Corrected spelling of "countermeasure" in the VR-Forces GUI.	VRF-IPB16, VRF-5.1
VRF-5505	Can't collapse objects list using engagement zones dialog	Users can now collapse hierarchies in the Objects List when using the Engagement Zones set data request. This allows you to more easily look in the list for the zone you want to select.	VRF-IPB16, VRF-5.1
VRF-5507	MSDL does not export entity parent links	Ensured that all units are exported first and then all entities. The entity export depends on all units being defined in order to find the IDs of the superior units.	VRF-5.0, VRF-IPB16, VRF-5.1
VRF-5509	Entities are under the terrain / sitting on top of ocean in BallisticMissileDemo	Fixed the terrain and ensured that the entities were positioned correctly.	VRF-5.1, VRF-IPB17
VRF-5511	Cloud state in Weather (Box) does not update after weather change	The Information Panel now correctly reflects the cloud state when changes are made to weather conditions.	VRF-IPB16, VRF-5.1
VRF-5514	SIM: set formation teleports unit to prior placement	There was an issue where moving a unit from one position to another and then changing its formation caused the unit to teleport back to its starting position. This is fixed.	VRF-IPB16, VRF-5.1
VRF-5517	Moving a range line that has only one end point attached to an entity causes bad behavior	Fixed to ensure that the start and end points are calculated correctly when attached.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5519	As designed, the nav area debug info doesn't show up until entity an entity uses the nav mesh.	When you enable Navigation Lab debugging and there is an entity in the navigation area, you can click the Navigation Lab button in the NavArea information dialog box to launch Navigation Lab. If there is no entity using the navigation area, however, the navigation data is not loaded in the back-end and you cannot use the button to open Navigation Lab. See the chapter Generating Navigation Data in the VR-Forces Users Guide.	VRF-IPB16, VRF-5.1
VRF-5523	Reset All Changes should clear persistent tracks	Reset All Changes now removes persistent tracks from the terrain.	VRF-IPB16, VRF-5.1
VRF-5536	Changing Sea State mode via config file does not work	Made a change to allow users to manually change the sea state in the Environment Conditions dialog box when the configuration file has been altered.	VRF-IPB16, VRF-5.1
VRF-5544	Local weather boxes are not showing precipitation	Changed the default size of the Weather (Box) tactical graphic to be 10 km per side (instead of 500 km).	VRF-5.1, VRF-IPB17
VRF-5547	Initial published weapon state is not correct when creating entity	Fixed so that the default appearance is now set first so that it does not blow away any possible state repository initialization.	VRF-IPB16, VRF-5.1
VRF-5555	DI-Guys teleport to Ala Moana warehouse rooftop when a detonation occurs nearby	DI-Guy entities now use the closest intersection instead of terrain height to ensure that they do not jump to the highest surface at their location after a nearby detonation.	VRF-5.0, VRF-IPB16, VRF-5.1
VRF-5557	Formation State should not be part of Aggregate State Component	Moved formationState from aggregate state component to internal state.	VRF-IPB16, VRF-5.1
VRF-5566	AirDefenseAndJamming scenario plays out a lot differently with 2 sims	Corrected the scenario to ensure that it works with multiple backends. Previously, entities were firing at targets as identified by the marking text rather than a unique identifier, and using multiple backends could lead to different entities having the same marking text.	VRF-IPB16, VRF-5.1
VRF-5567	Downgrade DtWarn in DtLasingController::lineOfSight() to DtDebug	Previously, the warning statement associated with a failed check for data available could spam the console. Now the data unavailable message is a debug level message, not warning level.	VRF-IPB16, VRF-5.1
VRF-5569	Scripted Spot Report Recipient Shows Yellow Icon with Full Knowledge	Added DtRwForceType as a valid reader/writer Lua element to allow contact_force to be set in spot reports. Previously, the default for the force was Other even when the recipient's detection level was Full Knowledge.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5570	Cleaned up the flyout munition configuration	Make sure missile warhead is available to moving object systems and the absence of the use-geometry boolean means to not use geometry. The SOE was mistakenly showing this as it should use it, but expendables and indirect munition cannot have detailed geometry defined.	VRF-5.1, VRF-IPB17
VRF-5579	Entity in area condition doesn't work using extruded areas	The entity in area condition now correctly calculates the ceiling of an extruded area based on the floor and line height. Previously, ceiling was calculated as 0, preventing the entity in area condition from registering any entities entering the area at a point higher than that.	VRF-IPB16, VRF-5.1
VRF-5580	Human entities sometimes head to invalid locations when destination is at the edge of nav data	When a human entity is assigned a movement task, it now checks whether the destination is inside the nav data before updating its destination for navigation planning. If possible, it changes the destination to a nearby position inside the nav data.	VRF-5.1, VRF-IPB17
VRF-5581	SOE Edit Forces dialog missing colors and does not show new forces that were added	Force colors once again display in the Forces Editor, and new forces are listed in all appropriate locations.	VRF-IPB16, VRF-5.1
VRF-5582	Embarkation issue for HMMWV onto an LCAC	Fixed embarkation issues to ensure that simulation objects embark correctly.	VRF-IPB16, VRF-5.1
VRF-5600	Ground vehicles overshoot destinations when not using Nav Areas	Applied some fixes to ensure that ground vehicle entities end their movement at or near the desired destination, rather than moving past it. This prevents odd behavior in scenarios where the entities move without using the navigation area.	VRF-IPB16, VRF-5.1
VRF-5601	Vehicles can get stuck going in circles mid-route when using Gameware.	This was fixed by other improvements to movement scripts.	VRF-5.1
VRF-5603	Entity Definition Editor causes all entities 3D visuals to disappear in SOE	The SOE now ensures that a derived SMS updates properly when a user edits visualizer definitions. Also disabled the Revert button in the SOE's version of the Visual Model Editors.	VRF-IPB16, VRF-5.1
VRF-5613	Speed control broken in diagggregated move along	Fixed the speed control in the task for units.	VRF-5.1
VRF-5616	Need a way to add a unit's hierarchy in the Order of Battle editor	Restored the ability to add units to the Order of Battle Panel.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5622	Visual bugs: entities staying invisible and embarked entities sometimes appearing at center of earth	Embarked entities sometimes showed up at the center of the earth, which was their offset embarked position because they were not visually embarked. Invisible entities remained invisible after being made visible because, when recreating visualizers, some flags were lost in the recreation. That caused entities that become visible to stay hidden. This is fixed.	VRF-IPB16, VRF-5.1
VRF-5624	SOE: Entity Inherit seems to save all systems into child entity file.	Fixed to ensure that only altered systems are saved in an inherited child's .entity file. When the system has not been changed for the child, the system in the parent file should be used.	VRF-IPB16, VRF-5.1
VRF-5638	Editing a newly created, non-published tactical graphic object resets the assigned overlay	Fixed the issue to ensure that an overlay other than the default, automatic overlay would remain for any tactical graphics after editing them.	VRF-IPB16, VRF-5.1, VRF-4.9-e
VRF-5641	Duplicate platform types in the SOE	Updated the display names of similar entries to differentiate them.	VRF-IPB16, VRF-5.1
VRF-5644	SOE: Hand grenade power editor is confusing	Changed the labels in the Detonation tab to Abstract instead of Fragmentation (% kill) for clarity.	VRF-5.1, VRF-IPB17
VRF-5647	New models from the SOE using default values don't appear in the terrain	Fixed an issue with new DI-Guy models.	VRF-IPB16, VRF-5.1
VRF-5648	Emitters don't set eventID accurately	The application now sets event ID in system to a new event ID.	VRF-IPB16, VRF-5.1
VRF-5658	Sending Data PDUs that are too large	VR-Forces now limits the size of Data PDUs to the DIS maximum (8192 bytes).	VRF-IPB16, VRF-5.1
VRF-5665	Add, Remove, and Edit Phase icons missing from Sync Matrix	When users had a setup that included a 4K monitor as well as other monitors, there could be display problems with the sync matrix and other icons. This is fixed.	VRF-IPB16, VRF-5.1
VRF-5671	Wheels floating in SOE	Fixed to display wheeled vehicles on the terrain in the SOE instead of appearing to hover over it.	VRF-5.1, VRF-IPB17
VRF-5672	Detonation sometimes occurs inside entity BV when it should be on the edge.	Fixed an issue where the detonation of ballistic guns did not impact against the bounding volume of the target entity correctly, and instead had a detonation location on the inside of the entity.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5675	Keyboard shortcuts don't show on the menus	Restored keyboard shortcuts to the menus, showing users how they can use the keyboard for some functions instead of the menu if they choose.	VRF-IPB16, VRF-5.1
VRF-5679	Missile param UI file has incorrect enumerations for US and CIS Chaff	Fixed enumerations in the counter_measure_type widget section to be consistent with entities.	VRF-IPB16, VRF-5.1
VRF-5682	Scenario .ORB file gets corrupt, when using the Order of Battle panel to create units	In a situation where there were multiple backends and the user created hierarchies of units through the Order of Battle panel, the .ORB file could become corrupt. This is fixed.	VRF-IPB16, VRF-5.1
VRF-5688	Skip Task causes crash in some entities	Added a check to prevent crashes when Skip Task is used.	VRF-IPB16, VRF-5.1
VRF-5690	Crowd Creation Dialog does not properly create sub-menus that do not have registered creators	Applied a fix to subclass the crowd creation assembler from the VRF-derived assembler that allows for the creation of non-registered menus by the name used in the path.	VRF-IPB16, VRF-5.1
VRF-5698	Set Force on a Unit often results in subordinates being removed from superior	Fixed a problem that caused units to become disaggregated when using the Force set data request.	VRF-IPB16, VRF-5.1
VRF-5701	Scripted Tasks Toolbar Location cannot be changed in some cases	Fixed an issue that prevented toolbar icons from displaying in the Last Selected Object Panel in certain situations.	VRF-IPB16, VRF-5.1
VRF-5704	New windows are starting on monitor 1, not primary	On Linux, there was an issue where a new window (such as the dialog boxes that open when you use the Task or Set menus) opened on monitor 1 regardless of the monitor where the VR-Forces GUI was positioned. This is fixed.	VRF-IPB16, VRF-5.1
VRF-5705	Tactical Graphic Freehand Line Unable To Set Altitude	Fixed an issue that prevented users from being able to edit the altitudes on the Freehand Line or Freehand Line with Arrow tactical graphics.	VRF-IPB16, VRF-5.1
VRF-5706	SOE Doesn't Sanitize Weapon System Name before Creating Sysdef	The SOE no longer allows system definition file names to include parentheses.	VRF-IPB16, VRF-5.1
VRF-5712	remove DtDebugDrawCommonLogic::findFirstChannel when we go up on VRV	Removed DtDebugDrawCommonLogic::findFirstChannel in favor of windowManager().findChannelsWithObserverName().	VRF-IPB16, VRF-5.1
VRF-5716	DI-Guy not embarking correctly	Fixed to ensure that DI-Guy entities embark correctly when taking a seat in a vehicle with embarkation slots.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5717	setNextFrameWorldOrientation() not sufficient in PostTickEntry - VRF5.0 IPB16	Applied a fix such that the application now updates topoEuler when validating state such that worldOrientation-only changes are reflected in topographic current frame.	VRF-IPB16, VRF-5.1
VRF-5721	Squad unit incorrectly set to embarked?	For units, the application no longer checks the independently tasked state. A superior is embarked if all its units are embarked or all its non-independently tasked subordinates are.	VRF-IPB16, VRF-5.1
VRF-5722	Radar tracking status function incorrect	The entitiesTracking function now uses the type argument to filter out beams that are not performing the desired function.	VRF-IPB16, VRF-5.1
VRF-5724	Issued plan is immediately abandoned	Added a check so that when setting a plan and there is already a plan, the first plan is abandon to allow for setting the new plan.	VRF-IPB16, VRF-5.1
VRF-5725	Subsurface watercrafts are hard to see or invisible in SOE when Visual Effects window is open	Subsurface vehicles now display on the surface in the SOE to make them easier to view and adjust.	VRF-IPB16, VRF-5.1
VRF-5741	Viewport Window in SOE will pop out after save on Linux	Fixed an issue on Linux where saving an SMS in the Simulation Object Editor would pop out the observer window and potentially cause a crash.	VRF-IPB16, VRF-5.1
VRF-5759	DtSimulationServices::scenarioCapabilities() should return DtU32 instead of int	Because the value returned is representing a bitfield, fixed it to return DtU32.	VRF-IPB16, VRF-5.1
VRF-5765	delayed_homing.lua file should not look for a specific system name	The homing torpedo scripts now work with any torpedo system, provided that the system name contains "torpedo" and "homing" (either upper or lowercase).	VRF-IPB16, VRF-5.1
VRF-5769	Problem using short cut I for entities	Fixed an issue where selecting a simulation object in the Objects List and then pressing I did not always open the Information dialog box.	VRF-IPB16, VRF-5.1
VRF-5785	GUI does not reliably show embarkation state of objects	Fixed to ensure that remote viewers of embarked simulation objects can view the information correctly.	VRF-IPB16, VRF-5.1
VRF-5801	Should be able to select unit in Objects List and then choose Any Subordinate of Selected Unit	Fixed an issue that prevented the Any Subordinate of Selected Unit check box from being enabled if the user selected the unit in the Objects List instead of the Name list in the Entity Destroyed dialog box.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5803	Allow ORBAT entities to be renamed directly in the list (if enabled)	When you select Object Renaming Directly in Objects List in GUI Settings, you can now rename entities in the Order of Battle Panel. This makes the behavior consistent with the Objects List and also makes it easier for you to rename entities when that option is enabled.	VRF-5.1, VRF-IPB19
VRF-5806	Launch Global Plan does not indicate that you can only select quick launch plans	The filter in the Launch Global Plan dialog box now indicates that you can select from Quick Launch Global Plans.	VRF-IPB16, VRF-5.1
VRF-5808	Setting an object to Invisible does not update the visibility status on the object list or overlay bar	Fixed the object visibility manager to ensure that simulation objects that have been set to invisible reflect that status in the Objects List and Overlays toolbar.	VRF-IPB16, VRF-5.1
VRF-5809	GUI crash editing plan statement for "Create Tactical Smoke" object.	Added a check for situations when there is no edit dialog for a created entity type to prevent crashes.	VRF-IPB16, VRF-5.1
VRF-5810	Gun being carried by Soldier in RaidDemo has very long tripod attached	Updated scenarios included with the application to ensure that human entities' hand items are not a weapon with a tripod.	VRF-5.1, VRF-IPB19
VRF-5818	Fixed wing Move Along is erratic	Made some improvements to eliminate long ticks.	VRF-IPB16, VRF-5.1
VRF-5819	When the layout_Scenario_Viewer.uisx is specified, the main window is not correctly displayed in full screen mode	When using the command-line option to open in full screen mode, the menu bar no longer displays.	VRF-IPB16, VRF-5.1
VRF-5837	Object type is not always correct when creating new entity	The SOE no longer checks whether there is a defined object type before setting the object type based on the selected platform. The Object Type remains consistent when you select a platform, regardless of whether you select another platform and then return to the previously selected platform.	VRF-IPB16, VRF-5.1
VRF-5854	DI-Guy action choosing makes bad decisions if stationary character has slight movement.	Fixed issue where action choosing would sometimes choose the wrong action if a character was moving slowly.	VRF-IPB16, VRF-5.1
VRF-5861	Subordinate units don't change formation when parent unit does	Fixed a bug where subordinate units would not always change formation when their parent moved into a new formation.	VRF-IPB16, VRF-5.1
VRF-5865	Formation name for a unit is incorrect in info panel after error	If assigned to assume a formation that does not a corresponding FRM file, an error prints to the console and the name of the assigned, nonexistent formation does not appear in the Information dialog box.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5869	Undesirable ground clamping embarking in slot	Fixed a problem where entities would not reliably embark in a desirable slot when added directly (not using a task or set but instead by drag-and-drop).	VRF-IPB16, VRF-5.1
VRF-5888	GUI: Order of Battle panel gets stuck (empty) between scenarios	Fixed to ensure that all simulation objects are correctly added to the Order of Battle panel.	VRF-IPB16, VRF-5.1
VRF-5907	Aim at angle not working	VR-Forces now checks that the input angles are in the expected ranges (-pi to pi). It prints an object console warning if the user selects an angle outside of the configured range.	VRF-IPB16, VRF-5.1
VRF-5910	Not all craters are reset	Fixed an issue where all craters would be reset in the sim engine but some were not cleared from the GUI.	VRF-IPB16, VRF-5.1
VRF-5913	Lase Location task does not take LOS into account	The Lase Location engagement task now takes line of sight into account when looking at the specified location. If blocked by terrain, the designator spot is at the blocked point.	VRF-IPB16, VRF-5.1
VRF-5915	Lasing from Gimble Sensor is in wrong direction	Fixed the lasing to point in the correct direction.	VRF-IPB16, VRF-5.1
VRF-5916	Persistent tracks are still visible after getting removed or reset	Fixed an issue that prevented dynamic terrain changes from being reset.	VRF-IPB16, VRF-5.1
VRF-5922	CDB Light points with offset not showing at right altitude	Fixed processing of elevation.	VRF-IPB16, VRF-5.1, VRF-4.10-j
VRF-5923	CDB Runways don't listen to relativePriority for faces	Fixed the lightpoint and the runway for CDB runways.	VRF-IPB16, VRF-5.1, VRF-4.10-j
VRF-5933	SMS: Tigr SISO entity type enumerations need to be updated	Changed enumerations in entity files to correct SISO numbers. Also renamed entities and files to reflect SISO names.	VRF-IPB16, VRF-5.1
VRF-5943	Path resolution issue when Shared data and installer is not on the same drive	Fixed path resolution issue to allow VR-Forces to find the SharedData directory in the user-specified location.	VRF-IPB16, VRF-5.1, VRF-5.0.3-f
VRF-5955	VR-Forces hangs for a few seconds when typing a value into DtLocationEntryWidget	There was an issue with the Set Location functionality. Made a change to improve the accuracy of the positioning.	VRF-5.1, VRF-IPB17

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5958	SU-33 Counter Measures launch tasks not working	Updated the sysdef file with the launchable resources.	VRF-IPB16, VRF-5.1
VRF-5967	When adding a tag in the SOE, the Add icon is missing to add an icon	The button for adding an Icon in the Add Tag Information dialog box was missing its Add icon. The plus symbol has been restored.	VRF-IPB16, VRF-5.1
VRF-5969	SOE still references "Disaggregation distance" on Movement Tab	Disaggregated units are no longer a concept in VR-Forces. Removed parameters related to disaggregation from the SOE.	VRF-5.1, VRF-IPB19
VRF-5974	SOE: Animated Movements not inherited	The Animated Movement list was empty in derived SMSs. Animated movements from the parent SMS now display but cannot be edited. Users can make a copy of an existing movement and then modify the copy.	VRF-5.1, VRF-IPB17
VRF-5976	Embarkation slots are unreadable	The embarkation slots on entities now display slots for entities as icons that are oriented to show the heading for an entity embarked on that slot.	VRF-IPB16, VRF-5.1
VRF-6004	GUI Map acts on keystrokes when dialog box is open	Fixed so that, when certain dialog boxes are open, pressing keys that are also observer controls do not affect the map but only update the entries in the dialog box.	VRF-IPB16, VRF-5.1
VRF-6008	BehaviorGroundAttackAlongAxis does not restore and run correctly from snapshot	Fixed a variable that was previously only local to allow the task state to be included in checkpointed scenario.	VRF-5.1
VRF-6051	User should be able to stop the SOE from loading an SMS	You can now cancel a load of an SMS in the SOE. This is helpful when you mistakenly select the incorrect SMS. Click the Cancel or Close button on the progress dialog to cancel the SMS load.	VRF-IPB16, VRF-5.1
VRF-6060	DI-Guy does not aim at location after move	Fixed the function that resets character state after re-creation to include aim angle.	VRF-5.1
VRF-6061	Cannot set sensor modes on different radars	You can now specify the sensor mode for radar on entities with more than one radar system.	VRF-IPB16, VRF-5.1
VRF-6072	FWA takeoff using move-along is broken	Fixed an issue that prevented fixed-wing aircraft from taking off using the innate behavior of moving to a waypoint or following a route with a vertex in the air.	VRF-IPB16, VRF-5.1
VRF-6086	In FormationFlight.scnx, tanker fuel probe does not seem to be configured correctly	The FormationFlight scenario no longer includes a refueling sequence. To see an example of refueling, use the HawaiiAir scenario.	VRF-5.1, VRF-IPB18
VRF-6099	Fire Cruise Missile dialog has illogical order	The No Route check box has been moved to be adjacent to the Route box instead of at the bottom of the parameters for the Fire Cruise Missile task.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6124	Soldier set to kneel changes to crouched	Soldier characters set to kneel now remain in the kneeling position after firing their weapon at a target.	VRF-IPB16, VRF-5.1
VRF-6130	Soldiers with NLAW and AT4 rocket launcher change posture during fire	DI-Guy soldier entities now perform the correct animation when firing the NLAW or AT4 rocket launchers.	VRF-IPB16, VRF-5.1
VRF-6136	Cannot edit floor and ceiling for Extruded Circle object	Fixed to allow users to edit the Floor and Ceiling settings on the Circle (Extruded) tactical graphic.	VRF-IPB16, VRF-5.1
VRF-6160	When assigning a scripted task to an entity twice, the script's shutdown() should not be called after the init()	When replacing a scripted task with the same task, VR-Forces now invokes the shutdown immediately to prevent the shutdown from the same task being called after the init. VR-Forces also now sets a flag that the shutdown was already called to ensure that it is not called on script destruction.	VRF-IPB16, VRF-5.1
VRF-6162	Ground vehicles just run through each other	Modified the move-to-destination controller to use obstacles on its input port to stop the vehicle before (or almost) running into them, if the vehicle is near the specified destination. This prevents entities from overlapping at the destination.	VRF-5.1
VRF-6166	Disembodied human heads sometimes hover above animals coming out of spawn points	Ensured that the application checks whether a head is compatible with a DI-Guy entity. This prevents human heads from being applied to animal entities.	VRF-5.1, VRF-IPB19
VRF-6167	SOE AggregateLevel: adding loadouts doesn't seem to work correctly	Fixed an issue that prevented users from adding to an aggregate-level simulation object Loadout Items.	VRF-5.1, VRF-IPB17
VRF-6177	SOE can't make embarkation slots for entities that are made from inherit	Users can now successfully add embarkation slots to an entity inherited from one that did not have any.	VRF-IPB16, VRF-5.1
VRF-6178	Tactical graphic's Activation parameters should not reset the set times	This is fixed. When a user selects a tactical graphic, chooses Set > Disposition > Activation, enters a time, and then reopens the Activation parameters, their previous entry is now correctly displayed.	VRF-IPB16, VRF-5.1
VRF-6180	Detonation Deformation Crater Land Cover is always set to 'rock'	Fixed to ensure that when a crater deforms the terrain, the soil type is appropriate.	VRF-5.1, VRF-IPB19
VRF-6181	Changing 2D icon TOT for a promoted object does not change the icon	Fixed to allow users to select the desired 2D icon in the SOE.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6188	Hard to determine which bv face or angle of incidence is being editing in SOE	Added text below the Damage Power Entries list to indicate which surface you are editing to make it clearer which is selected.	VRF-IPB16, VRF-5.1
VRF-6191	SOE doesn't save damage systems if only change is damage type	Added further checks to ensure that changes to damage systems are saved correctly.	VRF-IPB16, VRF-5.1
VRF-6193	Script listed only on right-click entity menu executes erroneously	Fixed the handling of scripted tasks when they are only added to the context menu to ensure that they execute correctly. Previously, they would be executed more times than was designed.	VRF-IPB16, VRF-5.1
VRF-6210	GUI crash editing routes	Fixed a problem where the VR-Forces GUI would sometimes crash when a user made extensive edits to a route.	VRF-IPB16, VRF-5.1
VRF-6232	Air carrier wing object group, embarkation of FWs seems to be messed up	Fixed an issue that came about when some parameters changed, which caused aircraft entities that were embarked on surface watercraft to behave in undesired ways.	VRF-5.1, VRF-IPB19
VRF-6234	Scenario Event on a different sim engine is not updated on remote sim engines	Fixed to ensure that a scenario event created on one back-end can affect a synchronization matrix on another back-end.	VRF-IPB16, VRF-5.1
VRF-6236	GUI crash setting target priority lists using Issue Plan in a Global Plan	Fixed to allow users to set target priority from global plans.	VRF-IPB16, VRF-5.1
VRF-6239	Export Props to Shape file sets wrong path.	Instead of writing the path as with \$(SHARED_DATA_DIR), it now writes with ../.. because the variable did not work with osgEarth.	VRF-IPB16, VRF-5.1
VRF-6240	VRF Entity Catalog is missing some munitions	Updated the Munitions list in the VR-Forces Entity Model Catalog to show more munitions.	VRF-5.1, VRF-IPB17
VRF-6242	Ground Scenario: detection problems with sensors	Fixed a math problem with coordinate extents in spatial organization.	VRF-5.1
VRF-6252	Scenario event matrix created on multiple back-ends	In scenarios with multiple back-ends, synchronization matrices are now created only on one back-end, whichever is the least loaded.	VRF-IPB16, VRF-5.1
VRF-6257	SOE crash when adding an entity using the File > Add Entity File menu option	Added a check to prevent crashes when using adding entities to an SMS.	VRF-IPB16, VRF-5.1
VRF-6263	Performance monitor display incorrect latency	Made a change to measure latency as the round trip time sent to the sim engine based on the GUI clock. This fixes the problem that can arise if the sim and GUI clocks are out of sync.	VRF-IPB16, VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6264	SIM: DtWarn spamming "endpoints identical" when bvols overlap.	Set the DtWarn in the terrain toolkit verbose to provide more information. Also added an extra guard before even calling into the terrain library.	VRF-5.1, VRF-IPB18
VRF-6265	SIM: need to repair unit-level move-to and move-along (lead/follow)	Added a new function to generate routes that will not cross over themselves at tight corners of the referenced route.	VRF-5.1, VRF-IPB19
VRF-6266	Bringing up sync matrix that has many aggregates degrades performance	Improved the code to be more efficient, allowing for better performance when opening a sync matrix with multiple units in it.	VRF-IPB16, VRF-5.1
VRF-6273	Follow Offset Route was not working correctly	Corrected the calculations to ensure that the following entity moves correctly.	VRF-IPB16, VRF-5.1
VRF-6276	AggregateLevel entity count indicators are hard to see	Changed the scaling of the entity count indicator graphics.	VRF-IPB16, VRF-5.1
VRF-6285	GUI: selection and tasking context remain after change in spot report settings.	Fixed an issue that allowed users to specify tasks or set data requests for an entity that the user selected before disabling the ground truth for that entity's force.	VRF-5.1
VRF-6286	Ground vehicles moving on airfields would not fall into craters	This is fixed with improvements to the way terrain is handled.	VRF-5.1, VRF-IPB19
VRF-6290	Edit Sector dialog box shows wrong unit of measurement	The sector dialog box now shows the correct measurements for what is specified in the Unit Display Settings. previously, it always showed km regardless of the Distance (Small) measurement unit.	VRF-5.1, VRF-IPB17
VRF-6291	Civilian Air Traffic scenario can sometimes not load	If you have any scenarios that include the deprecated features for creating civilian aircraft--the Air Traffic Area or a global plan with Generate Air Traffic from Flight Plans--you must edit them to use the new Aircraft Clutter Area (or spawn/sink points) instead.	VRF-5.1, VRF-IPB18
VRF-6295	Entity Velocity is totally unstable	Added code to get a different dead reckoning value to ensure that the velocity for an entity displays numbers that are smoother instead of varying wildly.	VRF-5.1, VRF-IPB17
VRF-6299	TACAN Set dialog should be under Sensors not OTHER	The TACAN Transmitter set data request has been moved from Other to Sensors in the Set menu and Command Panel.	VRF-5.1, VRF-IPB17
VRF-6303	Outdated documentation for running VR-Forces in Time Management	The sample FED file is no longer required. Removed it from the code example in the Enabling Time Management for the Back-end procedure.	VRF-5.1, VRF-IPB17

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6305	HLA1516e - After turning off the radar emitter - the emitter beam persists in the GUI - entity Info dialog	HLA does not call the update callback on a system when a beam is removed, while DIS does. Added an override to the HLA emitter reflected list to do that for VR-Forces.	VRF-5.1, VRF-IPB17
VRF-6312	Sim engine crash while playing Hawaii Naval scenario	Fixed an issue in the Aggregate.ope that could cause the sim engine (back-end) to crash after playing the scenario for about 20 minutes.	VRF-5.1, VRF-IPB17
VRF-6316	Air Axis Corridor Size seems to not be published	Increased the default size for air corridors to 1km and also ensure that the information is published.	VRF-5.1, VRF-IPB17
VRF-6317	Error symbols are not aligned with the area tactical graphics when you zoom out enough	Warning icons now display at the vertices.	VRF-5.1, VRF-IPB17
VRF-6318	Add defaultheight property to entity files for (Extruded) Areal Tactical Graphics	There is now a defaultHeight property in the Air Turbulence Area entity file. It can be added to others as well.	VRF-5.1, VRF-IPB17
VRF-6322	graphviz is not packaging its shared libraries for Linux	Fixed installRuntime.cmake to correctly package the libraries for Linux.	VRF-5.1, VRF-IPB18
VRF-6334	Crash playing scenario involving embarkation	Added a check to prevent crash due to null pointer.	VRF-5.1
VRF-6337	Very few of the VR-Forces scenarios have proper Scenario Names	Updated scenarios that had names such as "Unnamed Scenario" or "Scenario created on [terrain]" to use the name of the scenario.	VRF-5.1
VRF-6346	Comment and document max soil factors is deprecated, not used anymore	Updated documentation in groundVehicleParams.h to describe the acceleration-factor and stopping-factor correctly; also removed maximum-speed-factor. Added a brief explanation of how acceleration-factor affects maximum speed in a soil.	VRF-5.1
VRF-6349	Disable the component if init() call fails during DtSimComponent creation	If during the sim component creation (within DtSimComponent::createComponent()), the init() call fails, then the component is disabled.	VRF-5.1, VRF-IPB17
VRF-6353	VRF Sim: long delays loading scenario, on/after 'surfChar.map' step	Fixed long load time with earth files that do not contain any pageable terrain.	VRF-5.1, VRF-5.0.1-h
VRF-6355	Cultural features have no heading lines	Added heading indicator to cultural features. This allows users to know that they have successfully rotated an object when placing it in Plan View (2D).	VRF-5.1, VRF-IPB17
VRF-6370	Crash--Moving multiple non generated Nav Areas causes crash	VR-Forces now prevents users from moving more than one navigation area at a time.	VRF-5.1, VRF-IPB17

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6371	Civilian vehicle drives on water in Ala Moana	Fixed a problem where road features that go into and out of a graph tile were not being broken up correctly. Added a capability to limit the search for graph paths on disjoint road networks.	VRF-5.1, VRF-IPB17, VRF-5.0.1.10-ST-Wargame
VRF-6379	Move-to and path plan fail	Improved the move-to-location-path-plan scripted task to allow entities to complete the task successfully when the road feature has an altitude of zero on its vertices while the entity moves in a nav mesh.	VRF-5.1, VRF-IPB18
VRF-6381	Loading detonation and ammunition parameter files prints confusing messages.	VR-Forces now prints out a warning only if the file is there but can't be opened. (There are already warnings that print if no file of that type can be opened.)	VRF-5.1, VRF-IPB17
VRF-6402	Missing export macros in DtPropertySetter	Added DT_DLL_vrfLua to all of the DtPropertySetter function declarations to ensure that they can be used in plug-ins.	VRF-5.1, VRF-IPB17
VRF-6406	SOE: "Add Entity File" crashes adding entity level file to agg level SMS	Added a warning for users when they attempt to load an incompatible file into an SMS (such as an entity-level file into an aggregate-level SMS). If the model cannot be found as an active item, it is not added as an empty item.	VRF-5.1, VRF-IPB17
VRF-6440	Crash using embarkation in Aggregate Level SMS	Fixed the issue in the embarkation controller.	VRF-5.1, VRF-IPB17
VRF-6441	Disembarking an AggLevel object leaves the icon hidden	Corrected to set the embarked flag to disembarked before the signal that the parent is set; this is consistent with the behavior of entity state embarkation.	VRF-5.1, VRF-IPB17
VRF-6446	Articulated part typo	For the Attachments Panel, corrected the spelling of "gimbaled".	VRF-5.1, VRF-IPB17
VRF-6447	Problems with more than 4 forces	Fixed an issue where editing the position of entities created from an SMS that had more than four forces would change their force to Friendly.	VRF-5.1, VRF-IPB17, VRF-5.0.3-a
VRF-6448	Forces added to SMS are not added to existing scenarios	Fixed to ensure that new forces added to an SMS are available for use the next time a user edits a scenario that was previously created using that SMS. In earlier releases, new forces were only available in scenarios created with the SMS after the forces were added.	VRF-5.1, VRF-IPB17

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6456	LLDR Icon does not indicate destroyed state in plan view	Updated to ensure that sensor simulation objects such as the AN/PED-1 LLDR display as destroyed in the window as well as the Objects List and Command Panel.	VRF-5.1
VRF-6463	Crash loading scenario after character edit window is open in a group	Fixed an issue where users could not load a scenario after using DI-Guy Characteristics set data request for multiple lifeform entities.	VRF-5.1, VRF-IPB17
VRF-6468	Error in rate calculation for human guns results in stuttery turning.	Corrected rate calculation.	VRF-5.1, VRF-IPB17
VRF-6470	Flight Time is often off by a few seconds	VR-Forces now computes the time from launch point to apex, and apex to destination point, to provide a more accurate ETA.	VRF-5.1, VRF-IPB17
VRF-6472	Local MBTiles FeatureModel does not work with VR-Forces sim	The MBTiles were previously "threaded" in the same manner as shape files, where they were read all at once. They are now threaded like pageable tiles. This fixes a problem that could cause VR-Forces to not correctly read terrain information, which could cause entities to not interact with it properly (such as ground vehicles moving into water areas).	VRF-5.1
VRF-6476	Agg level update-combat-effectiveness throws error for non-ground units	Added a validation check of personnel.	VRF-5.1, VRF-IPB19
VRF-6478	FlyAtAltitude doesn't check for max altitude or climb rate	The DtFixedWingFlightCommandController now checks whether the flight command task's altitude is higher than the state repository max-altitude. If so, VR-Forces sets the altitude to the configured max-altitude.	VRF-5.1
VRF-6480	AggregateLevel Health can sometimes not be set	There was a mismatch between setting the health for a single simulation object and multiple simulation objects. Correcting the variable names in use fixed the problem.	VRF-5.1, VRF-IPB18
VRF-6489	Test Procedural Airport take a very long time for the sim to load	There used to be only one extent for all airports in the world. With the new improvements to VR-Vantage, there are now extents for every airport in the world. It can take a very long time to load a terrain with those in it. There's now an optional keyword: worldwide="true". For the sim side of VR-Forces, it bypasses the extent and assumes that the extent is the world.	VRF-5.1
VRF-6496	SOE: new system writes hardcoded paths into .entity file	Paths for new systems are written with the correct file path, relative to the location of the SMS file.	VRF-5.1, VRF-IPB17

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6497	Subsurface entities start moving when they shouldn't	Fixed by setting acceleration to 0 and releasing the ports.	VRF-5.1, VRF-IPB17, VRF-4.10k-Gladiator-2
VRF-6503	Triggers not clearing tasks when suppose to	Fixed some issues with conditionals to allow triggers in plans to behave better.	VRF-5.1
VRF-6509	METOC incorrectly encodes Atmospheric Pressure as kPa (TFST)	The BarometricPressure attribute in the METOC FOM was being published in Pa, when the unit should have been hPa. This is fixed.	VRF-5.1, VRF-IPB17
VRF-6510	Remove the old turret scan controller	DtTurretScanController and DtTurretScanComponentDescriptor have been removed because they are no longer used nor supported.	VRF-5.1, VRF-IPB18
VRF-6518	Rapidly arrowing down in the entity list box of SOE leaves view with lots of support points	Fixed to prevent extraneous support points from displaying when a user moves quickly through the Object List using arrow keys.	VRF-5.1, VRF-IPB17
VRF-6519	Typo in Runway Light dialog "Threshold Lightning"	Corrected the text to read "Threshold Lighting".	VRF-5.1, VRF-IPB17
VRF-6526	Rotary wings require advanced lighting settings	Configured rotary-wing aircraft to use the same lighting controls as fixed-wing aircraft. Also applied the changes to the quadcopter, and added state data to the rotary wing and quadcopter ope files for lights.	VRF-5.1, VRF-IPB18
VRF-6528	DtRwNlengthStringList drops spaces in string	Fixed to read all spaces. Previously, it was not counting each space and this prevented correct reading of categories for new markings.	VRF-5.1, VRF-IPB17
VRF-6562	Target Frame Rate Option Ignored	The application now uses a high-resolution tick count wait while loop in all instances because DtSleep is not accurate enough for shorter sleep times.	VRF-5.1, VRF-IPB18
VRF-6564	Aircraft taking off from carrier in Hawaii Air scenario moves through other entity	Repositioned the two fixed-wing aircraft on Carrier 1 that take off at the beginning of the scenario such that the first aircraft does not move through the second aircraft's position when taking off from the carrier.	VRF-5.1, VRF-IPB18
VRF-6566	Aircraft receiving fuel doesn't maintain station at the correct place	Corrected offsets to improve positioning of aircraft performing a Refuel From task.	VRF-5.1, VRF-IPB19
VRF-6581	Aggregate-level movement jumps backward	Fixed by changing the tick period and variance in the movement actuator component for the tank and motorized aggregate movement systems.	VRF-5.1, VRF-5.0.3-l

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6584	M1A1 AIM (AUS), M1A1 AIM (AUS) Mineplow have inconsistent short names	Fixed the short names of M1A1 AIM (AUS) Mineplow.entity and M1A1 AIM (AUS).entity. They now correctly use M1A1, rather than M1A2.	VRF-5.1, VRF-IPB19
VRF-6607	Problem with computing path when terrain has elevation	Changed the calculation to do only a 2D distance check because the entity's altitude should not matter when checking distance to road versus distance to destination.	VRF-5.1, VRF-IPB18
VRF-6609	Problem with state data update on information item in VR-Forces GUI	Changed the loading order for the SMS state properties to address issues.	VRF-5.1, VRF-IPB18
VRF-6611	MAK_NUM_LANES feature attribute broken for OSM database	Made a change to allow the application to handle roads in OSM terrain databases.	VRF-5.1, VRF-IPB18
VRF-6615	SIM: in Lua background task, can't vrf:sendTask() to another object.	Added a new version of the vrf:sendTask() Lua function that will never start the new task as a subtask and is only available to background processes. This allows background processes to send tasks to other entities, which they could not previously do.	VRF-5.1, VRF-IPB19
VRF-6622	Extended data is not saved in ovl file	Fixed such that extended data for environmentals (or any local object) is correctly saved to the OVL file, ensuring that changes are saved.	VRF-5.1, VRF-IPB18
VRF-6623	Landing lights turn on automatically when a vehicle is landing	Aircraft no longer turn on their landing lights when extending the landing gear. Landing lights are now turned on independently of any landing tasks, allowing aircraft to land with their lights off.	VRF-5.1, VRF-IPB18
VRF-6628	addPostSaveScenarioCallback does not save the filename and scenario name correctly all the time	Corrected a timing issue by reworking some calls. The scenario status message needed to be up-to-date when the post-save scenario callback was called.	VRF-5.1, VRF-IPB18, VRF-4.10-m
VRF-6632	Ground vehicles erratically change elevation when moving in SOE	Turned off ground clamping in the SOE to prevent ground vehicles from behaving irregularly when simulating movement.	VRF-5.1, VRF-IPB18
VRF-6643	nav area paths not working same as 4.10 paths	When a vehicle uses the abstract graph for path planning and stops before it reaches the destination, it now tries disabling use of the abstract graph and attempting the task again. Use of abstract graphs will be reset when the task completes.	VRF-5.1, VRF-IPB19

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6653	AddSensorPropagator example not working	Fixed the feature tiled data that was not getting the maxLOD correctly for WFS data. This fixes the issue with the example, where the nearby entity inside the forest was detected before the further entity placed outside of the forest. That does not happen when the propagator works correctly because the forest makes it harder to detect the entity inside of it.	VRF-5.1, VRF-IPB18
VRF-6655	Route Vertex should appear in Terrain Profile Line or Move Along Route With Actions	The features were looking for the vertices graphic in the wrong location. This is fixed.	VRF-5.1, VRF-IPB18
VRF-6659	Edit Spider Web dialog box should use NM for distance between Rings	When creating or editing a Spider Web tactical graphic, you now specify the Number of Rings instead of an X radius. The Distance Between Rings value is now always nautical miles (NM).	VRF-5.1, VRF-IPB18
VRF-6675	Sling Load embarkation visuals can appear offset	Fixed the script (rope_embarkation.lua) to ensure that the visuals are correct.	VRF-5.1
VRF-6678	Range Rings Settings do not properly restore to factory settings	Fixed to ensure that choosing to restore the Range Rings Settings in Display Settings to factory settings does not remove the settings. It now correctly brings in the factory settings.	VRF-5.1
VRF-6679	Terrain debug not working for nav data	Improved the Debug Simulation Terrain feature so that it uses an area to load nav mesh before the query, ensuring that it displays correctly.	VRF-5.1, VRF-IPB18
VRF-6685	M113 navigates through Fire Station when there is Nav Mesh	Fixed adding dynamic obstacles for cultural features in their own nav area. Reduced the amount of time between placing a cultural feature and entities recognizing that it is an obstacle.	VRF-5.1, VRF-IPB19
VRF-6686	Turn on planar reflections in the SOE	Planar reflections have been enabled for surface and subsurface watercraft in the SOE.	VRF-5.1, VRF-IPB18
VRF-6700	2D Saved Views from the terrain cannot be deleted (hidden)	The application was not checking for the correct information when users chose to Delete a saved 2D Observer View, which moves the view to a list of hidden views in the scenario file. This is fixed.	VRF-5.1, VRF-IPB18
VRF-6703	Individual nav meshes do not detect dynamic objects	Improved the code to allow nav meshes to detect both dynamic and remote objects. The application now creates a nav facade and decorator for sim objects. Each local object, when it creates a sim object, has a dynamic obstacle representation of itself. If it is local, it only adds itself to areas that it is not primarily in. If remote, it adds itself to all areas.	VRF-5.1, VRF-IPB19

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6712	Detonation not occurring in correct location after destroying an entity via munition detonation	Fixed an issue where using the Munition Detonation feature would not display the effect of the detonation in any location other than the first one.	VRF-5.1, VRF-IPB18
VRF-6714	Setting active/passive mode in sonar dip task doesn't work	The Sonar Dip task now disables the active sonar system using the Subsystem Enabled set data request rather than the Active Sonar set data request, because the latter cannot be used to turn off active sonar. This fixes problems with the Sonar Dip task. The documentation has also been updated to reflect that the Active Sonar set data request does not allow active sonar to be set to Off.	VRF-5.1, VRF-IPB18
VRF-6717	Debug Draw causes a vrfSim crash, without a scenario loaded	Added a check to ensure that the Debug Simulation Terrain feature can be used when there is no scenario loaded, only terrain.	VRF-5.1, VRF-IPB18
VRF-6728	Aircraft Lighting dialog - Navigation Lights field does not display a default value	The Navigation Lights list in the Aircraft Lighting set data request dialog box now shows the default value, which is On.	VRF-5.1, VRF-IPB18
VRF-6729	Sim Object needs to be reselected every time you edit a trigger conditional	This is fixed. The issue was with trigger conditions where users can select a force or unit and then specify that the condition apply to Any Subordinate of Selected Unit. If a user tried to edit it, even though the unit would still show as selected, users could not select the Any Subordinate of Selected Unit option. It was disabled until they reselected the force or unit.	VRF-5.1, VRF-IPB18
VRF-6736	Default configuration for system time should be Zulu time	The default display for system time is now Coordinated Universal Time (UTC, also called Zulu time).	VRF-5.1, VRF-IPB18
VRF-6749	Accesses to DtResourceMonitor may not be thread safe	There was an issue that could potentially cause crashes and hangs. Fixed this by protecting access to resourcesChangedFor().	VRF-5.1, VRF-IPB18
VRF-6755	Window layouts don't restore correctly in some cases	Fixed to ensure that the application gets the most recent dock location of the UI widgets.	VRF-5.1, VRF-IPB18
VRF-6758	CC-115 Buffalo has wrong object type	The object type has been corrected to 1.2.39.9.2 to match the SISO enumerations.	VRF-5.1
VRF-6759	Bombardier CL-600 is misclassified as twin engine turbo prop	The object type has been corrected to 1.2.39.87.32.4.1 to match the SISO enumerations.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6767	Direct hits can incorrectly get two attempts at damaging an entity	Fixed a problem where entities that took a direct hit from a detonation took damage from both the direct hit and the detonation's collateral damage. When processing damage from a direct hit by detonation power, the application no longer processes it for collateral damage, no longer doing more damage than expected.	VRF-5.1, VRF-IPB18
VRF-6774	VR-Forces sending of DtRawSignalEvent fails to send if content is oversized	Added a check for length of data > max of unsigned short or max content length.	VRF-5.1
VRF-6777	RadarCoverage display Setting file doesn't have a factory setting	Added the missing file to allow users to restore Radar Coverage settings to the factory settings.	VRF-5.1, VRF-IPB18
VRF-6788	Installer should include patch release letter in registry entries	When you install VR-Forces, the installer creates a registry entry in Computer\HKEY_CURRENT_USER\Software\MAK Technologies. It now includes the letter for patch releases, which ensures that registry entries for a previous release of that version don't overwrite any registry entries for that previous release. This preserves that installed release's associated settings.	VRF-5.1, VRF-IPB19
VRF-6789	DtIfScenarioStatus is sending absolute paths for SMS variables	Corrected to send over an unresolved path that the receiver will resolve to get the correct path.	VRF-5.1, VRF-IPB19
VRF-6791	Dynamic terrain publisher can be created in parallel	Fixed an issue that could cause problems in scenarios when using the HLA protocol.	VRF-5.1, VRF-IPB18
VRF-6793	Entity can become disembarked on NTC online terrain due to far away explosion	Fixed an issue when there was a detonation in some terrains because it would force entities to reclamp.	VRF-5.1, VRF-IPB18
VRF-6797	vrfSim Crash--Deleting an attached spider web from bullseye	If you set a bullseye to display range rings and then tried to delete the spider web from the Objects List, there was a crash. Added a check to allow users to delete the spider web.	VRF-5.1, VRF-5.0.3-a
VRF-6804	Missing export macros for functions in DtReaderWriterSetter	Exported all functions in DtReaderWriterSetter file, allowing developers to use those functions.	VRF-5.1, VRF-IPB18
VRF-6821	Corridor sizes are set to 1km for TGs that are used by Air assets	The default size for tactical graphics used by air assets is now 6 kilometers.	VRF-5.1
VRF-6825	Disabling then enabling spot report histories causes crash	Fixed an issue that caused a crash if users disabled and then re-enabled the Show Track Histories option in the Spot Report Settings page of Application Settings.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6832	SOE crash when modifying the graph for the Damage by Explosive Power	Made code improvements to prevent crashes when using the Probability of Effect widget to change the settings.	VRF-5.1, VRF-IPB19, VRF-IPB18
VRF-6836	Navigation queries can return failure before nav data loads	The application now checks whether the navigation area exists, and then executes the query only when the data is available.	VRF-5.1, VRF-IPB19
VRF-6850	vrfSimHLA1516e shows double objects when rewinding with timeManagement	Fixed issues that arose after the architecture changes made for VR-Forces 5.0.x. This allows timestamps to populate correctly from RTI messages sent from VR-Forces sim engine (back-end). VR-Forces also properly deletes instances and publishes objects to the network.	VRF-5.1, VRF-IPB19, VRF-5.0.3-c
VRF-6852	Update Back-End Remote Control Example Usage Instructions	Edited the example's documentation to reflect the command-line arguments required for HLA more accurately.	VRF-5.1
VRF-6853	Date/Time Display Format list out-of-sync with initial current format	The date/time format shown in the GUI now displays in the Environment Conditions dialog box, Set Simulation Date and Time page, Date/Time Display Format list.	VRF-5.1
VRF-6854	SIM: ground tracked movement endless circling forward for tight turns	Changed the move-to-destination such that ground vehicles will determine they have reached the goal when the goal location is inside their turning circle, given their minimum turn radius. This causes a move-to task to exit immediately if the destination starts inside the turn circle. (Wheeled vehicles can do K-turns, but this is only invoked for a turn-to-heading task.) The entity files for all vehicles that can pivot were also changed to reduce their turn radii to 0.3m.	VRF-5.1
VRF-6867	Remove the border from around the Object Console in the Information dialog box	Removed the decorative border from around the Object Console in the Information dialog box.	VRF-5.1, VRF-IPB18
VRF-6872	Landing gear comes down too soon when landing aircraft at aerodrome	Landing gear now goes down when an aircraft is 2 km from the end of the runway and less than 500 ft above it.	VRF-5.1, VRF-IPB19
VRF-6877	VR-Forces sim engine can hang for 10s of seconds when numerous detonations occur in an area with many dynamic terrain switches	Made code improvements to handle changes to dynamic terrain switches, particularly those caused by multiple detonations.	VRF-5.1, VRF-IPB18, VRF-5.0.3-a
VRF-6884	Icons for Fly Creeping Line Pattern and Fly Expanding Square Pattern are incorrect	Corrected the icons.	VRF-5.1, VRF-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6888	View menu > Entity Control Panel does not have checkmark toggle	When the Entity Control Panel is open, the View menu now correctly shows a checkmark to indicate that, as it does for other panels, palettes, and toolbars.	VRF-5.1
VRF-6893	Vehicles back up too quickly when doing a Turn To Heading using a K-turn	Adjusted the default speed for vehicles moving in reverse to be slower than that when moving forward. The desired speed for K-turns is now about 8 kph (5 mph).	VRF-5.1, VRF-IPB18
VRF-6908	SOE Damage Probabilities does not work if damage system is defined in parent SMS	The Damage Probability Results did not work correctly when the damage system definition was in a parent SMS.	VRF-5.1
VRF-6913	AAVC7A1 Landing Vehicle floats above water in SOE	You can now enable or disable the buoyancy model for entities that support it. Click the Visual Effects button and then select the check box.	VRF-5.1
VRF-6922	Change the order of "2D View Layer" and "Observer" section in the toolbar	Changed the default positions of the 2D View Layer Settings Toolbar and the Observer Settings Toolbar.	VRF-5.1, VRF-IPB19
VRF-6928	Aircraft decelerate instantly upon landing	The animation model caused aircraft entities to set their velocity to 0 at the end of an animation.	VRF-5.1, VRF-IPB19
VRF-6929	Can't create new HLA Evolved Connections in Launcher	Fixed an issue with VR-Forces 5.1 IPB17 that prevented users from creating an HLA Evolved connection configuration.	VRF-5.1, VRF-IPB18
VRF-6930	Input validators need to show a warning icon and disable OK button, not prevent input	Simple double and integer variable widgets now allow any data entry, but the OK button is disabled and displays a warning icon if the data entered by the user is out of range.	VRF-5.1, VRF-IPB19
VRF-6934	Rotary-wing aircraft should not have the Land At Airport Near Location task	Rotary-wing entities cannot perform this task. It is no longer available to those entities.	VRF-5.1, VRF-IPB19
VRF-6937	VR-Forces GUI crash with Radar Coverage	Added a check to prevent front-end crashes when showing radar coverage.	VRF-5.1, VRF-IPB18, VRF-5.0.3-a
VRF-6940	Search and rescue sensor shouldn't try to detect whether its entity is embarked	Fixed the embarkation slots on the Nimitz-class Carrier simulation object.	VRF-5.1
VRF-6941	SIM: setting Aggregate-Level health only results in "missing"	When you use the Health set data request on a simulation object, the values change without setting any casualties.	VRF-5.1, VRF-IPB19, VRF-5.0.3-f

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6944	F-18 Remote Control example has components that don't work	Remote entities, by default, are unable to send and receive spot reports. The documentation for the example, and also the user documentation on attaching components to remote entities, now explain how to configure remote entities for that ability.	VRF-5.1
VRF-6949	DtWeatherStateProvider::lineQueryCloudState() returns incorrect data on a Flat Earth terrains	Fixed issues related to the weather query functionality caused by geocentric coordinate conversions.	VRF-5.1, VRF-IPB19
VRF-6952	SIM: vehicle oversteering during about-face to waypoint 30 m behind	The move-to-destination script was modified. When the vehicle is near the goal, it steers directly toward it. When the vehicle is near the planned path, and the Gameware heading is more than 45 degrees from the direction of the current path segment, the desired heading is changed to align with the segment. This prevents the Gameware heading from taking the vehicle to the segment in a perpendicular direction, which would then cause it to overshoot.	VRF-5.1
VRF-6985	SIM: DtScriptVrfObject::isValid() crashing, null mySimulationServices	Fixed to ensure that the necessary data is returned.	VRF-5.1, VRF-IPB19, VRF-5.0.3-c
VRF-6997	GUI: Pressing the Delete key with simulation script folder selected deletes selected unit	Fixed to ensure that pressing the Delete key deletes the selected item in the Scripts window and not any entities selected in the main window.	VRF-5.1, VRF-IPB19
VRF-7001	Air Control Corridors crash backend	The application no longer crashes when a user places an entity after placing a corridor.	VRF-5.1
VRF-7011	Fast Rope Embark task should not be available for use	This scripted task was included erroneously. It has been removed.	VRF-5.1, VRF-IPB19
VRF-7021	Lua Script Metadata always changes "Command Level" to Primary	Some older scripts had a deprecated command level. Where it was 3, it now defaults to Tertiary (all).	VRF-5.1, VRF-IPB19
VRF-7026	Execute Surface Attack should have a task visualization for the initial point	When you assign an aircraft the Execute Surface Attack task and specify an initial point, that point displays as part of the task visualization when the entity is selected.	VRF-5.1, VRF-IPB19
VRF-7030	Clean up Zulu time formatting	Made the format for UTC (Zulu) time more consistent in the UI.	VRF-5.1, VRF-IPB19
VRF-7033	View > Toolbars submenu should be alphabetized.	The toolbars listed in the View > Toolbars submenu are now correctly sorted alphabetically.	VRF-5.1, VRF-IPB19

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7034	Air Base cultural feature object should be renamed Hangar to avoid confusion with airbases	Renamed the Air Base entity to "Hangar" because it is simply a hangar.	VRF-5.1, VRF-IPB19
VRF-7038	Getting sim object by marking text does work for entities on a separate simulation engine	Fixed to ensure that VR-Forces updates the UUID for an entity when a user changes the marking text.	VRF-5.1, VRF-IPB19
VRF-7041	VR-Forces Observer 'Attach Tether Track' fails from top-down projection	Made improvements to how observer attachments are handled when users change from Stealth to Plan View (or vice versa).	VRF-5.1
VRF-7055	You cannot always rename a selection group	The application now allows hot key selection groups to be renamed. After being renamed, they can be selected with the hot key.	VRF-5.1, VRF-IPB19
VRF-7056	Toolbars and dock widgets get bad geometry when moving GUI between 4K and non-4K monitor	Improved handling for multiple monitors, where some are 4K and some are not, on Windows 11 machines.	VRF-5.1, VRF-IPB19
VRF-7057	SOE: New state data isn't available in Munition tab	The SOE now correctly checks and updates parameters for ammunition that is also published.	VRF-5.1, VRF-IPB19
VRF-7067	In Add Group of Simulation Objects, down arrows should not overlap text	The button text in the UI is now clearly legible.	VRF-5.1, VRF-IPB19
VRF-7077	Adding new mesh is missing FBX as a available option in SOE	When you choose to edit a model's visuals and select Other 3D Formats in the Model Definition dialog, FBX is now in the list as one of the supported formats. For more information, see "Editing a Simulation Object's Visual Model" in the user guide or help.	VRF-5.1, VRF-IPB19
VRF-7082	Surface and Subsurface entities run aground in Ground DB II terrain	Fixed the Ground_DB II terrain to allow surface and subsurface entities to move in the water.	VRF-5.1
VRF-7092	Wait Duration task broken when parent entity is destroyed	The controller for the wait duration task now ticks when the parent entity is destroyed, allowing any further tasks or sets in the plan to execute.	VRF-5.1, VRF-IPB19
VRF-7093	Raid SCNX contains two copies of Raid.scn	Removed the duplicate, unused copy of the Raid.scn file from Raid.scnx.	VRF-5.1, VRF-IPB19
VRF-7097	Activation/deactivation of tactical graphics icon is inconsistent	VR-Forces now uses the same icon for the Activation set data request, the Show Only Active Tactical Graphics button on the Display Settings Toolbar, and the Edit Activation Time button in the tactical graphics edit dialog box.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7099	Doing a "reinitialize scenario" on scenarios causes any sync matrices to empty	Fixed to not clear out sync matrices when the user chooses File > Reinitialize Scenario.	VRF-5.1, VRF-IPB19
VRF-7102	Move to Location task not always producing all required routes for unit movement	Corrected the controller to pass routes down to subordinates, allowing them to move where able.	VRF-5.1, VRF-IPB19, VRF-5.0.3-d
VRF-7106	Add Lua call for returning light state intensity for a runway based on a lightgroup	Added getLightStateIntensity(runway, lightgroup) and getLightStateIntensity(lightgroup).	VRF-5.1, VRF-IPB19
VRF-7108	Tanker aircraft don't have tanker platform; refueling fails	Fixed by modifying entities with the refuel supplier system to use the correct OPE file.	VRF-5.1, VRF-IPB19
VRF-7112	Labels for Y (forward) and X (right) are backwards for Ingress and Egress Points	Changed the labels so that they correctly match the defined position.	VRF-5.1, VRF-IPB19
VRF-7116	Task "Articulated Part..." appears at too high a level on the command panel	Moved the Appearance > Articulated Part set data request to the Tertiary Command Level.	VRF-5.1, VRF-IPB19
VRF-7117	Clean up the Set Aircraft Lighting dialog	Made improvements to the Set Aircraft Lighting dialog box to support the new lighting features.	VRF-5.1, VRF-IPB19
VRF-7129	Info dialog doesn't display Emitter PDU after 1 cycle	This is fixed. Previously, the application didn't remove state data when emitters, sonar, IFF, and so on were turned off.	VRF-5.1, VRF-5.0.3-f
VRF-7141	Munition/damage configuration problem	Added kinetic and armor piercing damage tables to the small ship damage system. Small, vulnerable boats now use that small ship damage system.	VRF-5.1, VRF-IPB19
VRF-7146	Text overlays in SOE are difficult to read	Improved the readability of text labels in the SOE's Visual Models Panel by adding text shadows, increasing the font size by device pixel ratio size, and changing the use of red and yellow colors.	VRF-5.1
VRF-7148	Craters are not removed from sim engine terrain on rewind	Fixed by forcing subtiles of the tile being reloaded to be paged out, since it was these stale higher-res tiles that caused the issue.	VRF-5.1, VRF-IPB19
VRF-7154	Generating navigation data from a terrain in a different drive fails	Fixed the functionality to account for relative paths to drives other than C.	VRF-5.1
VRF-7155	Clean up the Set Ground Vehicle Lighting dialog	Made improvements to the Set Ground Vehicle Lighting dialog box to support the new lighting features.	VRF-5.1, VRF-IPB19

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7156	Clean up the Set Surface Vessel Lighting dialog	Made improvements to the Set Surface Vessel Lighting dialog box to support the new lighting features.	VRF-5.1, VRF-IPB19
VRF-7157	Chaff and Flare not showing in SOE	Added velocity to chaff and flares to allow users to preview the effects in the SOE.	VRF-5.1, VRF-IPB19
VRF-7159	Finite State Machine display shows nil/false values when executing task	Changed the display of state information such that the application doesn't show the task IDs of subtasks anymore but does show a few other state variables. Also, the start state was renamed to "Approaching".	VRF-5.1
VRF-7162	DI-Guys do not move on deck of carrier	Improved the Lua calls to allow DI-Guys that drop onto a carrier to then be able to navigate to a muster point on the vessel.	VRF-5.1, VRF-IPB19
VRF-7167	VR-Forces Backend drops when loading World Geocentric scenario with Time management mode / fixed frame	Resolved a problem that could cause a sim engine crash on scenario initialization with timeManagement fixed frame mode.	VRF-5.1, VRF-IPB19, VRF-5.0.3-e
VRF-7174	SIM: crash/hang looping artillery. DtResourceMonitor::tick().	This is fixed to avoid issues when running scenarios at higher simulation speeds.	VRF-5.1, VRF-5.0.3-f
VRF-7179	Radar is not using the beam index specified in the sysdef	The application now sets the beam ID from the beam index specified in the descriptor.	VRF-5.1, VRF-IPB19
VRF-7186	Register and Move DtSetOrientationType to an aircraft controller	Register and process DtSetOrientationRequest for aircraft. Note that this does not appear in the GUI; It is accessible only using the toolkit or Lua script.	VRF-5.1
VRF-7188	GUI + SIM: units don't show up in GUI on checkpoint load (engagement history)	Fixed a problem with state property publication in vrfVrExtensions.	VRF-5.1
VRF-7193	Emitter number for radar systems not being set	The radar-signature-sensor-descriptor has a section for the emitter-system. In DIS/RPR, the emitter system record has three parts: name, function, and number. The number differentiates two systems in the case where an entity has two systems of the exact same type. It allows for configuration of the name and function, but not the number. Added a new config option to the descriptor called system-number (an integer). In DtVrfEmitterSystem::setDataFromEmitterSystemEntry where we set the system function and name, and also set the system number. This change is published on the network.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7196	Remove older DIS Versions from Launcher	DIS 7 is currently the only supported version. There is no longer support for DIS 4, 5, or 6. (DIS 8 will be supported in the future.)	VRF-5.1
VRF-7197	DtRadioManager::sendControlMessage crash	Fixed by adding needed null checks to prevent crashes in the MAK Radio when the network connection disconnects.	VRF-5.1, VRF-IPB19
VRF-7205	Default remote attachment configurations allow unsupported set requests	Removed many of the sets that were enabled in the default remote attachment configurations because they are not valid for remote entities.	VRF-5.1, VRF-IPB19
VRF-7208	Invalid calls into DtRemoteAttachedObject should not throw exceptions	These are now warnings, not exceptions. Users should check the log to confirm whether calls to remote objects are working.	VRF-5.1, VRF-IPB19
VRF-7219	SimpleCGF example fails to place entities and complete scenario	This is fixed by adding a check for whether global weather has been specified, and also adding flags to the new scenario API to create global weather and dynamic terrain objects. Those latter objects are enabled in the simpleCGF example	VRF-5.1, VRF-IPB19
VRF-7220	Crash can occur when a remote object is deleted before it is fully discovered	DtReflectedExtendedAttributesObjectList now uses the new VR-Link callbacks for objects being added or removed from the waitlist. This allows for proper cleanup of objects.	VRF-5.1
VRF-7233	Multiple empty scripts or Lua scripts with a C++ file extension	Removed scripts with the *.c++ extension but were actually empty files or Lua scripts. Also removed references to those files from the corresponding XML files.	VRF-5.1, VRF-IPB19
VRF-7240	Debug Simulation Terrain Tool Crash when no terrain loaded in sim engine.	Crash no longer occurs if a user loads the terrain only in the GUI, not the simulation engine, and then connects the Debug Simulation Terrain functionality.	VRF-5.1
VRF-7264	Reuse entity identifier on load doesn't	Fixed the ability to reuse entity identifiers between scenario runs for objects that have them. This is set in the vrfSim.mtl file.	VRF-5.1, VRF-IPB19
VRF-7266	Error in aerodromes Lua task parameter widget	Text for Aerodrome Near Location correctly shows only location if the user does not select an aerodrome. Lua code will find a suitable aerodrome near that location.	VRF-5.1
VRF-7276	Shortcut to Adding Content manual should read "Adding Content to MAK ONE Applications"	Corrected the text of the shortcut link to the reference manual.	VRF-5.1, VRF-IPB19
VRF-7277	Cruise missile maximum speed is too low	Corrected the maximum allowed missile speed for the cruise missile to allow for up to Mach 10.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7278	GUI: late joining GUI does not draw tactical graphics and obstacles on 2D map	This is fixed. The problem occurred on terrains that were not geocentric. The tactical graphic listener did not respond to a coordinate system change, which resulted in late joining tactical graphics (if discovered before the coordinate system changes for the terrain) not displaying properly.	VRF-5.1, VRF-IPB19, VRF-5.0.3-g
VRF-7281	Sim: PerformAttrition.lua won't allocate casualties when only 2 personnel	There was an issue in an aggregate-level unit with only two personnel, one officer and one enlisted, where the unit's health would decrease but it would not indicate that any personnel in the unit were wounded or killed. Fixed by adjusting the rounding calculation.	VRF-5.1, VRF-IPB19, VRF-5.0.3-h
VRF-7285	Constructed bridges sometimes appear below terrain?	Fixed as part of the changes to tactical graphics.	VRF-5.1
VRF-7288	Set Enable Refueling Point can cause GUI crash	Added a null pointer check on the refuel points state property to prevent crashes.	VRF-5.1
VRF-7313	Debug Simulation Terrain causes crash when enabling Show Skin	Fixed to prevent the crash.	VRF-5.1
VRF-7324	Back-end crashes with RTDynamics test scenario	Fixed to prevent memory corruption caused by releasing a lock before sending an OPS message.	VRF-5.1, VRF-IPB19
VRF-7325	VR-Forces Launcher configuration always loses saved FOM revision configuration.	Updated the Launcher to ensure that it respects the configured rprFomRevision and does not overwrite the XML settings file to remove it.	VRF-5.1, VRF-IPB19
VRF-7330	Crash in human move-to when the control point is invalid	Fixed by ensuring that deleted simulation object references are not de-referenced.	VRF-5.1, VRF-5.0.3-g
VRF-7331	Crashing in resolving marking text from UUID	Added a check to prevent crashes related to publishing observers when there are multiple instances of the VR-Forces GUI (front-end) connected to a simulation.	VRF-5.1, VRF-5.0.3-g
VRF-7337	Aggregate-level air units cannot perform combat on initial placement	Defined default loadouts for each of the relevant aggregate-level units to grant them combat capability upon creation.	VRF-5.1
VRF-7360	Execute Gun Attack fails due to script error	Fixed the execute_surface_attack script and also updated it to accept points as well as entities. The Hawaii Air scenario now uses the Execute Gun Attack instead of the deprecated strafe task.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7362	Time/Date PDU (at least in DIS) not used on remote back-end	Fixed to ensure that date/time is dead reckoned when on a remote back-end so it advances the same as the back-end that is locally simulating it.	VRF-5.1
VRF-7372	FtwFW 2 in Hawaii Air flies straight up	Updated the evade_missile Lua script to have less aggressive climb and turn rates.	VRF-5.1
VRF-7374	Prevent circular references to parentFile when promoting entities in SOE	If the promoted filename is the same as the parent filename, change the promoted filename to include _Promoted. Users can edit the promoted filename if desired.	VRF-5.1
VRF-7382	Sensor blanking dialog still uses radians	Corrected the Set Sector Blanking dialog box to use radians (specifying angle and not heading).	VRF-5.1
VRF-7392	Rare crash running RTD scenario faster than real time in a boost signal	Made improvements for tracking items set for deletion and clearing the list to free up memory.	VRF-5.1, VRF-IPB19
VRF-7398	disembark generate warning on entity	Fixed the disembarkation for DI-Guy entities when walking on an object that does not have high fidelity geometry.	VRF-5.1
VRF-7400	Fire for Effect tasks do not select the specified ammunition when user edits statement in plan	Fixed to ensure that the current resource from task is selected in the weapon selection widget.	VRF-5.1
VRF-7405	VR-Forces crash when loading shape file of specific format	Instead of crashing on feature transform when transform fails due to unknown projection, VR-Forces now provides information to the user.	VRF-5.1
VRF-7406	Changing laser designator code on sensor view creates a second laser designator with previous code	Fixed the front-end to monitor changes to the designator code and also fixed the lasing controller code.	VRF-5.1
VRF-7416	Need specialized callback for IFF interrogator and reply interactions in DIS	VR-Forces now checks the transmission indicator to determine whether the IFF interaction is a reply interaction. If it is, it then checks to see whether it is lethal.	VRF-5.1
VRF-7418	Default emitter number is 0, which is invalid according to DIS	Default emitter number is now 1.	VRF-5.1
VRF-7420	Emitter system is checking the state component ID instead of the emitter ID	Fixed to call the correct function for checking the emitter system ID.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7433	Issue with aggregate-level loadouts	Fixed an issue where, when a user removed a row, only the name cell was removed. That caused a mismatch between data and name. The entire row is now correctly removed. There was also a problem setting the code for the property map: some map items were either removed incorrectly, overwritten incorrectly, or not removed at all. It is now standardized to always use the key value to either add, remove or update an item (not the position count).	VRF-5.1
VRF-7453	OSGEarth elevation in sim engine can page at higher LODs than max_data_level	Made a change to limit tile load requests to the specified max_data_level in the earth file, even when more detailed data exists.	VRF-5.1, VRF-5.0.3-h
VRF-7462	Cover Points scenario does not run because Circle Around Location is not defined for non-pedestrian humans	Changed the circle_around_location Lua task to once again allow it to be assigned to military units as well as crowds.	VRF-5.1
VRF-7473	vrflauncher does not seem to accept command line arguments with quotes	Fixed an issue that caused VR-Forces to not properly process command-line options entered in the Launcher's GUI.	VRF-5.1
VRF-7474	Laser designator "ID" field is not needed and can be removed from Information dialog box.	The ID field has been removed from the Laser Designator page of the Information dialog box. Where needed, the hostname and code are enough to identify laser designators.	VRF-5.1
VRF-7480	Example GuiThreadRemoteController need a clear button on the input line	Added a clear button to clear the command line, and also a button to allow for map selection (such that every map click does not go into the command window).	VRF-5.1
VRF-7487	Fly loiter hold pattern after fly loiter hold figure 8 runs longer than specified duration	Changed how the application starts measuring the time spent performing the task to better adhere to the specified time.	VRF-5.1
VRF-7502	Scenarios missing Scenario Description	Some scenarios were missing descriptions. They have been added.	VRF-5.1
VRF-7528	Radar mode does not show all configured modes	Updated the Radar Mode dialog box for that set data request to accept additional mode information after the first is received. The functionality did not previously wait to receive all emitter responses for the entity from the simulation engine. (For example, if an entity had more than one emitter system, it populated the dialog with information from the first system and ignored the rest. The next time a user opened the dialog box, it checked the data again and, because it was all there at that point, it populated correctly.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7530	Switching radar mode causes duplicate entries in drop-down list	Previously, the application added a new entry to the list in Radar Modes set data request dialog box whenever it discovered a new emitter number. This is fixed to prevent duplicate entries.	VRF-5.1
VRF-7535	Emitter systems can be slow to be discovered	Whenever a new simulation object is discovered, VR-Forces now rechecks all of the discovery criteria for emitter systems, IFFs, and active sonar. Once their host object is discovered, any waiting systems can be discovered, as well.	VRF-5.1
VRF-7541	Update Target Priority List dialog box is unreadable in dark mode.	Fixed the style on the Update Target Priority List dialog box. The background of the Priority column is now colored to ensure that the text is legible in both dark and light modes.	VRF-5.1
VRF-7543	Lua doc fixes/cleanup/expansion needed for weaponUtil, contactsUtil, threatLevelUtil	Cleaned up and added comments to these files.	VRF-5.1
VRF-7546	Actions without display names aren't added to animation task dialog.	Fixed issue where DI-Guy actions without display names weren't added to the DI-Guy Animation task dialog box. They now use the action ID when no display name is defined.	VRF-5.1
VRF-7556	DtVrfEmitterSystemPublisher should not be hidden	In HLA, VR-Forces used its own subclass of VR-Link's DtEmitterSystemPublisher to ensure that beam creation was done in a threadsafe way. However, this made it harder for plug-in developers to override because this class was not exposed in any header files. Moved the definition of this class to the header. Also added a new method, createBeamPublisher(), that developers can override when they simply want to change how the beam publishers are created and initialized.	VRF-5.1
VRF-7557	Remote attached component Flare/Chaff Launcher error	Fixed an issue that caused an error to display when a user attached a chaff/flare component to a remote entity and then ran the scenario. (The error was that nextFrameIsEmbarked method was unimplemented for DtRemoteAttachedObject.)	VRF-5.1, VRF-5.0.3-j
VRF-7565	Same SMS is loaded on scenario load because of path check	When a scenario is loaded that has the same SMS as the scenario that was previously loaded, it no longer tries to reload visuals and files. This prevents a possible lock contention issue that rarely threw an exception.	VRF-5.1
VRF-7568	Rarely an object can be published on the network while it is being deleted	Added a locking mechanism for individual publishers to ensure that if a simulation object is deleted while it is publishing, it now waits until publishing is complete.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7576	Soldier not choosing to shoot when it should	Fixed by reworking the registration of reactive tasks to be valid after the initial registration	VRF-5.1
VRF-7580	Observer view 32 - Tether HMMWV 1 in the Weather scenario needs to be updated	Repositioned the observer position such that power lines do not obstruct the view.	VRF-5.1
VRF-7590	Air turbulence level call only works sometimes	Made a number of fixes to ensure that the air turbulence level call works consistently. The current frame updates correctly, and the area and volume information is accurate.	VRF-5.1
VRF-7595	Issue reading wildcarded enumerations	Fixed to ensure that particle effects, such as those around that appear at the muzzles of weapons when fired, display correctly.	VRF-5.1
VRF-7610	Fleeing humans are jumping around	Fixed the flee_from_threat Lua script. This improves the appearance of the behavior and also performance.	VRF-5.1
VRF-7619	Warning icons not showing in object list and gumball charts not shown correctly on map for 4K monitors	Fixes for 4K monitor (especially when set at 150% scale) for aggregate-level gumball chart icons and warning symbols.	VRF-5.1
VRF-7620	Entity Control Panel does not work well for rotary wing aircraft	Improved the logic for non-geocentric terrains to ensure the Entity Control Panel works for rotary-wing aircraft regardless of the terrain.	VRF-5.1
VRF-7623	Simulation engine crash in scenario with DI-Guy movement.	Fixed warning output for human movement when the control point did not exist to prevent a crash.	VRF-5.1
VRF-7635	Simulation object groups didn't put tactical graphic in the correct overlay	Fixed an issue where simulation object groups (SOGs) such as the SA-21 Battalion would not add any associated tactical graphics in the overlay represented by the tactical graphic icon and instead in a separate overlay labeled "Tactical Graphics".	VRF-5.1
VRF-7637	Show Weather Areas Filled option in Local Weather Zones no longer relevant	Removed all of the code for filling in weather area--including the check box in the Local Weather Zones page of Environment Conditions--because the ability has been removed.	VRF-5.1
VRF-7642	Aggregate/Unit entities will not show themselves as destroyed	The application had trouble determining when all subordinates were destroyed--specifically those that were part of a unit/aggregate comprised only of units/aggregates--and therefore would not show the parent unit/aggregate as destroyed. This is fixed.	VRF-5.1, VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7645	VR-Forces/RTDynamics plug-in crash with multiple backends	Fixed such that the application does not create a global environment when looking for weather objects if not created. Also added a try/catch around dateTImeOfDay as an additional prevention.	VRF-5.1
VRF-7648	Fix or remove ability to assign overlay layer to aerodrome	In the Promote Aerodrome dialog box (formerly Compute Aerodrome), there is no longer an Overlay option. It is no longer necessary.	VRF-5.1
VRF-7652	Remove daylight saving time hardcode from timezone	Standard time is now always used.	VRF-5.1
VRF-7653	high-altitude-feature-los-query is no longer supported	Removed from both the descriptor class as well as from the three SMSs (base, EntityLevel, AggregateLevel).	VRF-5.1
VRF-7668	Translation Forward/Right are reversed for articulated parts	Changed the X and Y axes for articulated part translations on receipt from the network.	VRF-5.1
VRF-7677	Cannot perform set location on missile if data not available	Changed the settings applied to missiles on creation to ensure that they are not clamped to the ground. Additionally, when the position is set, it now intersects at the proper location.	VRF-5.1
VRF-7680	SetConcealed only happens once, you can never unconceal	Fixed to allow a simulation object that had previously been set to concealed (Set > Disposition > Concealed) to later be set to not concealed.	VRF-5.1
VRF-7681	VRF crashes after reaching max entity creation	Fixed to call the correct remove and delete.	VRF-5.1
VRF-7683	"FČ ČATEŽ" would display correctly in the name field but then change to "FC CATEZ" in the label field	Fixed the Label field to use the same 8-bit translation routines as the Name field to correctly display characters.	VRF-5.1
VRF-7690	Allow for negative values to be entered for Target Region Frustum	Frustum range is now -360 to 360.	VRF-5.1
VRF-7696	Crash due to invalid pointer being accessed when loading terrain	Added a null pointer check for myTerrainEngine.	VRF-5.1
VRF-7703	Crash when switching friendly/opposing for spot reports	Fixed to ensure that a DtSimStateObject safely has a handle to its DtSimEntry.	VRF-5.1
VRF-7709	SOE lists two Fall From Sky Dynamics movement systems	Corrected the sysdef file to ensure that it is listed only once.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7712	Update Rope_Demo scenario	Removed the rope ladder extraction on the ship. Added a new vignette that shows soldiers fast-roping off of a rotary-wing and onto a moving cargo ship.	VRF-5.1
VRF-7722	Luadoc has error in description of set-formation.	Changed the description of set-formation to indicate that it changes subordinate positions immediately, and set-formation-type to indicate that it does not.	VRF-5.1
VRF-7729	Graphviz/dot.exe is not getting packaged in bin64	The installer now includes dot.exe in .\bin64\Graphviz.	VRF-5.1
VRF-7731	Copy Names in List to Clipboard does not preserve order	When an SOE user chooses Edit > Copy Names in List to Clipboard, the list now pastes in the order shown in the SOE's list.	VRF-5.1
VRF-7733	Double-clicking on entity within formation editor jumps mouse to taskbar	Corrected how current cursor position is handled in the SOE.	VRF-5.1, VRF-5.0.3-m
VRF-7736	The print in DtGroundInteractionPt::calculatePosition() should not be a warning	Set this to verbose.	VRF-5.1
VRF-7739	Creating a new Selection Group with hot keys doesn't overwrite existing one with the same number	Fixed to allow users to ensure that when a user creates a Selection Group using hot keys that is the same as a previously created group, the previous group is completely removed.	VRF-5.1
VRF-7741	Surface Entity Patrol Route Realignment	Fixed the script to move entities more smoothly and also avoid periodic brief sharp turns.	VRF-5.1
VRF-7742	Sensor contact info is not updated lastDetectionTime if multiple sensors on same entity were tracking a target	Corrected and improved the code for merging two sensor contact infos.	VRF-5.1
VRF-7744	Spot report dialog shows time of report with bad formatting	Fixed the time format in the Information dialog box for military time.	VRF-5.1
VRF-7749	Air pressure is not correctly synced between two sim engines	Fixed an issue where the simulation engines receiving the weather data from the network had the pressure off by 10 times.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7752	DtWeatherStateProvider::lineQueryPrecipitationState() could potentially return incorrect precipitation segments data	Fixed by modifying the calculation of the query chord intersections with the precipitation areas (within the weather objects).	VRF-5.1
VRF-7754	Timing crash on rewind with emitters (found with RTDynamics plug-ins)	Added a check to prevent crashes.	VRF-5.1
VRF-7755	Transfer Supplies task dialog does not populate with values when editing an existing plan statement	Fixed to ensure that the correct values from the task display if users choose to edit the parameters.	VRF-5.1
VRF-7757	Occasional simulation engine crash from multiple burst detonations in the same tick	Fixed the code to be more thread-safe when multiple detonations that use burst fire occur in the same tick.	VRF-5.1
VRF-7758	Keyboard control to adjust pitch is now Shift+Alt	The keyboard controls for dynamically setting the pitch of an object changed due to the new functionality for incrementally adjusting pitch, heading, and altitude.	VRF-5.1
VRF-7760	DI-Guy un-pauses visuals if picked up and placed while scenario is paused	Fixed so that, when users reposition a DI-Guy character while a scenario is paused, it does not animate after it is placed until the scenario starts playing again.	VRF-5.1
VRF-7764	DI-Guy entities face wrong direction and/or animate poorly when embarked on entities that have nav data	Updated to ensure that DI-Guys that are embarked on an entity with navigation data can move with the correct orientation.	VRF-5.1
VRF-7768	Entity Control Panel doesn't work for some entities in existing scenarios	The application now uses a more generic match type if the specific match is not found to ensure that users can control the selected entity from the Entity Control Panel. Note that this panel works only for aircraft and watercraft.	VRF-5.1
VRF-7770	Creating domes and circles can be finished with right-click	Fixed to ensure that tactical graphics use only double-click to finish drawing them, never right-click.	VRF-5.1
VRF-7775	GUI crash moving task-generated target point	The application now checks whether the environmental that the user is editing has points.	VRF-5.1
VRF-7778	Ground DB II has an extra surface on the water	Fixed the Ground_DB II terrain to allow surface and subsurface entities to move in the water.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7782	SIM: engage_from_firing_position.lua creates an aiming point with no vertex, crashes GUI	If the target for Provide Suppressive Fire on Object is a line, the start location is now the first point of the line, rather than no point being specified.	VRF-5.1
VRF-7788	Tank unit doesn't make it to end of route.	Updated the calculation in ground unit movement systems to ensure that aggregate units reach their destinations.	VRF-5.1
VRF-7799	Multi-thread crash in nav data	Fixed an unprotected access to the navigation area data in the update() function to ensure it is performed after the mutex is locked.	VRF-5.1
VRF-7804	GUI crash on changing scenarios after modifying unit patches	Fixed the code for setting unit patches. This prevents a crash in cases where a user makes changes and the parameters are still open when something happens to remove the soldier entity from the scenario.	VRF-5.1
VRF-7807	SIM: setting ammunition on aggregate level not working	Restored the ability of the Ammunition set data request to change the ammunition supplies for entities in aggregate-level simulations.	VRF-5.1
VRF-7817	GUI: weather edit visibility is always in KM, can't set value to less than 1km.	Fixed an issue where users could not set the visibility in local weather areas to decimal places (for example, 0.5 km) when the Display Units Settings for Visibility allowed one or more decimal places.	VRF-5.1
VRF-7818	Pattern Hold Location does not show the task visualization	Fixed to use the altitude of the task rather than the location to ensure that the task visualization displays above the terrain.	VRF-5.1
VRF-7822	SIM: unit move along route fails, aggregate level	Updated the script for Move Along Route to work correctly in aggregate-level scenarios.	VRF-5.1
VRF-7823	Hawaii Air scenario: rotary-wing collides with terrain	Removed the rotary-wing Terrain Following vignette from the scenario.	VRF-5.1
VRF-7837	Translating scripted tasks does not seem to work	When loading scripts locally, the application once again loads translation files.	VRF-5.1
VRF-7840	SIM: aggregate-level aircraft fail to detect each other and engage	Engagement zones now have a default ceiling that extends high enough that aircraft will fall within the zone.	VRF-5.1
VRF-7850	Gound Vehicle Move Along Route does not update destination vertex when entity is moved by user	Updated the ground move-along controller to reset the destination vertex.	VRF-5.1
VRF-7851	Inconsistencies in Aggregate Display toolbar vs right click menu	Removed the icon for the Collapse option in the context menu for units to be consistent with the toolbar for units.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7853	SIM: Aggregate Level artillery attack continues after magic move and skip task	When an aggregate-level limited munition attack is canceled, all of its attacks are immediately canceled.	VRF-5.1
VRF-7864	Unit Display Settings: Publish Unit Formation Routes option under Aggregate Level Only	Moved the Publish Unit Formation Routes check box into the main section of the Unit Display Settings. It did not belong under Aggregate Level Simulation Model Only.	VRF-5.1
VRF-7870	Error in function to determine if agg unit has passed route point	Corrected the error in the code to ensure that the controller returns the correct value when it checks whether the unit has passed the route point due to a situation such as a long tick.	VRF-5.1
VRF-7875	Crash in DtSimObjectNetInterface::tick()	Made a number of fixes to address issues with threading.	VRF-5.1
VRF-7881	Continuous Debug level output of "Could not get attribute "UUID", name not recognized" from sim engine	Debug output for missing attributes is now only printed once per attribute per object.	VRF-5.1
VRF-7882	Crash in SOE during dialog close	Fixed an issue that could result in a crash when the user closed the Formation Editor using the X button.	VRF-5.1, VRF-5.0.3-m
VRF-7893	Boeing 707 type isn't matched in any .entity file and it just hangs in mid air	Added a match type in the Boeing 747 for this entity. In shipped scenarios, replaced any Boeing 707 entities with other Boeing aircraft.	VRF-5.1
VRF-7904	Tasks that require aerodromes should have text displaying if no aerodromes are in the terrain.	Tasks that require an aerodrome now check whether any are defined in the current terrain. If there aren't any, the task parameters inform the user. Users can then select a terrain with aerodrome information.	VRF-5.1
VRF-7908	Sim crash pausing and/or rewinding this AggregateLevel scenario	Fix a sim crash that could occur when a Lua script tried to access a state or parameter property for an entity that was already deleted.	VRF-5.1
VRF-7914	DI provide suppressive fire with grenades if target is close	Add a weapon-parameter for "allow-suppress" that, when set to False, prevents entities from choosing the weapon for suppressive fire if the task is set to auto-select the weapon.	VRF-5.1
VRF-7920	Entities do not avoid obstacle areas placed in nav areas	Obstacles are now added to all overlapping navigation areas, not only the first one in the list.	VRF-5.1
VRF-7929	Cannot fast rope onto moving ship	Human characters can now perform the Fast Rope task from an aircraft onto a moving surface watercraft.	VRF-5.1
VRF-7933	Crash in sendTask caused by mistake in Lua script	Changed to be a console warning instead of an assert to prevent a crash when a Lua script has a sendTask after a vrf:endTask() statement.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7934	Geocentric point entry in GUI is messed up for Z coordinate	The altitude for geocentric no longer reflects the display settings altitude.	VRF-5.1
VRF-7936	addSensorPropagator should be modified since there is no more forest areal	Re-tiled the forest feature area on the server to be on only one layer.	VRF-5.1
VRF-7946	Gameware path planning returns no-path if terrain not loaded	Fixed to ensure that offset routes are always created on the terrain, not beneath it. Previously, when creating offset routes for subordinate entities of a unit performing a movement task, the application did not properly check whether data was available on all terrain intersections when clamping the vertices.	VRF-5.1
VRF-7947	modifyWeatherModel example does not show the right temperature	Corrected display of the unit for temperature.	VRF-5.1
VRF-7948	Lua doc is incorrect	Corrected the documentation.	VRF-5.1
VRF-7950	Change to how LCAC height is set causes embarkation issues	If an old scenario has an entity embarked on an LCAC, and the entity embarked on that LCAC looks to be sunk into the deck, select the LCAC and set the Appearance for the power plant status to off then back to on. This should reposition the entity.	VRF-5.1
VRF-7951	Lifefoms don't disembark correctly from rope in rope insertion	Fixed to use the height of the attached object and altitude to entity to determine whether an entity can use the attached object's nav area.	VRF-5.1
VRF-7952	When embarking in car, sometimes entity jumps immediately to the seat	If the vehicle is still moving at the beginning of the embarkation task, the application now checks whether the vehicle is slowing to a stop before teleporting the human entity into the vehicle.	VRF-5.1
VRF-7955	luaFromRwFunctionMap can be called from multiple threads unsafely	Add mutex around luaFromRwFcnMap() to prevent multithreading issues.	VRF-5.1
VRF-7957	Various crashes in net interface code when you click Rewind very quickly in succession	Made improvements to prevent crashes if a user clicks the Rewind button repeatedly.	VRF-5.1
VRF-7960	Patrol Area task does not account for relocated patrol area.	If there is a change to the area that a watercraft entity is patrolling, the application now recomputes, allowing the entity to patrol the changed area.	VRF-5.1
VRF-7963	tick-overflow-strategy mode 2 does not work in the sim engine sensors	Fixed a logic issue that caused sensors to fail to detect after one detection cycle when the sensor detection period was consistently overrun.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7970	Can no longer edit a spawn pattern or completely delete it after renaming it	Corrected an issue that caused several issues with user-created spawn patterns if the user changed the name.	VRF-5.1
VRF-7974	Clean up dev guide related to METOC and Dynamic Terrain object models	Some of the documentation has been moved from the VR-Forces Developers Guide to the MAK ONE Interoperability Guide. Please refer to the new chapter on the MAK object model.	VRF-5.1
VRF-7975	VRF does two terrain intersections per sensor calculation for sensing humans	Sensor calculations looking at humans were doing an extra terrain intersection to check whether they were swimming. Changed this to be based on posture instead of terrain.	VRF-5.1
VRF-7983	Entities (platforms) defined with gui-can-aggregate = True	Corrected entities where this setting should have been set to False.	VRF-5.1
VRF-7997	Load Scenario dialog box does not default to most recent directory	After loading a scenario, the next time you open the Load Scenario dialog box, it once again defaults to the directory you used before.	VRF-5.1
VRF-7999	Editing multiple entities to set their heading also rotates their positions	Changed the Editing Multiple Objects dialog box. The first field's label now reads "Rotate" to make it clearer what editing the value will do. Also added a description to explain what will happen if the user enters a Rotate value.	VRF-5.1
VRF-8001	SOE - Changes need to be saved multiple times	If you save an SMS and then exit the SOE, you are no longer prompted to save the SMS. The SOE recognizes that there are no new changes to save.	VRF-5.1
VRF-8012	Scud missiles when tasked to launch only launch the first time the scenario is run.	Fixed to correctly initialize the state when necessary.	VRF-5.1
VRF-8016	Entity Type can't be changed in the SOE when creating a new entity by copying.	Fixed to allow users to change the entity type after using the New Model from Existing (Copy) feature.	VRF-5.1
VRF-8017	Deleting a formation file can cause a bad formation file to be written from the SOE	In the SOE, if there is no name for the formation when you are editing, it now assigns a name based on the word "Formation".	VRF-5.1, VRF-5.0.3-m
VRF-8022	set Ordered formation is not in documentation, nor is there any documentation in the lua script xml file.	The Ordered Formation set data request is now in the user documentation.	VRF-5.1
VRF-8026	RemoteControl example does not work with DIS	Corrected the instructions for the example.	VRF-5.1
VRF-8027	SOE - Only the Stinger is tagged as a missile	Ensured that the Missile tag was applied to all relevant Munitions simulation objects.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-8028	Lua error from paratroopers in scenario if interrupted while parachuting	Fixed by not enabling a lifeform's reactive tasks during the airdrop, which ensures that the parachuting task isn't interrupted.	VRF-5.1
VRF-8033	Remote control example doesn't keep time	The Remote Control Interface example was updated to correct a bug that prevented the local simulation time from being updated. Added a call to controller->communicationManager()->run() to start the local exercise clock. Since the controller->tick() function causes the simTime to be updated, the call to setSimTime in the main loop was removed. A new command "time" was added to the text interface to print out time from the environmental object, time from back-end status, and local sim time.	VRF-5.1
VRF-8038	Unable to cancel lasing task on entities with sensor gimbal	When the task is canceled, the laser designator is now turned off.	VRF-5.1
VRF-8041	Autonomous Lasing no longer works, and is no longer needed with new weapon system.	The Lase Autonomous set data request has been removed.	VRF-5.1
VRF-8045	New entity type copied from existing using the model menu item does not copy the tags	Fixed to ensure that the existing model's tags are included when users create a new entity type from it.	VRF-5.1
VRF-8046	Enter keys do not have consistent behavior in the Create New Model dialog	The OK button is now the default to ensure that the Return/Enter key works the same, regardless of whether it is the one on the primary keyboard or the one on the keypad.	VRF-5.1
VRF-8053	Dismount Vehicle Crew script issues movement before unit fully disembarked	Movement does not begin until the unit completely disembarks.	VRF-5.1
VRF-8056	Entity Invulnerability mode causes crash	Added a check to ensure that a target is still valid before using it.	VRF-5.1, VRF-5.0.3-m
VRF-8057	Cease Fire task is not documented	The Cease Fire task is now in the user documentation.	VRF-5.1
VRF-8060	Old scenarios with artillery tasks display out of ammo warnings	If you have any scenarios from a release prior to VR-Forces 5.0 that include entities that are using the M107-155mm resource as a munition for fire for effect tasks, you must modify the scenario to use newly assigned resources. For instructions, see the knowledge base or the Migration to VR-Forces 5.0 chapter of the VR-Forces Migration Guide.	VRF-5.1, VRF-5.0.3-n
VRF-8062	Entity disappear with one way road on this terrain config	Added protection in the application when bad road data in a terrain could cause a road to have no lanes.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-8082	Changing force on environmental will not trigger FOW changes	When the force on a simulation object should cause it to be hidden due to fog-of-war settings (spot report viewpoint), it is correctly shown or hidden.	VRF-5.1
VRF-8083	Menus in GUI are recreated if other GUIs start	VR-Forces now checks whether the local GUI was the one that opened the menu.	VRF-5.1
VRF-8084	Recreating menus when an immedate task/set dialog is up can cause a crash	If the menu is being cleared and there is a current dialog, cancel it.	VRF-5.1
VRF-8085	Filter out grenades as option for suppressive fire	The Provide Suppressive Fire Tasks now limit available weapons to ballistic guns.	VRF-5.1
VRF-8094	Edit tactical graphics latitude and longitude dialog does not accept certain locations	Previously, it checked for values greater than 59. It now checks for values greater than or equal to 60.	VRF-5.1
VRF-8095	Empty searchPaths for RemoteObjects	The application now correctly initializes with the SMS search paths.	VRF-5.1
VRF-8097	Model Definitions in VR-Forces GUI are all yellow	Made a fix to prevent the error '[definition] found in multiple files' from displaying when it's not appropriate.	VRF-5.1
VRF-8098	Year in Date/Time widget in Linux Environment Conditions dialog is only 2 digits	For Linux, the date in the VR-Forces-specific date/time entry widget now uses a 4-digit year at all times, regardless of the system settings.	VRF-5.1
VRF-8099	Snapshot and checkpoints fail after 40 minutes or more of real time	Fixed VR-Forces to close a handle that was opened for reading during save.	VRF-5.1
VRF-8103	Sensor Gimbal adjusts position when paused	When a scenario is paused, the gimbal controller and actuator no longer make any updates.	VRF-5.1
VRF-8104	Move to altitude not precise enough for fast roping	Added an option to the move-to-altitude task to specify the maximum distance from the target altitude the aircraft should reach before it considers the task complete. If not specified, the aircraft default is used, as in previous releases. This option is not available in the GUI, only in scripts or code.	VRF-5.1
VRF-8113	Crash changing scenarios	Improved the code to correctly handle deleted methods that Windows previously allowed to be called.	VRF-5.1
VRF-8117	Subpage in Vantage Developer's Guide section of VR-Forces Developer's Guide is inconsistently labeled as .9 instead of 12.9	Fixed an issue that was present only in the Vantage Developer's Guide portion of the VR-Forces Developer's Guide.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-8123	Units in create dialog do not match what is drawn on screen for ellipses	Corrected the units of measurement used in the create and edit dialog boxes for all circular and elliptical simulation objects.	VRF-5.1
VRF-8127	Visual model data does not save out correctly in extended SMSs	Fixed to merge changes from system visuals to local SMS copy of visuals.	VRF-5.1
VRF-8130	Behavior Engine has error in call to exitFn	Fixed a bug in the Lua Behavior Engine that would cause a Lua error if a node with an exit function is stopped by, for example, and endWhen or failWhen trigger.	VRF-5.1
VRF-8139	Set IFF and Set Radar Mode dialogs cannot be used before entity is created	Updated the IFF and Radar Mode set data requests to allow users to enter data even when an entity is not selected. This allows you to create a plan for an entity that will be created at a future point in the scenario. For example, you can edit the custom plans for entities that will be generated by a spawn point.	VRF-5.1
VRF-8141	Ground vehicles cannot move along roads when starting off a road and on ground that is not near sea level and are inside a nav area	Made changes to allow vehicles to better move along roads using the Move To Location/Waypoint (Plan Along Roads) tasks.	VRF-5.1
VRF-8152	Fire Event Range Field is not correct when dropping bombs	The application now sets the range value in the Fire event to the correct value when dropping bombs.	VRF-5.1
VRF-8153	Civilians with moderate injury just go prone instead of playing injured prone animation.	The application wasn't selecting the injured prone action for moderate injury because it wasn't set as intrinsic. This is fixed.	VRF-5.1
VRF-8154	Cursor gets into bad state when picking locations/waypoints in tasks and moving map	Fixed an issue where the cursor would continue to appear in the Select Location mode after the user selected a location. This was most common in 3D mode when the user used the right mouse button to adjust the view.	VRF-5.1
VRF-8159	3D model broken in extended SMS without duplicated visual data files present	Fixed to merge changes from system visuals to local SMS copy of visuals.	VRF-5.1
VRF-8183	Too much console output when cannot lase target	If laser designator is lost, the weapon system no longer continuously prints warnings. Once is considered sufficient.	VRF-5.1
VRF-8193	Provide Indirect Fire does not retain fuse type settings	The Fuse setting for the Provide Indirect Fire task is now correctly applied.	VRF-5.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-8204	Remote Graphics Crashing VRF	Fixed the signal disconnect to prevent the crash when visualizing remotely drawn objects.	VRF-5.1
VRF-8206	SIM disconnects after Paratrooper airdrop task	Fixed issues that resulted in an infinite loop in the air drop script.	VRF-5.1
VRF-8240	In ControllerComponent enableScritedTask function misspelled	Corrected the typo (in the controller component where it's defined and in the weapon manager component where it's called). The function is now "enableScriptedTask".	VRF-5.1
VRV-1008	Ocean performance	Improved performance when dynamic ocean is enabled by lowering the grid resolution.	VRV-3.1, VRV-IPB18
VRV-1048	long makeCurrent with multiple windows causes optional jobs to never run	Fixed code to correctly support multithreading.	VRV-3.1, VRV-IPB18
VRV-1830	exampleElementAttributesPlugin, examplePostProcessor, exampleProjectile, exampleSymbolDecoration, exampleSymbolFacade, exampleToolbar, exampleTacticalGraphics missing documentation	These examples are now documented in the class documentation.	VRV-3.1, VRV-IPB18
VRV-1972	Crash adjusting shadow map resolution with certain settings	Addressed issues that could cause a crash on Linux when users adjusted shadows.	VRV-3.1
VRV-2029	Vehicle headlights performance loss	This is fixed by the optimizations to indirect, including those for indirect light points. Enabling vehicle headlights no longer drastically reduces the frame rate.	VRV-3.1
VRV-2188	Varjo Overlay not rendering correctly	Virtual reality providers can now optionally request a stereo overlay. This takes the overlay texture and renders it on a floating quad in front of the user. The renders from the floating quad are then submitted as the overlay textures to the headset. This is only available on Varjo.	VRV-IPB9, VRV-3.1
VRV-2213	Sun rays are displayed in main window based off of the position of the sun in a second camera	This is fixed. In the main window and additional stealth windows, the crepuscular rays are shown emitting from the sun's location in that window.	VRV-3.1
VRV-2362	Overlay icons, widgets incorrectly positioned in VR	Virtual Reality Channels are now added to a HMD window rather than the main window. This ensures that the overlays, widgets, and so on display correctly.	VRV-IPB9, VRV-3.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-2416	Wind must be non 0 before grass is affected by it	A fix in osgEarth now allows grass to blow in rotor wash even when the global wind is set to 0.	VRV-3.1, VRV-IPB16
VRV-2506	Waypoints cast shadows	Waypoints no longer cast shadows.	VRV-3.1, VRV-IPB16
VRV-2819	::dataPath(), ::appPath(), etc. do not return correct values if defined by environment variable	These have been removed, since they did not work and the command-line options for setting these values work well.	VRV-3.1, VRV-IPB18
VRV-3012	Render settings shouldn't modify shadows	The Boolean property for Enable Shadows was duplicated in the shared render settings record. This caused the Enable Shadows option in Shadow Settings to be cleared when users chose to reset their Render Settings to factory.	VRV-3.1, VRV-IPB18
VRV-3058	Floating taxiway signs & runways on flattened airports	Fixed the issues on procedural terrains that caused taxiway signs to appear above the runways.	VRV-3.1
VRV-3159	SensorFX sends excessive spam to console.	The read particle input file output now displays only when the SIGSIM_DEBUG environment variable is set to 1.	VRV-3.1, VRV-IPB16
VRV-3369	Layers for Dynamic Craters get cached	This is fixed. Those layers no longer appear in the cache.	VRV-3.1
VRV-3390	Changing cloud type and sky cover can cause clouds to disappear from scene	This fix prevents clouds from disappearing when clouds are set to a low base altitude and the observer is below the configured fog height.	VRV-3.1, VRV-IPB18
VRV-3514	Remove VR-Vantage IG from start menu; rename VR-Vantage Stealth to just VR-Vantage	The VR-Vantage IG product no longer ships as a separate product.	VRV-3.1
VRV-3611	Update GStreamer to 1.20.2	Updated the GStreamer to a more recent release to improve support for video streams.	VRV-3.1, VRV-IPB18
VRV-3739	DtOsgWidgetLabel's ConstrainToText Size Constraint Policy does not work as documented	Fixed the code to work as intended and described.	VRV-3.1, VRV-IPB16
VRV-3763	DtCigiViewManager does not support removing a view ID from a group	Removed CIGI views from group when group ID is set to "None".	VRV-3.1, VRV-IPB18
VRV-3791	Seems that turning on track histories cause the PVD entity to blip back to the start of the track history	Fixed to ensure that entities do not return to their previous position if track histories are enabled after they start moving.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-3876	The sensor controller should call saveDefaults instead of the GUI	Sensor settings are now saved on exit. This fixes a bug where the settings were not saved when modified by the remote control.	VRV-3.1
VRV-3904	Dead reckoning regression slowing down DI-Guy performance at high entity counts.	Ensured that dead reckoning for DI-Guy entities are multithreaded.	VRV-3.1, VRV-IPB16
VRV-3909	Children particle systems are not affected by play/pause network messages	This is fixed. Child particle systems stop moving when paused and resume when played.	VRV-3.1, VRV-IPB16
VRV-3931	CIGI setWeaponDeployed to false does not seem to work	Added the ability to set DI-Guy item and head appearance correctly in CIGI python packets. This is the way to stow a weapon: set the item appearance to "no_weapon" (this is what DIS does).	VRV-3.1, VRV-IPB18
VRV-3998	Inconsistent line thickness between VR-Vantage and VR-Forces GUI	The application now checks whether values have been set on the listener before using them. It also now accesses and sets the values after the visualizer definition values have been loaded. This ensures the consistent display of lines in both VR-Vantage and the VR-Forces GUI. (The listener values take priority over visualizer definition values.)	VRV-3.1, VRV-IPB18
VRV-4036	SilverLining should cache shader binaries	SilverLining now allows for the caching of shader binaries to disk and use them on the next load. To use this optional functionality, set the option in the SilverLining.config file: shader-cache-path=../appData/cache/silverlining/. Without setting this option, it does not cache shader binaries.	VRV-3.1, VRV-IPB18
VRV-4078	Some attribute group widgets do not support altitude-based scaling or an LOD out altitude	Added the ability for DtValueBarAttribute, DtImageAttribute, DtQuadAttribute, and DtOutlineAttribute to LOD-out based on altitude. Made a change to DtFlatPrimitiveStyle and DtStippledPrimitiveStyle handling of sorted data to pick up needed data changes (and performance).	VRV-3.1, VRV-IPB16
VRV-4103	CIGI Rotorwash at wrong height on Ala Moana	Fixed the CIGI rotor wash on geocentric terrains. It now displays correctly on the terrain and below the entity, rather than above the terrain just below the entity.	VRV-3.1, VRV-IPB18
VRV-4129	Cannot change altitude of intervisibility lines	In the class DtMapMouseCursorFromBullseyeOnMouseCursorUpdater, removed unused DtBasicEditingEventProcessor from input driver event chain that was suppressing mouse events. DtMapMouseCursorFromBullseyeOnMouseCursorUpdater requires last known mouse coordinates, but these are provided by the input driver itself.	VRV-3.1, VRV-IPB16

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4132	--autoReconnectPeriod crashes every single time on Linux	Fixed the issue that prevented Linux users from running VR-Vantage with this command-line option.	VRV-3.1, VRV-IPB16
VRV-4141	exampleEffectPlugin ground clamping doesn't work	Corrected an issue that affected the example in Linux. Added the ability to set the ground clamping cull cylinder radius scale for the facade ground clamping updater. Changed the radius in the example to 1000m; previously it was 10.	VRV-3.1, VRV-IPB16
VRV-4143	examplePostProcessor is broken on Windows	Removed --disableReverseZBuffer in examplePostProcessor startup scripts because the example shader is intended to work with a reverse Z Buffer visually.	VRV-3.1
VRV-4148	Heading values constrained to 360 when using NATO MILS	When the application's Display Units Settings for Orientation was set to NATO-MIL, users were constrained to a value of 360. This is fixed.	VRV-3.1, VRV-IPB16
VRV-4150	Improve VR preview	Made improvements to the display of the VR preview.	VRV-3.1, VRV-IPB16
VRV-4152	Investigate and change rgba16/rgba to rgb16/rgb rtts in HDR chain that don't need the alpha channel	Work group size can now scale, depending on whether hardware supports larger sizes. Previously it was hardcoded to 32x32.	VRV-3.1, VRV-IPB18
VRV-4155	Power lines cause "trenches" in dynamic ocean	You can now specify a layer to not draw to the heightmap using <draw_in_heightmap>false</draw_in_heightmap>.	VRV-3.1, VRV-IPB16
VRV-4157	Rewinding a logger tape can cause aggregate icons to appear if entities in tape are part of an aggregate	This is fixed. Extraneous icons no longer display when you rewind a Logger tape.	VRV-3.1, VRV-IPB18
VRV-4159	HDR does not cache shader binaries	Fixed the code to allow for caching of shader binaries.	VRV-3.1, VRV-IPB18
VRV-4172	Parallelize text glyph processing and speed up text rendering	Significantly improved the frame rate by reducing the data sent for the text.	VRV-3.1, VRV-IPB18
VRV-4183	Alpha not used in ocean reflected lights	The point state is now set to smooth for reflected light points. Also modified DtPlanarReflection for height and width consistency with reflection size settings.	VRV-3.1, VRV-IPB16
VRV-4191	No 3D emitter visualizer definition	Made updates to use the new emitter visualizers.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4196	The attachment drop down resets when switching between entities	If you have attachments on multiple entities and switch between them, the Attachments panel now correctly preserves the settings you specified instead of resetting to the default.	VRV-3.1, VRV-IPB18
VRV-4197	Update CUDA to 11.7	Updated CUDA for Windows and Linux to 11.7.	VRV-3.1, VRV-IPB18
VRV-4203	exampleSensorSettings documentation needs to be fixed	Updated the documentation in the Developer's Guide/class doc for the example.	VRV-3.1
VRV-4210	Visualizers, when created, do not add the VisualizerShowHideContext::ElementHidden context	Sometimes an entity that was set to be invisible when embarking was not being set to be visible on disembark. Now we make sure that all relevant visibility flags are set correctly when an entity is first discovered.	VRV-3.1, VRV-IPB16
VRV-4223	Channel addition, initialization takes a long time (SilverLining)	Corrected an issue with cloud visualization that slowed down creation of new channels.	VRV-3.1, VRV-IPB16
VRV-4228	Startup dialog doesn't have focus on startup	The Load Terrain dialog box now has focus when you start VR-Vantage, allowing you to open the recently loaded terrain by simply pressing Enter.	VRV-3.1, VRV-IPB16
VRV-4231	VRV Feature Layer props can have the same name	Fixed to ensure that, even if a configuration file has props with the same name, VR-Vantage will not use the same name. This prevents crashes that duplicate names can cause.	VRV-3.1, VRV-IPB18
VRV-4232	LOD Center can cause osgEarth paging cycles	When determining the level of detail for magnified views, the terrain skin and insets are now checked together to address the paging cycle issues in terrains with insets.	VRV-3.1, VRV-IPB16
VRV-4244	GPU memory leaks when a new Stealth window is opened and then closed (VRV/indirect buffers)	Fixed an issue with flush camera logic. Also removed the concept of bindless buffers tracking.	VRV-3.1, VRV-IPB16
VRV-4261	Update makTriton CUDA version to 11.7 (Windows)	The version of Triton used by VR-Vantage now uses CUDA 11.7.	VRV-3.1, VRV-IPB16
VRV-4262	Simplify indirect texture processor(s) and residency management	Refactored multiple context handling to prevent crashes when using multiple windows.	VRV-3.1, VRV-IPB16
VRV-4272	Crash can occur when closing sensor gimbal window	Fixed a crash that could occur when opening and closing multiple gimbal sensor windows,	VRV-3.1, VRV-IPB16

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4276	Emitter Volume rendering is incorrect for wide azimuth and non-0 elevation beams	Fixed a rendering bug to ensure that emitters' vertices are correctly calculated using wide azimuth and non-0 elevation beams, rather than orientating the model based on those values. Emitters will render correctly, and now the application can accurately render higher angles of azimuth and elevation.	VRV-3.1, VRV-IPB18
VRV-4280	Crash when playing MAK Data Logger tape after opening then closing a new plan view	Fixed multiple context handling refactor.	VRV-3.1, VRV-IPB16
VRV-4293	getDistanceToViewpoint function returns the wrong value for height map cameras in 2D	The heightmap, which is used for ocean masking and several weather effects, is no longer computed when using the PVD. The heightmap is not needed in PVD, and was significantly increasing terrain paging when it was computed.	VRV-3.1
VRV-4302	DI-Guy isn't garbage collecting unused textures.	Fixed DI-Guy memory leak.	VRV-3.1, VRV-IPB16
VRV-4305	VR-Village doesn't turn dark and dynamic lights don't work when you set the time of day to night time	Fixed the dynamic lights in the VR-Village terrain.	VRV-3.1, VRV-IPB16
VRV-4309	Triton is leaking resources as new windows are made and destroyed	Made improvements to better handle the deletion of cameras and also to track textures, buffers, shaders, programs, and so on.	VRV-3.1, VRV-IPB18
VRV-4324	The Terrain Information Scene Graph node mask is misleading	Fixed the information to include leading zeroes, ensuring that all 32 bits of scene graph node mask text display.	VRV-3.1, VRV-IPB16
VRV-4349	Add geocentric tests to CIGI python scripts	Move the CIGI intersection tests to a geocentric terrain to properly test coordinate conversions.	VRV-3.1, VRV-IPB18
VRV-4352	VRV doesn't remember Object List state when brought in front of the Observer Views pane.	Fixed a bug that prevented the UI from displaying the selected tab on top.	VRV-3.1, VRV-IPB18
VRV-4354	Virtual program is caching programs 1 more time than necessary with toggling shadows	Made a fix to ensure that the application did not generate duplicate programs. Shaders hit the cache, even if they appear in a different order when collected from the state stack.	VRV-3.1, VRV-IPB16
VRV-4359	CIGI updaters are deleted and recreated incorrectly	The application now recreates clamping updaters after CIGI entities disembark.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4361	HBAO not working correctly when model Alpha to Coverage is off	To improve horizon-based ambient occlusion, added new shaders and modified some existing shaders and also values in the occlusion buffer texture.	VRV-3.1, VRV-IPB16
VRV-4366	Customer CDB loading hang with 1 model in indirect rendering	Fixed a bug in the CDB loader that caused the application to hang if there is a feature in the top-level node/shape file.	VRV-3.1, VRV-IPB16
VRV-4370	HBAO causing artifacts on procedural earth trees	To improve horizon-based ambient occlusion, added new shaders and modified some existing shaders and also values in the occlusion buffer texture.	VRV-3.1, VRV-IPB16
VRV-4377	Communication lines disappearing if we zoom in too closely	Changed the communication lines to ensure that they display correctly.	VRV-3.1, VRV-IPB16
VRV-4379	Channels that use sensor modes and do not use the entire viewport of its parent window render incorrectly	Updated the code for the settings display offset and display size in CameraFX.	VRV-3.1, VRV-IPB17
VRV-4387	Remove Zed lib which isn't used.	Removed the Zeb library because it was causing issues with CUDA.	VRV-3.1, VRV-IPB16
VRV-4391	Corridor TGs on reloading scenario do not retain color info	Corridor tactical graphics now correctly preserve custom colors set by the user.	VRV-3.1, VRV-IPB16
VRV-4393	Need a way to set cell size for entities' culling	Entities (in indirect) are divided into a grid of cells. The cells have the same size. This is a regular (sparse) grid that allows for efficient, higher-level culling. Setting it to one cell (infinite cell size) allows you to look at parts other than moving entities. You can use the new --entityGridCellSize command-line option to set the cell size for culling entities. This is useful when you need to debug for bottlenecks in the code.	VRV-3.1, VRV-IPB16
VRV-4404	Video streaming is not working	Fixes to CUDA to restore video streaming.	VRV-3.1, VRV-IPB16
VRV-4411	Change Entity Type Mapping to <New...> doesn't seem to do anything	Removed the non-functional New option from the list of choices in the Simulation Object Type Mappings dialog box.	VRV-3.1
VRV-4425	CDB clamping code is much slower than it be	Fixed the code to improve performance when loading CDB terrains.	VRV-3.1, VRV-IPB16

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4426	ExampleEmbedded does not properly set up the DtDeInitializer	Corrected to put the display configuration into the DtDeInitializer.	VRV-3.1, VRV-IPB16
VRV-4434	Example Gimbal view has a roll component	Changed the way the orientation was calculated by starting with a level topo orientation instead of the orientation of the UAV it's attached to.	VRV-3.1, VRV-IPB16
VRV-4443	HDR + reverse z disable washing out roads textures	Added the shader definition "OE_LIGHTING" to lighting and fog shaders. "OE_LIGHTING" is not defined when lighting and fog should be disabled. "OE_LIGHTING" is normally defined for each top-level VR-Vantage camera. osgEarth does not define "OE_LIGHTING" when using rendering techniques that require lighting and fogging to be disabled.	VRV-3.1, VRV-IPB16
VRV-4458	Always install shadow vp & use early out for shadows	When shadows are enabled, the stateset is now always active and a uniform is used to toggle them when the view is in outer space. There is also support for having shadows permanently active and using a uniform to toggle them. When shadows are disabled, the shadow camera traversal is skipped but the shaders remain the same preventing additional shader sets in SpeedTree and instant switching. This is off by default and can be enabled using the --enablePersistentShadowTechnique command-line option.	VRV-3.1, VRV-IPB16
VRV-4473	LOD update logic for DI-Guys doesn't account for multiple observers.	Fixed an issue where DI-Guys viewed by different observers would not display correctly or consistently.	VRV-IPB17
VRV-4476	When a prop version of a sim object is placed, any further instances of that sim object are invisible	Fixed an issue where, if a simulation object was placed using the Props Palette, adding the same object from the Simulation Objects Palette resulted in an invisible entity.	VRV-3.1
VRV-4482	Symbol Decoration LOD Out Altitude lets you specify negative values	The LOD Out Altitude slider in the Symbol Decoration Settings page no longer allows users to enter negative values.	VRV-3.1, VRV-IPB16
VRV-4485	Show Labels for Ghosted Objects (2D Only) does not work	Fixed to ensure that labels display correctly when the Show Labels for Ghosted Objects (2D Only) option in Unit Display Settings is selected.	VRV-3.1, VRV-IPB16
VRV-4486	Ghosted To Echelon Level does not work right	Fixed for ghosted level 1 aggregates.	VRV-3.1, VRV-IPB16
VRV-4492	Example in Signaler Pattern Documentation has errors	Improved the example by removing the unneeded first argument to the signal and making myDisplayEngine a reference.	VRV-3.1, VRV-IPB16

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4501	Multiple tactical graphics line thickness for 3D/XR needs updated in their visualizer definitions	For 3D and XR views, fixed tactical graphics line thickness in the visualizer definitions.	VRV-3.1, VRV-IPB16
VRV-4502	VR-Vantage texture memory profiler apparently not considering the new splatting, veg memory	Added osgEarth NVGL memory stats to F2 imGui.	VRV-3.1, VRV-IPB16
VRV-4516	Shadows not able to get dark enough	You can now apply shadows to ambient lighting, in addition to diffuse and specular shadows, by selecting the Apply Shadow to Ambient Lighting check box in Shadow Settings. This makes shadows significantly darker. By default, it is disabled to ensure that shadows display realistically.	VRV-3.1, VRV-IPB18
VRV-4520	VRV crashes when CIGI attempts to initiate a track mode that we do not support	Instituted an early out when the track acquirer does not exist for CIGI sensor tracking.	VRV-3.1, VRV-IPB18
VRV-4532	3D Tactical Graphic lines are not created correctly on network connection	Fixed the 3D lines to ensure that they are now created with the correct height and can be scribed on initial creation.	VRV-3.1, VRV-IPB18
VRV-4546	Hardcode Areal Informational Labels to use Feet for altitude and the Zulu time zone for (de)activation times	Areal tactical graphics now always measure the altitude in feet. If the tactical graphic is set to be active for only a specified period of time, the activation and deactivation times are shown in Zulu time.	VRV-3.1, VRV-IPB18
VRV-4555	Duplicate persistent track type model definition	Changed the level of the message from warning to info. In the application, persistent tracks will use only the first texture of each key (trackType / trackDepth).	VRV-3.1, VRV-IPB18
VRV-4559	CIGI Height Of Terrain requests in Geodetic do not ignore altitude	For HOT requests in geodetic, ignore altitude and use 100000.0 instead as the start point for the intersector.	VRV-3.1, VRV-IPB16
VRV-4566	MIL STD Icons can be rotated incorrectly when 'Rotate Entity Military Standard Symbols to Heading' is enabled	Fixed to ensure that, when Rotate Entity Military Standard Symbols to Heading is enabled, the heading of the icon and the heading indicator are pointed in the correct direction, regardless of the observer's orientation.	VRV-3.1, VRV-IPB16
VRV-4568	Separate the 'Range/Bearing Lines' Display Unit Setting into two different display unit settings	The measurements for Bearing and Range are now separated in the Display Units Settings. Previously, you could only specify whether the bearing was measured in degrees or NATO-MIL. Now you can also specify the distance used to measure the range.	VRV-3.1, VRV-IPB16
VRV-4572	VRV HLA1516 connection information in the simulations connection tab is not populated	HLA 1516 is no longer supported out of the box.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4577	Cleanup Intervisibility Settings and Remove Range Line Settings	You can now edit range line settings in the Model Definition Editor in Visual Model Editors, as covered in "Configuring Range Lines" in the VR-Vantage Users Guide. You can no longer display labels for the ends of Intervisibility Lines.	VRV-3.1, VRV-IPB16
VRV-4579	Connecting a RDE to a master with rain enabled causes rain visual problems on master	This is fixed. Added logic to not capture the environment map until cloud layer completely fades in.	VRV-3.1, VRV-IPB18
VRV-4580	DI-Guy does not aim at location after show/hide of DI-Guy	Added logic to ensure aim state is restored with the rest of the character state.	VRV-3.1
VRV-4581	Display symbolDecorations doesn't save out foreground text color	Corrected the built-in schema for entity symbol decorations by removing the "textColor" attribute. The text color is a global setting, not set for each entity.	VRV-3.1, VRV-IPB18
VRV-4586	Wake/Spray should orient orientation rather than velocity and have a low-velocity cutoff.	Added the ability to cut off wake rendering under a specified speed; it can be set in the visualizer definition. The default is 0.0. Also limited rendering the angle between boat's heading and velocity direction is greater than 45 degrees; it can be set in the visualizer definition. The default is 45 degrees.	VRV-3.1, VRV-IPB17
VRV-4588	Car embarkation doesn't correctly re-initialize coordinate system.	Fixed to ensure that DI-Guy entities embark correctly when taking a seat in a vehicle with embarkation slots.	VRV-3.1, VRV-IPB16
VRV-4593	Allow sectors to be created up to 360 degrees	You can now draw sectors up to 360 degrees. The arc goes counterclockwise; if you draw counterclockwise, the arc comes around to the cursor position.	VRV-3.1, VRV-IPB18
VRV-4594	Re-organize context menus for intervisibility and range lines	With the new ability to create range lines from the context menu, that menu has been changed. The top level now reads "Create" and has separate options for intervisibility lines and fans, range lines, and deleting any of those.	VRV-3.1, VRV-IPB16
VRV-4595	Remove "Cull Instanced Objects in Range" option	The Cull Instanced Objects In Range settings have been removed from the Experimental Features dialog box. They no longer apply to the application since the instancing pathway was removed.	VRV-3.1, VRV-IPB18
VRV-4599	VR-Vantage has 3 separate flags for triggering topo. updates for DI-Guy	Cleaned up initialization logic and removed redundant/unused flags.	VRV-3.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4605	CDB loading logic has buggy duplicate handoff of already registered models to indirect	Made code improvements to pass the model directly. The different model LODs were being passed as the same model ID, which caused duplicate registration and also was incorrect in that it used the first registered model LOD and ignored the others.	VRV-3.1, VRV-IPB18
VRV-4606	DtCreateInstrumentPanelMenu and a few other should reuse member variables	Modified DtCreateInstrumentPanelMenu to use the same signal mapping pattern as DtCreateSensorViewMenu. Modified DtCreateInsetViewItem to reuse the myAction so there is only 1 shared action.	VRV-3.1, VRV-IPB18
VRV-4609	Make Axis Tactical Graphics Render with a Width in World Space (not Screen Space)	Corrected the display of Air Axis, Axis, and Main Axis tactical graphics to correctly represent the world space covered by the tactical graphic.	VRV-3.1, VRV-IPB18
VRV-4612	Make extruded areas have no fill	Extruded area tactical graphics no longer have fill in either Plan View (2D) or Stealth (3D).	VRV-3.1, VRV-IPB18
VRV-4613	Cannot add .earth file as terrain patch	VR-Vantage now uses the absolute file path for the Add Terrain Patch feature even when the terrain patch being added could be relative to the executable folder.	VRV-3.1, VRV-IPB18
VRV-4616	Check myConnections in classes derived from DtTickable and DtOsgModelInstance	Removed redundant declarations of myConnections in child classes of DtTickable and derived classes.	VRV-3.1, VRV-IPB18
VRV-4635	Preload OSG drivers for VRV common formats to speed up load	Improved load speed for medf/meif files.	VRV-3.1, VRV-IPB18
VRV-4641	VR-Vantage crashes if given a font file that does not exist	VR-Vantage no longer crashes when it cannot find a specified font file. Instead, it tries to use a default font file and logs an error. If it cannot find the default font file, it logs a warning.	VRV-3.1, VRV-IPB18
VRV-4648	Air Axis Twist is applied on wrong line segment	To represent the 2525D standard, the air axis tactical graphic now has the twist applied to last segment rather than the first segment.	VRV-3.1, VRV-IPB18
VRV-4649	MCOD roads do not have the correct road width	Corrected the math used for estimating MCOD angular feature road width to ensure that the width is correct.	VRV-3.1, VRV-IPB18, VRV-3.0.3h
VRV-4650	The recently loaded terrains list isn't updated until exit or close	The list of recently loaded terrains now updates when the user loads a terrain. This ensures that the most recent terrain displays at the top of the list even in the case of a crash.	VRV-3.1, VRV-IPB17

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4654	Screen numbers do not work right when using fullscreen windows	Modified the code to move the window to the appropriate screen first, then apply fullscreen.	VRV-3.1
VRV-4656	Changing observer mode for one observer/channel makes previous observers/channels within the same window flicker	Updated the logic used when initializing a channel sensor. This prevents flickering in other channels when changing the observer settings for one channel.	VRV-3.1, VRV-IPB17
VRV-4658	Coordinate displays are forced to claim flat earth grid line support even when they don't	Instead of defaulting to the Flat Earth coordinate system when no terrain is loaded, the Grid Lines Settings are now blank until you load a database.	VRV-3.1, VRV-IPB18
VRV-4661	Never use 'smoothed velocity' from the dead reckoner	All places outside of the smoother class shouldn't use "smoothed velocity". Developers using the API should use DtDeadReckonUpdater::approxUnsmoothedVelocity. They are now prevented using DtDeadReckonUpdater::approxVelocity because it can return smoothed/erratic values.	VRV-3.1, VRV-IPB18
VRV-4662	Image data can sometimes be null/garbage and cause crash	Fixed an issue that could cause issues when loading models, frequently this manifested itself loading OpenFlight models referenced by CDB terrains.	VRV-3.1, VRV-IPB18
VRV-4663	Jobs code for MetaFlight and CDB may be unnecessarily blocking paging threads	Improved performance to ensure that MetaFlight and CDB render once they are ready.	VRV-3.1
VRV-4679	Ability to set up 2-sidedness and alpha in FBX	Added the ability to specify alphaCutOff in model definitions.	VRV-3.1, VRV-IPB18
VRV-4685	HLA1.3 connection option and its tab need to be removed from the dialog	HLA 1.3 is no longer supported out of the box.	VRV-3.1, VRV-IPB17
VRV-4690	Recent Terrains are saved with a full path name, even if they are from \$(MAK_SHARED_DATA)	File names are prepended with \$(MAK_SHARED_DATA) before they are written to the Recent Terrains list.	VRV-3.1, VRV-IPB17
VRV-4691	VR-Vantage's DtModelSet clashes with existing class in VR-Forces	Renamed to DtModelSetId.	VRV-3.1, VRV-IPB18
VRV-4697	Lat/Lon Grid lines don't draw at certain latitudes/altitude	Fixed to ensure that the latitude and longitude lines display correctly to the observer when grid lines are enabled.	VRV-3.1, VRV-IPB17
VRV-4698	Remove occlusion query code	Removed the path for infrequently used occlusion query usage.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4701	Post processors cannot be used with plan view	You can now use post processors with the Plan (2D) view.	VRV-3.1, VRV-IPB18
VRV-4707	Cultural features have no heading lines	Added heading indicator to cultural features. This allows users to know that they have successfully rotated an object when placing it in Plan View (2D).	VRV-3.1, VRV-IPB17
VRV-4724	Alphabetize the menu for toolbars	Toolbar names in the View menu are now sorted alphanumerically.	VRV-3.1, VRV-IPB17
VRV-4749	Disembarking an AggLevel object leaves the icon hidden	Corrected to set the embarked flag to disembarked before the signal that the parent is set to be consistent with the behavior of entity state embarkation.	VRV-3.1, VRV-IPB17
VRV-4751	Goto panel cannot handle negative minutes and seconds when no degrees have been set.	Updated the Go To Location panel to allow users to enter negative values when using the Lat, Lon (DMS) coordinate system.	VRV-3.1, VRV-IPB17
VRV-4758	Track history color doesn't take	If you change the color for an entity's track history before enabling Show Track Histories, the entity displayed the default color. This is fixed, and the color setting is now respected regardless of when you set it.	VRV-3.1, VRV-IPB17
VRV-4765	Using the same model definition for Stealth and XR breaks node switches	Fixed to ensure that the correct node is passed to the model container. Refactored to put the mappings in a separate mappings class, which also maintains the model node master.	VRV-3.1, VRV-IPB18
VRV-4768	DtTacticalGraphicNameVisualizer missing name position policy for 2525D	Added new name label position options to the DtTacticalGraphicNameVisualizer to display trailing and upwards text.	VRV-3.1, VRV-IPB17
VRV-4789	Indirect geometry with >3 texture coordinates causes shaders to fail compiling	Fixed an issue in the shader that caused indirect shaders to fail to compile when a model used three or more texture coordinates.	VRV-3.1, VRV-IPB17
VRV-4795	Actions coming in with "default" speed value shouldn't autogenerate speed.	For DI-Guys, the action speed autochoosing logic was being triggered instead of using the speed off of the network.	VRV-IPB17, VRV-2.8j
VRV-4799	With multiple channels in a Window, changing CameraFX Sensor causes trees to render differently	Updated the code for the new functionality of uniform maps.	VRV-3.1, VRV-IPB17
VRV-4805	DtWindowEntityAttachedSurface has a jitter	Fixed the jitter in DtWindowEntityAttachedSurface. This issue primarily affected API and CIGI users.	VRV-3.1, VRV-IPB17

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4806	Buoyancy does not work if DtTritonWaterClampingUpdater does clamping	Fixed the Triton water clamping updater to ensure that it applies buoyancy to scene objects when it should. The buoyancy now works even when the updater clamps the scene object to a different position.	VRV-3.1, VRV-IPB17
VRV-4813	Cloud shadows setting needs to be removed	Removed the Clouds option from the Cast Shadows From settings. It did not work correctly.	VRV-3.1, VRV-IPB18
VRV-4815	Use of EpFomMapper in HLA for VR-Link connections blocks usage of new NETN FOM mapper	Removed all references in code (and the code) of the outdated EpFomMapper workaround.	VRV-3.1, VRV-IPB17
VRV-4820	There is no DtWindowArcAgent	Various DtWindow graphics have an agent, such as DtWindowEllipseAgent. It was missing for DtWindowArc. Added DtWindowArcAgent and DtOsgWindowArcAgent to address this oversight.	VRV-3.1, VRV-IPB18
VRV-4829	DtWindowArc/DtOsgWindowArc do not work	Removed the arc window classes because they do not work and the window ellipse covers all functionality with start/end angles and number of vertices.	VRV-3.1
VRV-4834	Terrain formats in VR-Forces (TerraPage v.2.2 LOD)	Added improved support for TerraPage databases that are modeled using a geocentric coordinate system.	VRV-3.1, VRV-IPB18
VRV-4835	Terrain formats in VR-Forces (TerraPage v.2.3 Crash)	Added support for TerraPage databases that contain Transform and SmartMesh Seam nodes.	VRV-3.1, VRV-IPB18
VRV-4839	Remove batch scripts that use the old debug executables	There were some older batch scripts in the bin64 directory that still used the debug versions of our executables. They have been removed because they no longer work: stealthScalableDisplayd.bat, vantageIGScalableDisplayd.bat, stealthVirtualRealityd.bat, and vantageIGVirtualRealityd.bat.	VRV-3.1, VRV-IPB18
VRV-4852	Ocean around Ala Moana inset is very bright in NVG (SensorFX)	Fixed by refactoring the sensor object registration. Terrain node registration was inconsistent in some cases.	VRV-3.1
VRV-4853	Range Line Distance/Bearing text disappears at long distances	Due to the curvature of the Earth, range lines did not show the distance when they were longer than about 1300 km. Range lines have been adjusted to show the distance and bearing information at distances up to the diameter of the Earth.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4871	VR-Vantage crashes when opening/closing/using multiple windows (related to multiple contexts and driver version > 527.56)	Fixed a crash caused by a driver bug released for NVIDIA drivers after November 2022. The crash was related to the use of multiple graphics contexts and showed up when using multiple windows in VR-Vantage-based applications. NVIDIA plans to fix the driver but has not yet released a fix, therefore we developed a workaround for the problem in our own code.	VRV-3.1, VRV-IPB18
VRV-4872	Error checking with visual definitions with multiple model definitions not working	Improved the error messages that the Visual Model Editors display. Also fixed an issue where Visual Model Editors would claim there was an error when none were present.	VRV-3.1, VRV-IPB18
VRV-4881	Low FPS when using Nimbostratus clouds	Made changes to reduce the number of indices that result when adding nimbostratus clouds to the scene, which improves the frames per second.	VRV-3.1, VRV-IPB18
VRV-4884	Platform-specific display unit settings do not correlate between master and slaves	Display unit information is passed along differently so that the application no longer checks for it every tick. Slave machines also use the same settings as the master machine.	VRV-3.1, VRV-IPB18
VRV-4886	The labels on the Spider Web tactical graphic don't scale	This is fixed. The labels now display like those in other tactical graphics, where they become smaller and are eventually hidden from the window when the observer moves farther away from Spider Web.	VRV-3.1, VRV-IPB18
VRV-4889	Map overlay should not change when mouse is hidden	Ensured that the map overlay doesn't change when the cursor is not displayed.	VRV-3.1, VRV-IPB18
VRV-4895	Ship kinematic chains are always single threaded	Improved performance. Watercraft kinematic chains are always single-threaded, and Triton water clamping is not thread-safe. Now the chain is set to thread-safe when water clamping is off. (Note that the surface clamber for amphibious vehicles is never thread-safe.)	VRV-3.1, VRV-IPB18
VRV-4896	Larger icon due to selection does not change the overall selectable area	When simulation objects icons are larger, such as when you have selected them and then zoomed out, you can now click any part of the entire, larger icon. Previously, only the area of the original-sized icon was clickable.	VRV-3.1, VRV-IPB18
VRV-4911	SilverLining atmospheric halo doesn't display around the earth when it's enabled in the config file	Fixed an issue with SilverLining that was preventing the display of the atmosphere around the Earth. The display of the atmosphere is controlled by the enable-atmosphere-from-space setting in the ./data/Environment/Sky/SilverLining.config file.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4915	rain effects appear while in space	Fixed an issue where rain splash effects would display in space after moving from a terrain where rain was in the scene.	VRV-3.1, VRV-IPB18
VRV-4916	Air Axis and Air Corridor have wrong size	The Air Axis and Air Corridor tactical graphics default to a width of 1 km. Users can edit the style of these tactical graphics to be wider.	VRV-3.1, VRV-IPB18
VRV-4925	PE2 terrain and vegetation does not use SensorFX materials	Procedural Engine 2.0 supports procedural terrain and vegetation for SensorFX.	VRV-3.1, VRV-IPB19
VRV-4927	Entity HAT line should be thinner	Modified the default model configuration for HeightAboveTerrainLine in <code>./SharedData/17/latest/ModelData/Configuration/Definitions/Entity/core Model Definitions.ommx</code> to have a line thickness of 1 rather than 3.	VRV-3.1, VRV-IPB18
VRV-4931	XTAL headset causes a crash when entering and exiting a VR-Engage role	Fixed the crash that could occur when a user deactivated an XTAL HMD that they had been using with VR-Engage.	VRV-3.1, VRV-IPB18, VRV-3.0.3a
VRV-4949	GUI: crash zooming Miami Topo Online	Made improvements to support thread-safe loading of lights in this terrain.	VRV-3.1, VRV-IPB19
VRV-4963	crash in DtIndirectSwitchManager	Added checks to prevent crashes caused when the application incorrectly parsed data on terrain models with switch nodes.	VRV-3.1, VRV-IPB18
VRV-4971	MEDF Tool crashes on Linux when converting a PNG to a MEIF	Fixed in makOSG, which made zlib dependency fixes for Linux.	VRV-3.1
VRV-4974	Track histories not respecting max length settings	Track histories were not being removed as soon as expected based on settings. This has been fixed, but it can impact performance. If you experience problems, increase the length of segments.	VRV-3.1, VRV-IPB18
VRV-4986	Indirect trees move with observer orientation	Fixed camera relative rendering to prevent the appearance of jittering vegetation.	VRV-3.1, VRV-IPB18, VRV-3.0.3a
VRV-4994	Crash when procedural trees are enabled in the sim engine	This is fixed for Procedural Earth 2.0. If you use Procedural Earth 1.0, your machine must have an NVIDIA graphics card if you want to load procedural trees in the back-end and thereby allow trees to affect line-of-sight and cause entities to collide with any they do not avoid.	VRV-3.1
VRV-4995	CIGI Symbol surface using max U for max V coordinate	Corrected a typo in the code.	VRV-3.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5003	Coordinates incorrect in GUI when using UTM terrains	VR-Vantage applications now display the correct easting and northing coordinates for UTM terrains.	VRV-3.1, VRV-IPB18, VRV-3.0.3b
VRV-5007	DtIndirectGlTextureObjectManager::getOrCreate: image can cause a crash	Addressed thread safety issues inside of the GL texture object management to prevent crashes.	VRV-3.1, VRV-IPB18
VRV-5015	CIGI attachments have 2 m altitude offset if view control is in the same buffer as entity control	Disabled bounding volume for attached offsets for CIGI to ensure that the default offsets are not used for the ownship, which does not have a model.	VRV-3.1
VRV-5016	Prevent accidental API usage of default copy constructor for DtModelInstanceFactory	Changed the API to prevent accidental use of default copy constructor for DtModelInstanceFactory.	VRV-3.1, VRV-IPB19
VRV-5024	CDB created by CAE Lithos tool does not publish GS/GT point from LOD -10 but from LOD 0	Added more checks to ensure that CDB terrains that were created using CAE Lithos will load in VR-Vantage applications.	VRV-3.1, VRV-IPB18, VRV-3.0.3b
VRV-5029	CAE Lithos published CDB database does not contain Metadata Folder\Version.xml	VR-Vantage now supports CDB terrains published from CAE Lithos. Previously, because those terrains didn't include the ./SharedData/###/latest/ModelData/Other/CDBTest/CDB/Metadata folder and Version.xml file, VR-Vantage couldn't load them. VR-Vantage now creates those when they are missing.	VRV-3.1, VRV-IPB18, VRV-3.0.3b
VRV-5034	Sample Distribution Shadow Maps (SDSM) is unstable and causes shadow flickering	Removed the SDSM entirely. It was unstable and unused.	VRV-3.1, VRV-IPB19
VRV-5038	CDB plug-in is too slow with tree layer on large database with high resolution elevation	Adjusted the clamping LOD of GT/GS models to improve performance in CDB terrains built using the CAE Lithos tool.	VRV-3.1, VRV-IPB19, VRV-3.0.3c
VRV-5046	Factory Reset on Virtual Reality when VR checkbox is enabled crashes VRV.	Ensure proper cleanup of boost signal connections in DtSubmitOverlayCallback by using the DtSignalConnectionManager utility class.	VRV-3.1
VRV-5067	Nightmaps (NTE) are not being loaded,	Fixed an issue with colored night textures not displaying on building models.	VRV-3.1
VRV-5074	Filename assignment for leaf element definitions problematic	The filename for leaf element definitions no longer defaults to the existing filename and instead prompts you to enter a filename.	VRV-3.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5078	Spider web should have different units	Spider webs now always use nautical miles as the unit of measurement. They do not use any setting from Display Units Settings.	VRV-3.1, VRV-IPB19
VRV-5081	Add support for distance-to-go lights for aerodromes	These lights are now supported.	VRV-3.1, VRV-IPB19
VRV-5083	SensorFX / RadarFX doesn't run without setting the MAK_SHARED_DATA_ROOT env variable	If the MAK_SHARED_DATA_ROOT environment variable does not have a value, it is defined and set to the default shared data directory. See the user documentation or the MAK ONE Installation Guide to learn more about using this environment variable.	VRV-3.1, VRV-IPB19
VRV-5089	Embarked entities do not have labels in 3D	You can now choose whether to display the labels for embarked entities. Select Embarked Entity Labels from the Settings menu, click the icon on the Display Settings toolbar, or press Ctrl+L.	VRV-3.1, VRV-IPB19
VRV-5090	Crash when using a CameraFx sensor and a really small window	Updated the minimum pixel size.	VRV-3.1, VRV-IPB18
VRV-5110	Graphical issue when enabling Wave / Rain Splash or Ocean spray	Fixed the issue that occurred when users started in PVD (2D), loaded a terrain, and then changed to Stealth (3D).	VRV-3.1
VRV-5115	VR-Vantage Observer 'Attach Tether Track' fails from top-down projection	Made improvements to how observer attachments are handled when users change from Stealth to Plan View (or vice versa).	VRV-3.1
VRV-5116	Crash calling DtSpeedTreeForest::setWindStrength if the forest hasn't been created	Added null pointer checks and ensured that an information dialog box displays when the myForest pointer is nullptr. This prevents crashes with SpeedTrees when setting the windspeed.	VRV-3.1, VRV-IPB19
VRV-5133	Terrain patch other 3D formats no longer supported	The Add Terrain Patch feature of the Terrain Editor now shows only support file types (GDB, MEDF, EARTH, FLT, MFT, TXP, FBX, IVE). It no longer lists unsupported types.	VRV-IPB19
VRV-5138	Rotational Velocity often not initialized in an Entity's Kinematic State	The rotational velocity in DtEntityKinematicState is now initialized based on what is set in the listener. This ensures that entities orient themselves using the rotational velocity information in the DIS packet.	VRV-3.1, VRV-IPB19
VRV-5141	Color swatches shouldn't overlap text labels in Intersector Settings	Improved UI to show the entire text as well as the color swatch icons.	VRV-3.1
VRV-5142	DtModelDefinition findParameter is not truly case-insensitive	The method findParameter in the class DtModelDefinition is now truly case insensitive.	VRV-3.1, VRV-IPB19

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5146	CDB should handle missing LC folder for raster material	VR-Vantage can now handle CDB terrains if the terrain database is missing the LC folder for raster material.	VRV-3.1
VRV-5165	DtLine3DObject (remote tactical graphic) isProjected property doesn't work.	Ensured that the depth test will now pass by using a flag. Also, now using a different render bin to not impact other visuals.	VRV-3.1, VRV-IPB19
VRV-5198	Crash can occur when there is heavy use of external references	Fixed a crash that could occur when loading terrain data containing a number of external references.	VRV-3.1
VRV-5200	Performance decrease when terrain node is paged out.	Fixed a performance hit that occurred when paging out terrain data containing a number of external references.	VRV-3.1
VRV-5202	Common dmp and callstack naming convention	The names for dmp and callstack.log files now use the same naming convention, helping users to know which ones are related.	VRV-3.1, VRV-IPB19
VRV-5208	Multiple LODs are getting incorrectly rendered at the same time.	Fixed an issue where low- and high-fidelity LODs were rendering at the same time. This issue affected MetaFlight terrains that are modeled with only one level of tiles on disk, specifically where each file utilizes sibling LOD nodes for level-of-detail control.	VRV-3.1
VRV-5209	Random crash can occur when indirect rendering is enabled.	Fixed a crash that could occur when loading a terrain with indirect rendering enabled.	VRV-3.1
VRV-5215	Wheels don't spin backwards when vehicle moves backwards	Wheels spin backward when vehicles move in reverse, looking more realistic.	VRV-3.1, VRV-IPB19
VRV-5230	DI-Guy models have low LOD when using 3D models in PVD	Updated DI-Guy culling to be the same as other models.	VRV-3.1, VRV-IPB19
VRV-5244	Remove old HLA connections from VRV connections dialog	Removed HLA 1516 Evolved RPR 2.9 NETN with MAK extensions and HLA 1516 Evolved RPR 2.9 METOC connections from the connections dialog. Use the HLA 1516 Evolved connection.	VRV-3.1
VRV-5250	Crash and/or hang in aerodrome code when changing observer views	The application no longer shifts light point information in the global light point group buffer. Instead, it marks any empty slots in the global light point buffer as free. Future light points groups that are registered can then use those free slots.	VRV-3.1, VRV-IPB19
VRV-5256	Entity Appearance Switches are not working on Fixed Wing (MAK-1 Ryan Tanker)	The Anti-Collision, Formation, and Spot/Search Lights can now be turned on and off. The fictional MAK-1 Ryan Tanker entity type in the MAK Test SMS is configured with these lights.	VRV-3.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5258	Implement a better way to reset time/date information	Moved the flags to their respective interceptors such that the flags determining whether values had ever been set reflect the status for the given publisher.	VRV-3.1
VRV-5263	Crater with Procedural Earth 2 should have the possibility to have different soil type.	Fixed to ensure that when a crater deforms the terrain, the soil type is appropriate.	VRV-3.1
VRV-5268	Loading the NTC (online) terrain using the attached .earth file causes crash	Added better error handling to report problems instead of crashing.	VRV-3.1
VRV-5273	Shortcut to Adding Content manual should read "Adding Content to MAK ONE Applications"	Corrected the text of the shortcut link to the reference manual.	VRV-3.1
VRV-5276	Calling initialize on DtKinematicState multiple times will cause connections to keep being connected	Fixed to address an issue in VR-Forces where tactical graphics would not display for late joiner GUIs on non-geocentric terrains.	VRV-3.1
VRV-5278	DtVrlinkTacticalGraphicStateListener needs to connect to the signal_coordinateSystemChanged	Tactical graphic vertices will now update when the coordinate system changes.	VRV-3.1
VRV-5290	DtOsgEarthFile::parseExternalReference gets stuck in infinite loop if no URL present	Fixed a problem with resolving external references that could cause the Terrain Editor to freeze the GUI.	VRV-3.1
VRV-5303	Configure F2 and F4 menus to work in VR	Made changes to the way the Framerate Statistics and ImGui display in VR to make them more usable.	VRV-3.1
VRV-5306	Need specialized callback for IFF interrogator and reply interactions in DIS	VR-Forces now checks the transmission indicator to determine whether the IFF interaction is a reply interaction. If it is, it then checks to see whether it is lethal.	VRV-3.1
VRV-5307	--withDisplayEngine, -W have different syntaxes for Windows and Linux	Added support for a comma (,) separator for both Windows and Linux to the -W --withDisplayEngine command-line options. The old separators (semicolon ;) for Windows and colon (:) for Linux) still work if they're used, providing continued support for any scripts that use those separators.	VRV-3.1
VRV-5308	No feedback given to user when command line syntax is wrong	Added more information if users enter command-line options with incorrect syntax when running VR-Vantage with the --withDisplayEngine <port@netAddress,displayConfigFilenameN> option (that is, launching it as the Display Engine.	VRV-3.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5329	Potential confusion around Importing Object Type Mappings behavior in documentation	Updated the documentation on Importing Object Type Mappings. There is also a new command-line option, --overwriteMappingsOnMerge. See VRV-5376.	VRV-3.1
VRV-5334	Display settings dialog has unreasonable precision options in some widgets.	Previously, some values in the Display Settings pages were configured to display at unnecessary levels of precision (over three hundred decimal places). These values now display more reasonable precision, around a maximum of the thousandths place.	VRV-3.1
VRV-5345	exampleEmbedded cannot accept VR-Vantage command line arguments	The example now supports standard VR-Vantage command line arguments.	VRV-3.1
VRV-5347	exampleEmbedded does not support 2D features by default	The example now supports 2D features in addition to 3D features.	VRV-3.1
VRV-5348	Ocean is using the wrong thermal model in SensorFx	Updated the logic in the setup code for sensorized objects, and also the material system file for the Triton Ocean to use the correct thermal model.	VRV-3.1
VRV-5369	DtEnvironmentalIconCenteringUpdater not working correctly for line graphics	Improved the API by adding some functions in a utility namespace to simplify the logic in the updater.	VRV-3.1, VRV-3.0.3f
VRV-5385	Enabling Ocean Planar Reflections causes the terrain disappear around the shore	Added a state setting to the heightmap camera to explicitly set the front face cull winding to the default CCW.	VRV-3.1
VRV-5389	Mirror view not working with Oculus headsets	Fixed by forcing the Oculus provider to use the blit mode to display mirror preview. Also fixed such that the mirror preview is correctly resized when screen size or other settings change.	VRV-3.1
VRV-5390	ImGui renders not displaying in OpenVR headsets	Fixed to display the performance statistics in the headset overlay when using OpenVR provider.	VRV-3.1
VRV-5391	Varjo Simple Rendering mode requires Vantage side flag to enable	In Virtual Reality Settings, added an option to override the focus views support in Varjo provider. Disabling focus views in the Virtual Reality Settings forces the Varjo provider to render only the context views. The result is a single multi-view channel and increased performance.	VRV-3.1
VRV-5400	LLDR icon does not indicate destroyed state in Plan View	Updated to ensure that sensor simulation objects such as the AN/PED-1 LLDR display as destroyed in the window as well as the Objects List and Command Panel.	VRV-3.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5405	Translation Forward/Right are reversed for articulated parts	Changed the X and Y axes for articulated part translations on receipt from the network.	VRV-3.1
VRV-5418	Symbol Decoration offsets broken	For symbol decorations, the quadrant offset override is disabled when values have been set in the visualizer definition.	VRV-3.1
VRV-5426	Crash in DtSimStateObject is possible	Fixed to ensure that a DtSimStateObject safely has a handle to its DtSimEntry.	VRV-3.1
VRV-5430	Vegetation is culled when partially off screen	Improved how the application handles terrain layers.	VRV-3.1
VRV-5442	Decal projected polygon texture fill is broken	Fixed to ensure that filled polygon logic is also applied to decal projected polygons.	VRV-3.1
VRV-5447	VR-Vantage translations are completely broken	Fixed the initialization of the Qt application so that the language is properly set.	VRV-3.1
VRV-5460	DI-Guy un-pauses visuals if hidden then shown when scenario is paused	Fixed so that, when users reposition a DI-Guy character while a scenario is paused, it does not animate after it is placed until the scenario starts playing again.	VRV-3.1
VRV-5462	DIG entities face wrong direction and/or animate poorly when embarked	Updated to ensure that DI-Guys that are embarked on an entity with navigation data can move with the correct orientation.	VRV-3.1
VRV-5476	VR/MR SpeedTrees disappear when shadows enabled in VR mode	Fixed in SpeedTree. Separate shaders for different passes were not being propagated properly.	VRV-3.1
VRV-5477	VR/MR Add toggle in VR menu to disable Multi Sampling	Added an option to disable multi-sampling. This improves performance, although it also disables alpha to coverage and so there will be issues with transparency. (Also added support for increasing render target size over 100%.)	VRV-3.1
VRV-5481	Inconsistencies in Unit Toolbar vs right-click menu	Removed the icon for the Collapse option in the context menu for units.	VRV-3.1
VRV-5485	Wake, Hull Sprays do not respect entity orientation	Fixed an issue with ship hull sprays where the spray was not in the correct position based on the ship's orientation.	VRV-3.1
VRV-5486	Model Watermask does not work on FBX files	Fixed an issue where water masking did not work for FBX models.	VRV-3.1
VRV-5491	CIGI Model Mappings and scripts need update	Updated mappings and scripts with latest model definitions.	VRV-3.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5512	Crash updating creature attach state	Added locks to DtDiGuyOsgGraphicsLink::attach_to_scene() and DtDiGuyOsgGraphicsLink::detach_from_scene(), where node addition/removal was being done unsafely in a multithreaded context.	VRV-3.1
VRV-5517	VR/MR SensorFX not working in VR mode	Updated SensorFX to better support virtual and mixed reality.	VRV-3.1
VRV-5519	Changing the displayed language on the Linux OS can cause VRV to become unstable	Added an article to the knowledge base (https://mak.com/knowledge). Be sure that the VR-Vantage application displays the same language as the OS.	VRV-3.1
VRV-5534	exampleBulletHole missing screen name for schema attributes	Added screen names for the visual definition parameter that the example implements.	VRV-3.1
VRV-5544	MCOD layers are not functioning	Improved how shader layers are handled.	VRV-3.1
VRV-5564	exampleMultipleChannelText documentation is mistitled	Corrected the title for the topic in the VR-Vantage class documentation.	VRV-3.1
VRV-5565	exampleWindowObjects documentation needs an image	Added image of expected results to the exampleWindowObjects documentation in the VR-Vantage class documentation.	VRV-3.1
VRV-5570	No longer ship HLA1.3 versions of examples	Because HLA 1.3 support has been deprecated, the HLA 1.3 versions of exampleDrawObjects, exampleSendControl, and exampleSendDrawControl are no longer built nor shipped.	VRV-3.1
VRV-5575	exampleHla13Connection should now be exampleHla1516eConnection	Created a new exampleHla1516eConnection and moved the Hla13 example to the old examples directory.	VRV-3.1
VRV-5580	Links to exampleModelArticulation in documentation are broken	Fixed the links to the example.	VRV-3.1
VRV-5581	exampleSequenceControl.sh is broken	Removed --startConsole from the script. This option is not available in Linux.	VRV-3.1
VRV-5583	exampleSymbolFacade documentation is missing sections for building/running	Updated the documentation in the VR-Vantage Developer's Guide for the example.	VRV-3.1
VRV-5586	Old link in Developer Documentation to the Bonus Materials page	Updated the links to the Bonus Materials page on the mak.com website (https://www.mak.com/mak-one/support/help/bonus-material).	VRV-3.1
VRV-5596	VR-Vantage Architecture: Layers, Application Layer Examples page is missing images and links	Corrected the broken links and replaced the missing images.	VRV-3.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5598	Paths to python tools are incorrect in exampleCigiExtension documentation	Updated the documentation in the VR-Vantage Developer's Guide for the example.	VRV-3.1
VRV-5612	Channel creation and shadow toggling in terrains with lots of SpeedTree forests is slow	Made performance improvements, particularly for virtual reality. The application no longer reloads shaders multiple times in the same frame for multiple Forests. This drastically speeds up channel creation and shadow toggling in terrains with many SpeedTree forests.	VRV-3.1
VRV-5618	NVG (SensorFX) blown out when it is dawn and completely black in the daytime	Fixed the logic around the computed max radiance value for a scene.	VRV-3.1
VRV-5620	VR/MR - XTAL - Configure F2 and F4 menus to work in VR	Improved to allow users to better access the F2 and F4 menus when wearing the XTAL headset.	VRV-3.1
VRV-5630	CLONE - VR/MR - Make sure Mixed Reality works on XTAL	Fixed to allow mixed reality mode to function with XTAL headsets.	VRV-3.1
VRV-5651	VR/MR - Example mixed reality definition file is not included in VR-Vantage installer	The VR-Vantage runtime installer now includes the example files for the MixedRealityDefinition.xml files.	VRV-3.1
VRV-5657	Scenes using NVG (SensorFX) are completely blown out on Linux	Added a default SensorFX cache folder for runtime, which is required for write permissions on Linux. Note that if you delete the cache folder, SensorFX will have issues writing to the cache. In that case, re-create it with write permissions.	VRV-3.1
VRV-5663	Navigating to the Ala Moana inset causes massive console spew when running SensorFX	Fixed a bug in OpenSceneGraph where Texture2DArray was not cloning images.	VRV-3.1
VRV-5666	Rewinding scenario causes problem with DI-Guy character	Fixed issue where first update didn't fully update newly created DI-Guy characters.	VRV-3.1
VRV-5672	SensorFX: Clear starlight (no moon) not working because gain needs to be limited	Fixed the logic around the computed max radiance value for a scene.	VRV-3.1
VRV-5677	Enable SensorFX MWIR / LWIR automatic gain by default	The Automatic Gain Control option is once again enabled by default in VR-Vantage with SensorFX.	VRV-3.1
VRV-5679	Buildings and trees appear to have incorrect radiances in IR	Updated the material system (.ms) configuration files for assets.	VRV-3.1
VRV-5687	Remote Graphics cause VR-Forces to crash	Fixed the signal disconnect to prevent the crash when visualizing remotely drawn objects.	VRV-3.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5688	Dynamic Ocean draws 'high' at a distance from the shoreline	Improved behavior when zooming the observer view. This fixes shoreline issues and also distant views of ships as they move over the horizon.	VRV-3.1, VRV-3.2
VRV-5693	SensorFX IR manual gain does not get too bright compared to automatic	For MWIR, LWIR, and LWIR (Blackhot), the max manual gain is now 2.0 (formerly 1.0). Additionally, changed the default gain adjustment to 0.5. Overall, this keeps the out-the-box visuals the same while allowing you to increase the gain further if needed.	VRV-3.1
VRV-5695	IMOD has less of an impact in MWIR compared to LWIR	The shader now multiplies the IMOD Gain by 2. The default IMOD gain in the Sensor Settings to 0.5. Fixed a minor issue with SensorRender::_useNormalBasedIM and changed its default to false.	VRV-3.1

Feature List

Table 2. Feature List

Key	Summary	Release Notes	Fix Version/s
DIG-28	Clean up old FED Files & FOM Modules from packaging script.	Removed legacy FED/FOM files from package in favor of the latest versions.	DIG-IPB18, DIG-13.7
DIG-570	Attach camera to link/bone when clicking to select.	Fixed broken link attachment logic for camera when shift-clicking to select.	DIG-IPB19, DIG-13.7
DIG-651	Add remove button for material states.	You can use the new Remove State button in the Geometry Viewer to remove old material states.	DIG-IPB17, DIG-13.7
VRF-97	Dynamic Ditches and Berms	There are new Terrain simulation effect objects that allow you to create berms, ditches, and tank scrapes in dynamic terrain. Ditches and berms slow down opposing forces' advance. Tank scrapes allow you to create a place for tanks to take hull-down positions. Information on configuring these objects is in the Adding Content to MAK ONE Applications Reference Manual.	VRF-5.1, VRF-IPB17
VRF-142	(SOE) Have button to show muzzle flash	You can now preview the particle systems associated with a vehicle's weapon systems. Simply click the weapon's Fire button in the Articulated Parts section of the Physical tab.	VRF-5.1, VRF-IPB17
VRF-143	(SOE) Have button to show detonation effect	You can now see a munition detonation. In the Munitions tab, select the munition and then click the Detonate button in the upper right-hand corner of the 3D display. The Display Detonations dialog box opens. Select the detonation type you want to see and then click the Detonate button.	VRF-5.1, VRF-IPB17
VRF-2695	State property update thresholds should be configurable	You can now configure thresholds for state property updates to control how often the published data is updated. For more information, see "Publishing User-Created State Properties" in the VR-Forces Developer's Guide.	VRF-5.1, VRF-IPB19
VRF-2938	Improve IFF default parameters	Improved the dialog box for the IFF set data request as part of the work to improve and refactor the IFF feature. See VRF-5742.	VRF-5.1, VRF-IPB17
VRF-3353	Include ZeroBrane as default editor for Lua scripts.	ZeroBrane Studio, a lightweight Lua IDE, has replaced SciTE as the default editor for Lua scripts in VR-Forces, making them easier to create and edit. VR-Forces generates a configuration file for ZeroBrane Studio to support code completion and syntax highlighting features for all of the VR-Forces Lua API functions.	VRF-IPB16, VRF-5.1

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-3644	Add state properties via systems	You can now configure state properties in both the OPE and within sim components. For more information, see "Publishing User-Created State Properties" in the VR-Forces Developer's Guide.	VRF-5.1, VRF-IPB19
VRF-3671	Allow accuracy parameters on a per-munition type bases for indirect fire	You can now adjust the accuracy of simulated munitions by editing the error probability parameters in the Simulation Object Editor's new Firing tab.	VRF-IPB16, VRF-5.1
VRF-3757	Change wording for Spot Reports in the user documentation	Updated the documentation to state consistently that spotted entities are shown with "spot-report icons" instead of referring to them as "spot reports". This better reflects the GUI settings for spot reports.	VRF-5.1
VRF-3800	Optimize DtVrfVisualsManager::loadVisuals to reduce startup time in VR-Engage	Made improvements to launch the VR-Forces GUI quicker.	VRF-IPB16, VRF-5.1
VRF-3985	Stop using landingLights appearance bit for landing gear	When you task an aircraft to land and then set its landing lights off, they stay off and the landing gear stays down. Landing gear and landing lights are sometimes set at the same time, but not because the other is set.	VRF-5.1, VRF-IPB17
VRF-4084	Improve trigger view in Plan Edit Dialog	The Plan dialog box has been updated to display triggers more effectively. They now display below the main plan block, which provides you with a better view of any triggers in the plan. You can expand a trigger to display the actions included and see what will happen if the trigger occurs.	VRF-IPB16, VRF-5.1
VRF-4148	SOE Embarkation Editor Near Clipping Plane	You can now adjust the near clipping plane in the Stealth view of the SOE, which allows you to see inside a vehicle when defining the slots.	VRF-5.1, VRF-IPB19
VRF-4357	SOE Embarkation Slot Animation List enhancement	In the Configure Embarkation dialog box, for lifeform slots where there is no defined posture, all animations are available. If there is a specified posture, the list is still filtered by the posture to list only animations appropriate for that posture.	VRF-5.1, VRF-IPB19
VRF-4658	Reduce network traffic for lua script transfer on scenario startup.	Reduced network traffic related to Lua scripts when loading a scenario. Previously, there was much more information sent about the Lua scripts. That caused a lot of data PDUs and, as a result, some information could be lost and the GUI would not know about Lua scripts in the sim engine.	VRF-IPB16, VRF-5.1

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-4668	Ship station keeping task to allow offset using true bearings and distance	The new Keep Station movement task for surface and subsurface watercraft allows you to specify that a watercraft maintain a specific distance and position relative to north and the current position of another watercraft.	VRF-IPB16, VRF-5.1
VRF-4934	Have the svn branch of Vantage in the about box	The About dialog box now includes more information about the versions of VR-Vantage and VR-Forces, specifically the branches where the code originated. This is useful for our MAK engineers when they provide you with support.	VRF-5.1
VRF-5211	MAIS Transmitter (Maritime AIS Transmitter)	The new AIS Data set data request allows you to define the automatic identification system for surface entities.	VRF-IPB16, VRF-5.1
VRF-5282	Dynamic placement of tank scrapes	There is a new Terrain simulation effect object that allows you to create tank scrapes in dynamic terrain.	VRF-5.1, VRF-IPB17
VRF-5400	SIM: make dismount-hq-section more resilient, dismount the remaining soldiers if one task fails.	Improved unit behaviors to make them more likely to complete.	VRF-IPB16, VRF-5.1
VRF-5472	DevGuide: Build out dev guide organization	Made further improvements to the VR-Forces Developers Guide by streamlining content and reorganizing some back-end APIs.	VRF-IPB16, VRF-5.1
VRF-5520	SIM: improve resiliency of mount scripts	Improve the ability of the scripts to handle specific situations, such as a unit that is: already partly mounted; already embarked on target transport; embarked, but not on target transport; embarked, not on target transport, but both have same embarkation parent.	VRF-IPB16, VRF-5.1
VRF-5525	SIM: mount-platoon, mount-squad handle case of dismounted ghost crew	When a ghost crew is not on its vehicle, the application now issues set-mounted-crew.	VRF-IPB16, VRF-5.1
VRF-5527	SIM: move "getAssignedTransport()" to DtScriptVrfObject	"getAssignedTransport()" should not have been limited to DtScriptOwnshipVrfObject.	VRF-IPB16, VRF-5.1
VRF-5549	SIM: auto-assign transports for Stryker Platoon	Added a script that auto-assigns the squads to the transports. The script determines eligible squads and transports, then determines their left-right order in a line formation.	VRF-IPB16, VRF-5.1
VRF-5568	Lua - sendReport (spot report) to include contact-position parameter	The sendReport Lua function now supports sending contact-position as part of the contact-info when sending a spot report. One example for using this is to allow for "incorrect" signal analysis or active deception from the sending entity.	VRF-IPB16, VRF-5.1

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5588	Auto-Generate descriptor and param documentation	There is now HTML documentation for the parameters in the component descriptor and object parameter entries, which allows you to read some guidance on configuring .sysdef and .ope files. You can access it by opening ./doc/descriptorDoc.html. On Windows, you can also open the Start menu and then choose MAK Technologies > Descriptor and Parameter Documentation.	VRF-IPB16, VRF-5.1
VRF-5591	SOE Assign Tags by Visuals Filter to speed process	When you choose to Assign Tags Based on Visuals in the SOE, you can now filter the Select Visual Models list by category as well as by selecting specific models.	VRF-IPB16, VRF-5.1
VRF-5593	Improve Multi Sim Object selection widget for tasks/sets	Improved the method for selecting multiple simulation objects for a task or set. The selection stays active until you right-click or select another option, allowing you to select multiple objects one at a time or by using Ctrl or Shift. (In VR-Forces 5.0.x, users had to click the Select Object button before selecting each object.) When you click the Remove button to unselect one of the objects you previously chosen, the next object in the list is highlighted, allowing you to easily remove multiple objects by continuing to click the Remove button. The ability to add entities that don't currently exist in the scenario is now in a context menu instead of add button.	VRF-IPB16, VRF-5.1
VRF-5598	Clutter Entities: Ships	You can now create surface watercraft objects as background "clutter" using the Ship Clutter Area tactical graphic. See the Generating Traffic (Pattern of Life) chapter in the VR-Forces Users Guide.	VRF-IPB16, VRF-5.1
VRF-5599	Clutter Entities: Aircraft	You can now create aircraft objects as background "clutter" using the Aircraft Clutter Area object. See the Generating Traffic (Pattern of Life) chapter in the VR-Forces Users Guide. These areas use dashed lines to distinguish them from other areal tactical graphics. If you have any scenarios that include the deprecated features for creating civilian aircraft—the Air Traffic Area or a global plan with Generate Air Traffic from Flight Plans—you must edit them to use the new Aircraft Clutter Area (or spawn/sink points) instead.	VRF-5.1, VRF-IPB18
VRF-5604	Allow setting of default appearance in SOE	Using the new Appearance field in the Simulation Object Editor's Physical tab, you can specify the default appearance for simulation objects, which will be used when users create that object in a scenario. For example, you might want a launcher to always start in the raised position.	VRF-IPB16, VRF-5.1
VRF-5625	Improve VRF GUI startup time	Made improvements to launch the VR-Forces GUI quicker.	VRF-IPB16, VRF-5.1
VRF-5632	Add Loiter Munitions to VRF	VR-Forces now supports loiter munition systems. You can task a launcher to fire a loiter munition, and you can also task loiter munitions themselves.	VRF-IPB16, VRF-5.1

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5633	Added new example to send and receive VR-Link interactions from the sim engine	Added a new example for sending and receiving VR-Link interactions from the sim engine (back-end).	VRF-IPB16, VRF-5.1
VRF-5660	Update VR-Forces FOM support	VR-Forces now supports the NETN FOM (NATO Education and Training Network Distributed Simulation Federation Object Model) and uses it as the default FOM. It is an extension of the RPR FOM 2.0. (The old 2.0 publication (and non-NETN publication in VR-Forces) will not work.)	VRF-5.1, VRF-IPB17
VRF-5664	Have scenarios remember when units are collapsed	The expand/collapse state of units in entity-level scenarios is now saved as part of the scenario. When a scenario is loaded, if you have the saved scenario on your computer, the expand/collapse state of any unit in that scenario is restored.	VRF-5.1, VRF-IPB17
VRF-5673	squad-assault: expand comments to reference field manual	There are now comments in the squad-assault.lua file that describe the US Army documentation used to create the script, providing more context.	VRF-IPB16, VRF-5.1
VRF-5714	GUI: orbat editor needs a spot to specify label	When you add a simulation object to an OOB using the Order of Battle Panel, you can now specify a label for it in the Add to Order of Battle dialog box. You can also add or edit labels for simulation objects that are already in the OOB using the Edit Name / Object Type dialog box. A common use for labels is as a human-readable tag when the name (marking text) must be a Uniform Resource Name (URN) for other federates.	VRF-5.1, VRF-IPB19
VRF-5728	Update VR-Forces UUID and use NETN FOM UUID field	VR-Forces now supports the NETN FOM (NATO Education and Training Network Distributed Simulation Federation Object Model) and uses it as the default FOM. The VR-Forces UUID class has been refactored to send in the NETN FOM using the standard attribute there. It now uses the NETN UUID as the UUID for entities (even if they are not VR-Forces) if they are specified in the FOM.	VRF-5.1, VRF-IPB17
VRF-5742	Improve and Refactor IFF	The IFF set data request has been improved and utilizes the new VR-Link IFF API. It is more representative of real-world IFF usage.	VRF-IPB16, VRF-5.1

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5743	Add entry options to Fly Loiter Pattern for CAP	The Fly Loiter Pattern task and the task dialog have been changed. The pattern type that was "Racetrack" has been changed to "Hold Pattern." The behavior of this pattern selection is unchanged;* it executes a Pattern Hold behavior. A new pattern type has been added to the bottom of the list, "Racetrack." This pattern is an oval just like Hold Pattern, but the aircraft enter the pattern with a different maneuver. For a Racetrack, the aircraft fly along a tangent line to a point on either the inbound or outbound turn circle, and then execute that turn to start the pattern. This is intended to support military use cases, vs. civilian cases for Hold Pattern. * The Aircraft Hold task has been modified to use the new behavior engine rather than just the FSM Lua package. Thus the code is all new. The functionality is the same, however.	VRF-IPB16, VRF-5.1, VRF-4.10-i, VRF-4.10-Branch
VRF-5760	Reading SMC/FID codes from Openflight to set Soiltype (FBX implementation)	VR-Forces now has the ability to read SMC (surface material code) or FID (DFAD feature ID) code in OpenFlight terrains to get the soil type information. Previously, VR-Forces assigned the soil type for FLT and FBX terrains using a .surfChar.map file, which mapped a texture to a soil type. Now it uses the ./appData/settings/vrfSim/smc_fid_soiltype_map.csv file.	VRF-IPB16, VRF-5.1
VRF-5820	When adding a scenario event, change the default state to show on the Quick Launch Panel	The Show on Quick Launch Panel option in Scenario Events is now enabled by default. Typically, users want to be able to kick off events manually, therefore it is more practical to have that be standard.	VRF-IPB16, VRF-5.1
VRF-5833	Ambush Line Tactical Graphic	There is a new tactical graphic, Ambush, which allows you to create an Ambush line. See the Creating and Editing Tactical Graphics chapter in the VR-Forces Users Guide.	VRF-IPB16, VRF-5.1
VRF-5839	TLAM Cruise missile system support for Subsurface entities	Subsurface entities can now successfully use TLAM Cruise Missile system while submerged.	VRF-IPB16, VRF-5.1
VRF-5874	Make multi-selection work for large numbers of entities	If you select more than 20 simulation objects and then open the Multiple Object Information window, it now displays only the first 20 at first. There is a button at the bottom of the window that allows you to load more. There are now options in the Objects > Decorations submenu to remove the pins for all entities (radar coverage, range rings, sensor contacts, task visualizations, or track histories).	VRF-IPB16, VRF-5.1
VRF-5891	Add a way to specify scripted task variables are tied to state properties for restore	When editing the parameters for a scripted task variable in a VR-Forces script, you can now select the Initialize from State Property check box to indicate that it is associated with a state property. If you do, you can enter the state property name. In the scripted task dialog, users will see the values for that state property.	VRF-IPB16, VRF-5.1

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5899	Allow user to control default type of Ordered Airspeed in Set dialog	VR-Forces remembers the last airspeed setting such that the next time the Set Airspeed dialog displays, it shows the most recent setting. This applies to the current session only. The information is not stored when the user exits the GUI.	VRF-5.1, VRF-IPB19
VRF-5911	Show counts on object list	The Objects List now shows counts at the high level (Friendly, Opposing, Neutral, and so on) to indicate how many simulation objects are under that level. You can disable or enable this setting in the GUI Settings page of Application Settings. The count does not include items hidden by Fog of War.	VRF-IPB16, VRF-5.1
VRF-5912	SOE should be able to add new range enumerations	If a new system or an entity can have a range ring associated with it, there is now a setting that allows you to select from the predefined range rings (read from the VRF-Enums.xml file). You can also add new range rings that are saved to a VRF-User-Enums.xml file to be used as custom names. You can edit these names in the file after adding them; the predefined names cannot be edited through the SOE.	VRF-IPB16, VRF-5.1
VRF-5917	Create Support By Fire Tactical Graphic	There is a new tactical graphic, Support By Fire Position.	VRF-IPB16, VRF-5.1
VRF-5919	Create clutter overlay and object list folder	The new clutter objects have an object list folder and their own organized overlay.	VRF-5.1, VRF-IPB17
VRF-5935	Add an option (default is on) to have range lines not round to larger units	Range lines now have a setting that allows you to control whether they round up to a higher unit (for example, meters to kilometers). The default is on (to round up), which is the current default behavior. If you do not want to round up, edit OverlayRangeLine in the Model Definition Editor and set AreSmartDistanceForMeasurementTextEnabled to false. This allows you to make accurate measurements.	VRF-IPB16, VRF-5.1
VRF-5941	Add "Count" line to the bottom of SOE object list	Unlike the VR-Forces GUI, the Simulation Object Editor's objects list previously included entities and tactical graphics. The layout has changed to be similar to the new Create Object Palette mentioned above. The new folder structure also shows counts of the simulation objects.	VRF-5.1, VRF-IPB17
VRF-5957	Nav generation requires option for the minimum navigable surface area	The ./appData/settings/vrfSim/navigationProfiles.mtl file has a new option called min-navigable-surface which indicates the minimum size, in meters squared, of the surface area a section of the terrain must have before the generator will generate navigation data for it. The default is 10 meters squared, which is reasonable for many terrains but can omit small rooms that are connected by dynamic doors to the larger terrain. By specifying smaller sizes, you can include areas like those.	VRF-IPB16, VRF-5.1

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-5986	Import Scenario Improvements	Improved the Import Scenario Objects feature and updated the documentation to more clearly reflect what is imported and what is not. The reorganized dialog box presents the options more clearly. UUIDs are now preserved unless you choose to import duplicate objects, in which case new UUIDs are assigned.	VRF-IPB16, VRF-5.1
VRF-5991	Tactical Graphics should be colored by force type by default	Most tactical graphics now default to be the color of the force with which they are associated.	VRF-IPB16, VRF-5.1
VRF-6003	Entity Control Panel - Per entity panel	You now create a separate Entity Control Panel for each entity that you want to command. This allows you to open panels for multiple entities at the same time, giving you quick access to each of them.	VRF-5.1, VRF-IPB19
VRF-6096	Align GUI tags (create menu) for entities in Agg. and Entity Levels	The tags are now better aligned between the aggregate- and entity-level SMSs.	VRF-5.1
VRF-6106	Enhancements to Displaced Threshold Lights to On or Off functionality.	Displaced Threshold lighting controls support Threshold Wingbar and PreThreshold Edge Lights.	VRF-5.1, VRF-IPB18
VRF-6118	Add range to laser target designator	The Lase Location engagement task now takes range into account when looking at the specified location. If the target is beyond the range of the laser designator, the spot does not display.	VRF-5.1, VRF-IPB18
VRF-6126	SOE: System list should be in alphabetical order when a user selects them from available list to add them to an entity	When adding systems to an entity, the list is now shown in alphabetical order.	VRF-5.1, VRF-IPB17
VRF-6144	Add option for a plan in a sync matrix to continue through multiple phases	You can now specify that plans in a synchronization matrix span two or more phases, allowing one phase to end and the next phase to begin while the entity or unit continues to perform its plan. See the Synchronization Matrix chapter in Section VII. Plans of the VR-Forces Users Guide or online help for details.	VRF-5.1, VRF-IPB17
VRF-6186	Make the location of the tabs in Display Settings menu consistent across products	The organization of pages in Display Settings that are in both VR-Vantage and VR-Forces are now consistent across both applications.	VRF-5.1, VRF-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6192	Use Label as tooltip for scenario event buttons when showing expanded.	The Label box in Scenario Events allows you to provide more information about the event. The Quick Launch Panel displays that text as a tooltip.	VRF-5.1, VRF-IPB17
VRF-6248	Unified Creation Palette	The old Simulation Object Palette and Tactical Graphics Palette have been combined into the new and improved Create Object Palette. You can create entities, cultural features, tactical graphics, simulation effect objects, and more all from one palette. See the VR-Forces online help, VR-Forces Users Guide, and VR-Forces First Experience Guide to learn how to use the new Create Object Palette.	VRF-5.1, VRF-IPB17
VRF-6258	Add configuration option for additional enumerations files	Each simulation model set now has (at the same level as ammunitionParams.mtl) an enumerations file that can list user-defined enumerations. This replaces the VRF-User-Enumerations file concept (which was at the settings level). The enumerations file is specified in the SMS file and is loaded from each SMS. You can still specify your own enumerations at the settings level, which are shared among all of your SMSs. Any weapon range enumerations that you add using the SOE are added at the SMS level.	VRF-5.1, VRF-IPB17
VRF-6268	Add Entity in Range conditional	There is a new condition that you can test for with a conditional statement: Entity in Range of Target. This tests for whether the entity that is testing for that condition is within range of the target that you specify.	VRF-5.1, VRF-IPB17
VRF-6277	New Tactical Graphic Activation Mode: Time of Year	The Activation set data request has a new check box, Ignore Year, enabling you to use the Use Date and Time of Day option as only month, day, and time, ignoring the year. This causes the activation to occur at the same time of any year. One use case is that you can import older scenario objects without modification, using them for modern training. The date on any tactical graphics would then apply to whatever year your scenario is set in.	VRF-5.1, VRF-IPB17
VRF-6293	Calculate weather colorization code in the back-end so VR-Vantage will get it as well.	VR-Vantage now receives weather color information to ensure that it displays correctly.	VRF-5.1
VRF-6298	Entity Info Dialog needs more IFF Fields	The IFF page in the Information dialog box now supports more fields, reflecting the values set for the entity.	VRF-5.1, VRF-IPB17
VRF-6308	Add Boundary Line Tactical Graphic	VR-Vantage can visualize the new Boundary Line tactical graphic.	VRF-5.1, VRF-IPB17
VRF-6319	Add link to HTML docs to the Start menu	You can now access the VR-Forces HTML5 help using the VR-Forces Online Help shortcut in the Documentation folder of the installation	VRF-5.1, VRF-IPB17

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6321	Move airspeed publishing to the FOM so it can be read by VR-Vantage.	True Airspeed, Indicated Airspeed, and Mach Number have been moved to be part of a FOM extension to allow VR-Vantage to get the published state data.	VRF-5.1, VRF-IPB19
VRF-6326	Update VRF protocol support	Removed support for HLA 1516.	VRF-5.1, VRF-IPB17
VRF-6327	Aggregate Level units should show task vis for movement tasks	Aggregate-level simulation objects now show task visualizations that they did not before, such as for movement tasks.	VRF-5.1, VRF-IPB18
VRF-6328	Add grid line type selection buttons to the toolbar	When you want to work with multiple coordinate systems in the Plan View, the new Grid Line Selector toolbar allows you to rapidly toggle between grid line overlays. By default, it is set up to show DDM, GARS, or MGRS. You can customize the available coordinate systems in the Grid Lines Settings page of Display Settings.	VRF-5.1, VRF-IPB17
VRF-6335	RTB (Return to Base) feature for Aircraft	The Base set data request allows you to assign an aerodrome to an aircraft, and the Return To Base task sends that aircraft back to the assigned aerodrome.	VRF-5.1, VRF-IPB18
VRF-6382	Support for Weather via METOC in VR-Forces	Added support for the METOC FOM for weather, using the updated VR-Link weather module. The primary change is how VR-Forces publishes weather to the network. This works in both HLA Evolved and DIS. (Note that there is no support for the METOC overlap rules. Global weather always has the lowest priority, ensuring that local weather has priority.) For details, please see the VR-Forces Developers Guide and the MAK ONE Interoperability Guide.	VRF-5.1, VRF-IPB19
VRF-6384	Update Weapon Control System	Each weapon system has been modified to support explicitly commanded fire. This created new Fire tasks for VR-Forces entities. There are basic combat systems for each general entity type, allowing integrators to build on them and develop more sophisticated ones.	VRF-5.1, VRF-IPB19
VRF-6386	Refactor VR-Forces to better support RTDynamics-VR-Engage API.	Improved VR-Forces to allow for a better workflow for incorporating RTDynamics into VR-Engage.	VRF-5.1, VRF-IPB18
VRF-6395	Generate a crater on procedural runways	You can create craters on aerodromes and runways.	VRF-5.1, VRF-IPB19
VRF-6397	vrfSim cannot get soiltypes from MAK Earth (all unspecified)	Updated to be able to retrieve the lifeform soiltype variable. This works for legacy splat terrains and the new Procedural Earth 2 terrains.	VRF-5.1, VRF-IPB17

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6399	Add Grid Toolbar	When you want to work with multiple coordinate systems in the Plan View, the new Grid Line Selector toolbar allows you to rapidly toggle between grid line overlays. By default, it is set up to show DDM, GARS, or MGRS. You can customize the available coordinate systems in the Grid Lines Settings page of Display Settings.	VRF-5.1, VRF-IPB17
VRF-6403	Task manager to allow multiple controllers to register same task	Multiple controllers can now register for the same task type. The task manager passes the task to each controller (in a defined order). The first one to accept the task is designated to execute it.	VRF-5.1, VRF-IPB17
VRF-6404	Add "Fire" task to Ballistic Gun	Added a task to the ballistic gun system to allow it to fire at a target or location.	VRF-5.1, VRF-IPB18
VRF-6405	Add Fire Task to missile system	Documentation covered in VRF-6761.	VRF-5.1, VRF-IPB18
VRF-6423	Plan Lock	When a simulation is running, the new default is that you can view the Plan dialog box but not make changes to the plan. If you want to make changes, click the Unlock button. If you do, VR-Forces warns you that editing a plan while the simulation is running can lead to undesired behavior. You can edit a plan at any time when the simulation is not running.	VRF-5.1, VRF-IPB18
VRF-6451	Pass more detonation parameters into Lua	For Lua, added a new scriptDetonation to store information about the most recent detonation. Expanded the Lua interface for detonations to include additional information including Detonation Result and Burst Descriptor. Nothing was removed, ensuring this change is backward compatible.	VRF-5.1, VRF-IPB19
VRF-6452	Change TAS to IAS on last selected entity panel for aircraft	True Air Speed on the Last Selected Object panel and other places in the UI has been changed to Indicated Air Speed.	VRF-5.1, VRF-IPB17
VRF-6482	Aircraft Platforms - Landing, Anti-Collision, Navigation, Internal and HDU lights.	The Aircraft Lighting set data request now allows you to publish the lighting information for interior lights and HDU lights (which are for air refuel platforms) in addition to the aircraft lights that were supported in earlier releases. The 3D visuals on the fixed-wing model reflect the lighting if the model is configured with those lights.	VRF-5.1, VRF-IPB19
VRF-6485	Land Platforms: Headlights, taillights, indicator, spot, warning lights	The new Ground Vehicle Lighting set data request allows you to publish the lighting information for ground vehicle entities. The 3D visuals on the model reflect the lighting if the model is configured with those lights.	VRE-1.7, VRF-5.1, VRF-IPB19

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6487	Aircraft Towed Array Decoy	The new Extend Towed Array Decoy and Retract Towed Array Decoy tasks allow entities with the Towed Array Decoy system to extend and retract a towed array decoy. The model must be configured with the articulated part to visualize the task.	VRF-5.1, VRF-IPB19
VRF-6490	Airfield Lighting: Control Runway, Approach, PAPI and Taxiway lights	Added the ability to set the state of Control Runway, Approach, PAPI and Taxiway lights.	VRF-5.1, VRF-IPB18
VRF-6492	Maritime Platforms: Navigation, Warning, Stobes, Deck, Flight path lights and Horizon bar.	Added visual support for more maritime light types that allow for control of the lights' intensity. Some examples are flight deck lights, horizon bar lights, glide path indicator lights, and so on. There are fictional surface vessels in the MAK Test SMS that MAK created solely to demonstrate these features.	VRF-5.1, VRF-IPB19
VRF-6500	Add sim support for procedural tree on PE2 osgEarth Terrain	Procedural trees are supported in the VR-Forces back-end (simulation engine).	VRF-5.1, VRF-IPB18
VRF-6501	Add ability to set air corridor size less than 1 km	Previously, the line style of two parallel lines was for air corridors, which was fixed at a minimum of 1 km. This line style is now used for other 2525D symbols, such as Planned Explosive State Of Readiness, and therefore can be set to be less than 1 km.	VRF-5.1, VRF-IPB19
VRF-6515	Add mechanism for displaying diagnostics when an entity is not behaving as expected	Added a new admin message that requests an entity to print diagnostics. It is only available in the sim console. To learn about the available commands, enter help in the console.	VRF-5.1
VRF-6525	New Location Reference type for use in tasks and sets	Parameters that include specifying a location or waypoint have been improved to allow more flexibility.	VRF-5.1, VRF-IPB17
VRF-6543	Add sim configuration option to specify procedural trees should not be loaded	You can now choose whether the VR-Forces back-end (simulation engine) loads procedural trees from the terrain. In the ./appData/settings/vrfSim/terrainInterfaceConfig.mtl file, edit the procedural_sim_vegetation_enabled parameter and set it to either True or False.	VRF-5.1, VRF-IPB18
VRF-6557	Streamline location entry widget	The location entry widget in the Create dialog box for simulation objects now starts as a single, read-only line. You can expand it to manually enter the desired location.	VRF-5.1, VRF-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6593	IFF Interrogation	The new IFF Interrogate and IFF Sweep Interrogate tasks allow aircraft entities to check IFF codes enabled by other entities. Detected modes display in the interrogating entity's Object Console. The IFF Interrogate task interrogates a single entity, while IFF Sweep Interrogate interrogates multiple entities within the specified range. The IFF Interrogate task also allows you to enable lethal interrogation for Mode 5. If the target of the interrogation has Mode 5 available but has not enabled it, the interrogated entity briefly displays a V in the Plan View and the Object Console indicates it was a lethal interrogation. These tasks belong to a new category for immediate tasks that can be executed without abandoning a plan.	VRF-5.1, VRF-IPB18
VRF-6610	Clutter area graphics should use dashed or dotted lines	The penstyle keyword in the .entity file can now have an optional value set to it in order to have a default penstyle for an environmental that supports it, for example, penstyle=dashed. Supported styles are: nopen, solid, dashed, dotted, dashdot, dashdotdot	VRF-5.1, VRF-IPB18
VRF-6619	Add support for Callsign	Added support for automatically populating the NETN Callsign attribute.	VRF-5.1, VRF-IPB19
VRF-6648	Add an IFF Interrogator Sweep task	Release notes included in VRF-6593.	VRF-5.1, VRF-IPB18
VRF-6660	Add support for 2525D Screen/Cover/Guard	VR-Vantage can now display the Cover, Guard, and Screen maneuver control tactical graphics.	VRF-5.1, VRF-IPB18
VRF-6663	Use Ctrl key during object movement/editing as modifier for snapping to a heading or position	When creating and editing a simulation object, you can now snap the object to a grid. When you click and move the mouse to position the object: For altitude, use Ctrl+Alt. For heading, press Ctrl+Shift. For pitch, press Ctrl+Alt+Shift. It is 5 meters of elevation or 15 degrees of heading or pitch. This helps you position objects more precisely, such as props.	VRF-5.1, VRF-IPB18
VRF-6664	Fast Rope Insertion on moving carrier should go to the waypoint, regardless of where the carrier is located	Previously, aircraft went to the waypoint's initial position in the world, rather than adjusting to the carrier's current location and the waypoint's position on it. The task has been updated to allow the aircraft to keep pace over the moving waypoint.	VRF-5.1, VRF-IPB19
VRF-6673	Have a category of tasks that do not abandon plans	There is a new category for tasks that can be executed without abandoning the current plan. The IFF interrogation tasks are examples of this category. You can use those tasks at any time and the entity will continue to perform its plan.	VRF-5.1, VRF-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6713	Modify overlay API to allow for creation of a folder structure	Added API to allow for local overlay folder structure, and there is now an example overlaryOrganization to show how to use it. This functionality is not used in the system in general, however, is provided for developer usage.	VRF-5.1, VRF-IPB18
VRF-6748	Define correct aerodrome light modes	VR-Forces now has the ability to define light modes for aerodromes, which can be set in a Lua script. The terminology is industry standard.	VRF-5.1, VRF-IPB18
VRF-6750	Add Sphere and Hemisphere tactical graphics	Use the new Sphere and Spherical Sector tactical graphics to define 3D areas in space: a full sphere and a hemisphere.	VRF-5.1, VRF-IPB19
VRF-6751	New attachment modes for tactical graphics attaching to entities	The new Attached set data request allows you to attach tactical graphics to entities. You can specify the graphic's orientation relative to the entity or the world. You can also use it to detach a tactical graphic from an entity.	VRF-5.1, VRF-IPB18
VRF-6760	Add vertical, horizontal and range error parameters to contact reports	The DtRwSensorContactInfo's detectionError parameter has been replaced with horizontalError (an angle), verticalError (also an angle), and rangeError (distance). Out of the box, VR-Forces does not use these errors. They are available for plug-ins.	VRF-5.1, VRF-IPB18
VRF-6761	Allow Ballistic Guns to fire on a location	There are new Fire At, Fire Ballistic Gun, and Fire Missile Launcher tasks for weapon systems that support direct fire. Older platform-specific weapon tasks (such as Fire At Target and Fire TOW at Target) have been deprecated in favor of those using the new unified system. See the Engagement Tasks for Entity-Level Scenarios section of the help or VR-Forces Users Guide.	VRF-5.1, VRF-IPB18
VRF-6762	Allow missile system to target location	Documentation covered in VRF-6761.	VRF-5.1, VRF-IPB19
VRF-6766	Load balancing improvements	You can now create rules for load balancing when you run multiple back-ends, which is useful for very large scenarios. Previously, the only choices were even or manual distribution, and you could manually move simulation objects from one back-end to another.	VRF-5.1, VRF-IPB19
VRF-6787	Add set light controls for the aerodromes	Aerodromes and runways have changed from previous releases, and the controls for those terrain features have been significantly improved. See "Aerodromes" in the Terrain section of the online help or user guide for details.	VRF-5.1, VRF-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6795	Improvements to the Configure Embarkation dialog	The Configure Embarkation feature has been improved. There is now an Apply button, which allows you to save intermittently while you configure embarkation. In the 3D views (Stealth and XR), you can now select from one of the views (top down, perspective, and various sides). The labels for the positions of ingress and egress points are now the same as for slots. You can now adjust the near clipping plane in the Stealth view, which allows you to see inside a vehicle when defining the slots.	VRF-5.1, VRF-IPB19
VRF-6796	Add ability to set new parameters in MAK_RadarBeam	Added reasonable default values to the new attributes under mak-radar-mode in the active-radar-sensor.sysdef file. Updated the Emitter tab in the Information dialog box to show the values of these new attributes.	VRF-5.1, VRF-IPB19
VRF-6816	Warn users when saving scenario without applying plan changes	If you have open plans that have not been saved when you save the scenario, VR-Forces now prompts you to decide whether to save those changes before saving the scenario.	VRF-5.1, VRF-IPB18
VRF-6870	Vertical Takeoff and Landing aircraft movement system	Aircraft configured with the Fixed Wing VTOL movement system can perform the new Takeoff (Vertical), Land (Vertical), and Hover tasks. If the model is configured for it, such as the CV-22B or MV-22B Osprey, articulated parts move realistically.	VRF-5.1, VRF-IPB19
VRF-6918	Add earth file parameters to overwrite large Z values scaling on GT trees (published by CAE Lithos tool)	Added support for CDB terrains published using the CAE Lithos tool. Added parameters to scale GT models, such as trees.	VRF-5.1, VRF-IPB19
VRF-6932	Laser Designator Improvements to take directionality into consideration	When an entity lases one side an entity, the direction of the laser is considered and weapons can only target the designated spot if they have line of sight to it. If the weapon does not have visibility to that side of the entity, the weapon cannot target it.	VRF-5.1, VRF-IPB19
VRF-6963	GUI feedback for sim operations	When you place or move a simulation object, there are now small indicators that display temporarily before the simulation object is added to the scenario. This shows you that you were successful and that the application is working to load or move the object. When you open a terrain or scenario, an indicator near the bottom right of the application window displays. This indicates what is loading: terrain, insets, navigation, and so on.	VRF-5.1, VRF-IPB19
VRF-6979	Improve handling of max air speed	Added configuration options to limit the maximum ordered speeds allowed for aircraft in the Entity Control Panel in IAS and Mach number. You can change the settings per entity type in the SOE.	VRF-5.1, VRF-IPB19

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-6984	Make osgEarth procedurally generated buildings destructible	For detonations of appropriate size near a vertex of a procedurally generated building, the buildings is replaced with a rubble model. This works for any osgEarth terrain using the osm.features.xml and the debris models provided in the MAK data package. For details about these files, see the Adding Content to MAK ONE Applications Reference Manual or the product help.	VRF-5.1
VRF-7010	Put log and dmp files into new Log directory	All MAK ONE log and dmp files are now saved in a central location. The default is C:/MAK/logs, which you can change by using the MAK_LOG_DIR environment variable to specify a different path.	VRF-5.1, VRF-IPB19
VRF-7020	In the Fire for Effect tasks, users should select either Number of Rounds or Continuous	Improved the dialog boxes for the Fire for Effect tasks (on Entity, on Location, and on Target) to clearly indicate that users can choose to fire only a specified number of rounds or continuously.	VRF-5.1, VRF-IPB19
VRF-7022	Ship the VR-Forces Quick Reference Card as a separate PDF	The VR-Forces Quick Reference Card has been removed from the end of the VR-Forces Users Guide. It is now a separate, easy-to-reference PDF included in the installation and available online on the VR-Forces Products Specifications & Dependencies page.	VRF-5.1, VRF-IPB19
VRF-7028	Make the keyboard-created tactical graphics the force type last set in the creation panel	The last force used when creating a tactical graphic will be used for the tactical graphics created using the context menu or keyboard shortcuts (Ctrl+A for area, Ctrl+R for route, and Ctrl+W for waypoint).	VRF-5.1, VRF-IPB19
VRF-7054	Allow users to set the Airbase on the Edit Entity Dialog	You can assign an aircraft to a base from the Edit dialog box for that entity. There must be an aerodrome in the terrain.	VRF-5.1, VRF-IPB19
VRF-7059	Change Follow Entity to ignore leaders roll and pitch	The Follow Entity task for fixed-wing aircraft has changed so that the follower's position offset from the leader does not change when the leader changes its roll or pitch. This means that the majority of formation-flight use cases work as desired, with aircraft staying in the same vertical position relative to their leader. It also means that "airshow" formations no longer roll as a formation when the leader rolls.	VRF-5.1, VRF-IPB19
VRF-7080	Update Start Menu Links	To account for the "flatter" menu structure of Windows 10 and Windows 11, the Start menu links to VR-Forces and its associated applications now display the version information. The documentation and tools are in versioned subfolders, and there are also versioned shortcuts on the Start menu to access the folders.	VRF-5.1, VRF-IPB19
VRF-7110	Configure radio towers to send radio messages	You can now assign Radio tasks to the Tower Radio simulation object. This allows it to send tasks, sets, and messages to other entities in the scenario.	VRF-5.1, VRF-IPB19

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7163	Improve calculation of Indicated Airspeed at high altitudes	The indicated airspeed for aircraft uses an improved model that remains valid for high-altitude aircraft.	VRF-5.1
VRF-7165	Convert quick launch toolbar to a dock widget	The Quick Launch toolbar is now a panel, displaying the text of the Event Title of a scenario event or the name of the global plan. This new default configuration allows users to quickly read the text description of the event. The new Quick Launch Panel's default position is behind the Command Panel at the right side of the main window.	VRF-5.1, VRF-IPB19
VRF-7166	Add Lua function to get articulated part extension	Older versions of VR-Forces had the ability to get the rotation and translation of articulated parts from Lua scripts. This was not possible for part extension, which is used for both refueling drogues and towed decoys. Added a new function to the Lua API to support this. This allows you to write scripts that consider the part extension.	VRF-5.1, VRF-IPB19
VRF-7180	Single Object Mode should allow embedded entities	This addresses an issue for VR-Engage. Extended the "single object mode" to allow for creating additional platforms, such as the deployable tripod-mounted missile launcher and the handheld drone.	VRF-5.1, VRF-IPB19
VRF-7198	Aircraft should set the weight-on-wheels appearance bit when on the ground	VR-Forces now populates the appearance bit for weight on wheels. This bit is set when the aircraft is on the ground and is used for various EW transmitters that broadcast this information of aircraft state.	VRF-5.1, VRF-IPB19
VRF-7210	Stop building VRF for HLA 1.3	VR-Forces no longer supports HLA 1.3 out of the box. Users who want HLA 1.3 support must contact MAK's Sales team.	VRF-5.1, VRF-IPB19
VRF-7211	Do not package deprecated FOMs	Deprecated FOMs (e.g., old RPR versions, HLA 1.3, HLA 1516, old versions of MAK FOM modules) are no longer packaged with VR-Forces.	VRF-5.1
VRF-7229	Get rid of working waypoint creation in fly to controller	Eliminated the working control point creation by creating a new type of reader/writer object that enhances the DtRwLocationReference object to provide an API that returns positional information of the object based on whether or not it is a sim object or an absolute location. VR-Forces uses this object instead of the working control point to set the target destination of fixed-wing aircraft.	VRF-5.1, VRF-IPB19
VRF-7419	Create PDB installer for VR-Forces	You now install PDBs, which supply data to inform the callstack.log file, using an executable. This is easier than manually unzipping and putting the files in the ./bin64 directory.	VRF-5.1
VRF-7518	Add speed to Create/Edit dialog boxes for air-based entities	The Create and Edit dialog boxes for air-based entities now allow users to set the ordered airspeed.	VRF-5.1

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRF-7519	Update IFF panel to use placeholder text for easier editing	The IFF set data request dialog box now uses placeholder text for octal codes that the user has not yet entered instead of actual numbers. When the user enters the desired numbers, they overwrite the placeholder 0s.	VRF-5.1
VRF-7708	Replace tick-period-uses-real-time with periodic-tick-while-paused in DtComponentDescriptor	The specified tick period is now used in real-time only while scenarios are paused. While running, the same tick period uses real-time.	VRF-5.1
VRF-7878	Add a way to specify the default ceiling height of an extruded area	The new keyword, ceilingheight=, defines the default ceiling height of extruded areas.	VRF-5.1
VRF-7926	Move shipped scenarios to "Sample" subdirectory	All of the example scenarios that ship with VR-Forces are now in a subfolder: ./userData/scenarios/Sample. This separates them from any scenarios that you save in the ./userData/scenarios folder. Also, some outdated scenarios were removed from the installation.	VRF-5.1
VRF-8004	Add button to return directory to default scenario directory on load dialog	Added a button to the Load Scenario dialog box to return users to the default scenario directory.	VRF-5.1
VRF-8228	Add callback mechanism to be called when CGF is being deleted	The DtCgf can now notify plug-ins when it is about to be deleted. It does so by adding an addCgfAboutToBeDestroyedCallback to it.	VRF-5.1
VRV-202	Replace billboard trees with 3D model trees at close range	The application now replaces the GroundCover GPU trees with 3D models when the observer is close to the trees.	VRV-3.1, VRV-IPB17
VRV-2160	Unify 2D and 3D symbol decorations	The Symbol Decoration Settings page in Display Settings now allows you to control what labels display for 2D and 3D model sets. Previously, it applied only to the 2D model set; the labels in the 3D model set were not configurable.	VRV-3.1, VRV-IPB18
VRV-2299	Texture Replace for Models, for Variations as well as Camo type	Added the ability to swap out the texture on a model in the configuration. This allows for a single model to have different appearances, which helps to manage runtime performance and data by sharing content.	VRV-3.1, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-2467	Make terrain patches pageable	There is a new optional check box in the Add Terrain Patch dialog box: Is Pageable. When you select this check box, the patch will page in only when it is part of the observer view. This can improve performance when loading large terrains. If the patch is not pageable, it fully loads when you load the terrain, regardless of the view.	VRV-3.1, VRV-IPB17
VRV-2509	Making a change to the element definition hierarchy requires saving the leaf children / Some parts of the hierarchy need to be in in the leaf file	In addition to the --entityDefsDir command-line option, which existed previously, the new --unitDefsDir and --tacticalGraphicsDefsDir options allow you to specify the directory where the application should load the .hier and .leaf files to the entity, tactical graphics, or unit element definition managers, respectively.	VRV-3.1, VRV-IPB19
VRV-2813	Replace and retire Makland from the VRV examples	Replaced the Makland terrain in examples because the terrain was deprecated and removed from the data package.	VRV-3.1, VRV-IPB18
VRV-2923	Visualize Ditches and Berms in VRV	VR-Vantage can visualize ditches and berms created in VR-Forces.	VRV-3.1, VRV-IPB18
VRV-3019	Add support for Attack By Fire (ABF) position graphic	There is a new tactical graphic available, Attack By Fire Position.	VRV-3.1, VRV-IPB18
VRV-3021	Add support for Support By Fire Position Graphic (SBF)	There is a new tactical graphic available, Support By Fire Position.	VRV-3.1, VRV-IPB18
VRV-3367	Upgrade SenSim and SigSim for SensorFX	Upgraded SenSim to 4.0.0.19238 and SigSim 4.0.0.19238. These libraries from JRM Technologies power sensor modes.	VRV-3.1, VRV-IPB18
VRV-3386	Add new MACH/GS/IAS/TAS speed symbol decorations	In the Plan View, you can now specify whether you want to see the speed for aircraft as the ground speed (GS), indicated airspeed (IAS), true airspeed (TAS), and Mach number (MACH). Surface watercraft can also display ground speed. These settings are separate from the Show Speed setting previously available for display in symbol decorations. (Ground vehicles do not show these speeds, even when they are enabled.)	VRV-3.1, VRV-IPB17
VRV-3393	Add logic for using rsync to VRV_CopyFiles so we can avoid copying headers if they haven't changed.	For the MAK internal build system, updated VRV_CopyFiles to use rsync, which allows it to update only files that are different, regardless of whether the files are newer or not. This is now the default behavior, but the previous behavior--using the `cp` command to copy all the 3rdParty dependencies header files--can be enabled if necessary.	VRV-3.1, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-3608	Velocity Indicator Symbol Decoration	You can now display a velocity indicator for air entities that displays the heading and an indication of the velocity. When displayed, the line is bright green and shows the relative speed of entities, allowing you to rapidly assess the velocity of air entities relative to each other. The faster the entities are moving, the longer the line. At this time, the indicator points in the same direction as the entity's heading.	VRV-3.1, VRV-IPB16
VRV-3634	Optimize Performance of MAK Earth with Procedural Terrain 2.0	Improved terrain performance with Procedural Earth 2.0 improvements.	VRV-3.1, VRV-IPB17
VRV-3659	Finish refactoring the remaining the VRL visualizers	Removed more protocol-dependent visualizers. Most have moved to vrvCore, but some were removed because they were no longer required.	VRV-3.1, VRV-IPB16
VRV-3661	Remove DtSceneObjectVisualizer	As part of the Element & Visualizer Refactor, removed DtSceneObjectVisualizer because it is no longer required. Elements now create a scene object for each model set.	VRV-3.1, VRV-IPB16
VRV-3666	Refactor remaining element types to new design	Refactored Smoke, Remote Graphic, and Laser Designator Elements as part of the Element & Visualizer Refactor.	VRV-3.1, VRV-IPB16
VRV-3676	Update embarkation to three states	There are now three embarkation states: unembarked, embarkationRequested (or Pending); and fullyEmbarked.	VRV-3.1, VRV-IPB18
VRV-3747	Refactor elements to use one kinematic state object for ALL model sets	Refactored elements to use one kinematic state object for all model sets. There is now one kinematic state object per element, rather than one per model set. This means there is one updater chain per element; all scene objects for active model sets of an element are updated by this chain.	VRV-3.1, VRV-IPB18
VRV-3843	Splash screen should stay visible until the main window is shown and be more informative	The splash screen now remains visible until the main window is available. Additionally, simple messages display on the splash screen to report what is happening while you wait. This makes it clear that the application is launching.	VRV-3.1, VRV-IPB16
VRV-3861	Ability to disable a dataset from being used by the intersector	You can disable a dataset/feature_geom layer from being used by the intersector. See "Disabling Intersections for a Feature Geometry Layer" in the Adding Content to MAK Applications Reference Manual.	VRV-3.1, VRV-IPB16
VRV-3910	Add support to particle system editor for time-controlling all particle systems (not just preview systems)	The Particle System Editor has a new option in the Advanced Debugging Settings. When it is enabled, the Play/Pause button in the Preview Settings apply to all particle systems in the scene, not only any systems you are actively previewing.	VRV-3.1, VRV-IPB16

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4021	Underwater Visibility controlled by Depth	The underwater IG is now more realistic, allowing factors such as depth and underwater fog to affect visibility. The overall ambient light also affects the scene, for example, it is harder to see underwater at night than in daylight. The Underwater Visibility setting in the Advanced Marine Settings has been adjusted to support these improvements.	VRV-3.1, VRV-IPB18
VRV-4022	Ship Smokestack smoke control and environmental effects	The smoke can be enabled or disabled based on the state of the powerplant bit. Particles are realistically affected by windspeed and direction as well as the movement of the ship.	VRV-3.1, VRV-IPB19
VRV-4034	Add creator-creatable signaler for listeners	Added a creator-creatable signaler to listeners so that you do not need to override protocol-dependent listeners. The exampleFomMapper has been updated to demonstrate the new functionality.	VRV-3.1, VRV-IPB18
VRV-4039	Performance Improvements to OSGEarth	There are significant performance improvements in osgEarth: - Fixed some unnecessary mutex contention on all layer types to allow you to use all of your cores more effectively. - Extruded geometry layers are also faster. Tiles that previously took 10 seconds to load now take about 1 second. - Mipmap generation and texture compression for image layers are faster. Each image layer that you add to your earth file now requests an image for each tile that must be loaded, and each one of those images needs to be mipmapped and maybe compressed based on your layer settings. - Each loaded tile creates an elevation layer, which also requires the generation of a normal map. Previously it took 30 ms per tile, and now it's about 10 ms. - Aerodromes now load much more quickly, taking approximately a tenth of the time that they did previously.	VRV-3.1, VRV-IPB18
VRV-4123	Add an ability to output a list of visible entity names or pointers from the camera.	You can get a list of entity names or pointers that are visible within the camera frustum. In the DtOsgChannel, use <code>vector<Entity*> getEntitiesInFrustum()</code> .	VRV-3.1, VRV-IPB18
VRV-4171	API needs a model to scene object coordinate conversion method	Added a simple static method to DtSceneObject, <code>modelCoordToSceneObjectCoord</code> , to convert from model coordinates to scene object coordinates.	VRV-3.1, VRV-IPB16
VRV-4174	Command Line to suppress Vertex/Alpha color in FBX	Because most renderers do not support vertex or alpha color, you should ignore it when it is in the file. There are two ways to do this. For FBX model files, use the new command-line option for the medfTool, <code>-c</code> or <code>--disableVertexColor</code> . For MFT files, add <code><myDiscardVertexColor>1</myDiscardVertexColor></code> under <code><myTerrainPatchDefinitionRecord></code> .	VRV-3.1, VRV-IPB16

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4195	Rework text rendering for areal tactical graphic names	Text for areas is now in the center. Some areal tactical graphics show more information than they did in previous releases, such as altitude and the time during which the graphic is active.	VRV-3.1, VRV-IPB16
VRV-4235	Ability to debug specific entity/entities in indirect	To make use of this functionality, specify via this function in DtOsgArticulatedModel::static void trackEntity(const std::string& entityDisplayName, int modelSet, bool track);	VRV-3.1, VRV-IPB18
VRV-4243	Add support for mirror mode to CIGI	CIGI supports mirror mode.	VRV-3.1, VRV-IPB18
VRV-4245	PVD Improvements for Aggregates	The new Aggregate Display Toolbar allows you to collapse or expand all units in the scene, or display ghosted icons to a specified echelon level. (The Collapse All and Expand All buttons apply only to units that are known at the time you click the button. Any units added to the scene after you click the button display in their default state.)	VRV-3.1, VRV-IPB16
VRV-4247	Add new Detector Sensor Settings for SensorFX: Horizontal/Vertical Jitter Amplitude, Horizontal/Vertical Jitter Frequency, Charge Well Capacity	The new settings are available in the Sensor Settings page of Display Settings for VR-Vantage with SensorFX.	VRV-3.1
VRV-4277	Rework text rendering for line tactical graphic labels	Text on linear tactical graphics is now aligned with the segment it is adjacent to.	VRV-3.1, VRV-IPB16
VRV-4288	Make the width of Line Indicator Symbol Decoration customizable via visual attribute	You can adjust the thickness of the new velocity indicator line by editing the entity's Entity Symbol Decorations visual definition for the 2D Icons model set.	VRV-3.1, VRV-IPB18
VRV-4372	It should be possible to find the terrain specified on the command line if other prerequisites are met.	VR-Vantage now looks in the correct data location for terrains or scene files specified on the command line, working as it did in the releases before shared data. It looks in either the default location (C:\MAK\SharedData) or the one specified by the environment variables (MAK_SHARED_DATA_ROOT and MAK_SHARED_DATA_STEM).	VRV-3.1, VRV-IPB17
VRV-4397	Create Ambush Line Tactical Graphic	Added support for the Ambush Line tactical graphic (MIL STD 2525D).	VRV-3.1, VRV-IPB16
VRV-4412	Create a Support By Fire Tactical Graphic	Added support for the Support by Fire tactical graphic (MIL STD 2525D).	VRV-3.1, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4446	Add a signal to the entity state listener to turn track histories on/off at a per element basis	You can now use a signal in the DtEntityStateListener to enable or disable track histories for an entity in all model sets.	VRV-3.1, VRV-IPB18
VRV-4466	Add text decoration support to the Area model	The tactical graphics for minefields now display appropriate text on the outlines of the areas.	VRV-3.1, VRV-IPB16
VRV-4467	Add more fill pattern textures for areas	The tactical graphics for minefields now use different fill patterns to represent the type of mines in the minefield: antitank, antitank with antihandling device, antitank wide area, antipersonnel, decoy, and decoy fenced.	VRV-3.1, VRV-IPB16
VRV-4468	Minefields (Element Definitions)	The new tactical graphics for minefields--antitank, antitank with antihandling device, antitank wide area, antipersonnel, decoy, decoy fenced, and unspecified--use standard fill patterns to differentiate the type of mines in the minefield. They also display appropriate text on the outlines of the areas.	VRV-3.1, VRV-IPB16
VRV-4470	Some Area TGs should have more informational text at the center of the area	Some areal tactical graphics show more information than they did in previous releases, such as altitude and the time during which the graphic is active.	VRV-3.1, VRV-IPB16
VRV-4474	Display appropriate visuals for an empty scene	Channels now display an overlay containing the MAK One logo when no terrain is loaded. A new ImGui check box in the F4 debug options allows you to enable or disable this feature as desired.	VRV-3.1, VRV-IPB16
VRV-4478	Hide/Show tactical graphics based on its Activation State	You can now set VR-Vantage to display tactical graphics only when they are active. This option is in the Tactical Graphics Display Settings, found in the Display Settings.	VRV-3.1, VRV-IPB16
VRV-4491	Tactical Graphics should be colored by force type by default	Most tactical graphics now default to be the color of the force with which they are associated.	VRV-3.1, VRV-IPB16
VRV-4495	Improve performance in osgEarth and also frames per second.	Made various fixes and optimizations to increase both frames per second and loading time in osgEarth.	VRV-3.1

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4505	Implement GAR Grid Lines	You can now see Global Area Reference System (GARS) grid lines in the Plan View. GARS is a standardized geospatial reference system developed by the National Geospatial-Intelligence Agency (NGA) for use across the U.S. DOD. When you want to work with multiple coordinate systems in the Plan View, the new Grid Line Selector toolbar allows you to rapidly toggle between grid line overlays. By default, it is set up to show DDM, GARS, or MGRS. You can customize the available coordinate systems in the Grid Lines Settings page of Display Settings.	VRV-3.1, VRV-IPB17
VRV-4507	Remove DiGuy Motion Model	Moved the relevant code into a new DI-Guy motion controller object, which the DI-Guy character model creates/owns. Removed all previous references to the motion model and the add/remove model methods that its use caused us to add.	VRV-3.1, VRV-IPB17
VRV-4513	Allow more Text Box Visualizer properties to be user-settable via configuration	You can now specify more text box properties using element or visual definitions: Origin Placement Policy, Text Horizontal Alignment Policy, and Background Color. Text Horizontal Alignment Policy requires that Default Width and Default Height are defined.	VRV-3.1, VRV-IPB16
VRV-4517	Add command line argument to disable model sets	Some users do not need all of the model sets, and those users might want to disable the sets they are not using. The new --disableModelSets "#" command-line option allows you to specify the sets you want to disable: 3D model set (0), colorized models (1), minimap (4), or 2D icons model set (5). You can also specify multiple model sets by separating them with commas. For example, --disableModelSets "0, 1" disables the 3D and XR (colorized) model sets.	VRV-3.1, VRV-IPB16
VRV-4538	Allow Outline Textures to be larger than 16x16	Allowed for more configuration of the outline textures of tactical graphics so that they display as desired.	VRV-3.1, VRV-IPB16
VRV-4541	Make Antivehicle Ditch/Wall Tactical Graphics conform to MIL STD 2525D	The tactical graphics for Ditch and Fortified Ditch now conform to MIL STD 2525D.	VRV-3.1, VRV-IPB16
VRV-4551	Move Range/Bearing Line Support for Plan View (2D) from VR-Forces to VR-Vantage	You can now measure bearing and range by drawing a range line. See "Range Lines" in the Intervisibility Objects chapter of the VR-Vantage Users Guide (or the help).	VRV-3.1, VRV-IPB16
VRV-4554	Add Boundary Line Tactical Graphic	VR-Vantage can visualize the new Boundary Line tactical graphic.	VRV-3.1, VRV-IPB18
VRV-4560	Add support for text rotation in world space	Text on linear tactical graphics is now aligned with the segment it is adjacent to. Text for areas is now in the center.	VRV-3.1, VRV-IPB16

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4562	Add Screen-Interval Text Rendering support to Overlay Line Models	Added the capability to render text at intervals along the lines for tactical graphics to support more complicated models such as Boundary Line, which renders informational text along the line. The text renders at specific intervals depending on the size of the tactical graphic and the position of the observer view.	VRV-3.1, VRV-IPB18
VRV-4565	Add functionality to tactical graphic models to enable them to be hidden rather than destroying them	If you experience performance issues when hiding and showing tactical graphics in scenes with a large number of them, you can choose to make them invisible when hiding them. (The default behavior is to destroy and recreate them.) To configure tactical graphics to be invisible when hidden instead of destroyed, clear the new Delete Tactical Graphics on Hide check box in Tactical Graphics Display Settings.	VRV-3.1, VRV-3.2, VRV-IPB18
VRV-4569	Add support for a maximum text bounds in world space	Text on tactical graphics is now hidden when the observer is at an altitude such that the text is longer than the adjacent line segment or shape. The text on larger tactical graphics is visible at higher altitudes than the text on smaller ones.	VRV-3.1, VRV-IPB16
VRV-4611	Add Airspace Control Zone Tactical Graphics	Added support for Air-to-Air Restricted Operations Zone, Base Defense Zone, Fighter Engagement Zone, High (Altitude) Missile Engagement Zone, High-Density Airspace Control Zone, Low (Altitude) Missile Engagement Zone, Restricted Operations Zone, Short Range Air Defense Engagement Zone, Unmanned Aircraft Restricted Operations Zone, Weapon Engagement Zone, Weapons Free Zone.	VRV-3.1, VRV-IPB18
VRV-4614	Improve Polygon Fill	Modified the polygon stipple fill to be texture-based. The stipple texture pattern is now projected onto the polygon and UV coordinates are scaled based on discrete camera altitudes.	VRV-3.1, VRV-IPB17
VRV-4623	Add texture limiting code to osgEarth	There are new command-line options that you can use to limit the size of the textures that: -limitEarthSplattingTextures, --limitEarthTerrainTextures, and --limitEarthVegetationTextures. These allow you to constrain the amount of GPU (video) memory used for .earth files. For each, you specify the width and height of the texture limit as a power of 2, for example, --limitEarthTerrainTextures "16". If you do not enter a power of 2, VR-Vantage rounds it up to the next highest power of 2.	VRV-3.1, VRV-IPB18
VRV-4624	Show Only Active Tactical Graphics Needs a Toolbar Button	You can control whether active tactical graphics are the only ones displayed using the new Show Only Active Tactical Graphics button on the Display Settings toolbar.	VRV-3.1, VRV-IPB18
VRV-4629	Automatic save of DMP files	DMP files now save automatically, even if you are unable to respond to the error message prompting you whether to save one.	VRV-3.1, VRV-IPB18
VRV-4664	Add Airspace Control Line Tactical Graphics	There is support for many 2525D tactical graphics, which include Identification, Friend-or-Foe (IFF) Off Line and Identification, Friend-or-Foe (IFF) On Line for Airspace Control.	VRV-3.1, VRV-IPB19

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4668	Put Geodetic Grid Labels at the top and side of the display when zoomed in.	Geodetic coordinates now display at the left and top edges of the window, no longer cluttering the view in the center of the window.	VRV-3.1, VRV-IPB17
VRV-4669	Put MGRS grid line labels at the top instead of at the bottom of the display	The MGRS coordinates now display at the top of the relevant lines, rather than the bottom.	VRV-3.1, VRV-IPB17
VRV-4677	Add Link to HTML docs in the doc folder under the start menu	You can now access the VR-Vantage HTML5 help using the shortcut in the Documentation folder of the installation.	VRV-3.1, VRV-IPB17
VRV-4687	Make Phase Lines conform to MIL STD 2525D	Phase lines now conform to MIL STD 2525D.	VRV-3.1, VRV-IPB18
VRV-4703	Add color control adjustment for plan view	There are new color controls for 2D map views (Plan View) which helps you see tactical graphics and other overlay information more clearly. The color controls include adjustments for grayscale invert, contrast, brightness, and color mix. You can enable and disable color controls using the icon located on the Display Settings toolbar or through the Display Settings.	VRV-3.1, VRV-IPB18
VRV-4706	Add element definition/type mapping configuration for Dynamic Terrain Tank Scrape	VR-Vantage applications can visualize tank scrapes created in VR-Forces.	VRV-3.1, VRV-IPB17
VRV-4709	Add option to set friendly force tactical graphics color from blue to black or white	For friendly forces, you have the option to display tactical graphics as either black or white. Other forces' tactical graphics display as their defined color.	VRV-3.1
VRV-4716	VR-Vantage to use VR-Link weather classes for all weather state	VR-Vantage now uses the METOC FOM for simulating weather.	VRV-3.1, VRV-IPB19
VRV-4722	Add visual support for more Maritime light types (e.g. warning, distress, anchor, RAM, fishing, mine hunting)	Added visual support for more maritime light types including warning and safety lights, distress beacons and strobes, upper deck flood lights, anchor lights, wave off lights, not under command lights, restricted ability to maneuver (RAM) lights, fishing with nets lights, fishing with lines lights, and mine hunting lights.	VRV-3.1, VRV-IPB19
VRV-4729	Add support for 2525D Area of operations	Added support for Area of Operations tactical graphic.	VRV-3.1, VRV-IPB17

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4730	Add support for 2525D Assembly Area	Added support for Assembly Area tactical graphic.	VRV-3.1, VRV-IPB18
VRV-4731	Add support for 2525D Engagement Area	Added support for Engagement Area tactical graphic.	VRV-3.1, VRV-IPB18
VRV-4732	Add support for 2525D Objective Area	Added support for Objective Area tactical graphic.	VRV-3.1, VRV-IPB18
VRV-4733	Add support for 2525D Named area of interest	Added support for Named Area of Interest tactical graphic.	VRV-3.1, VRV-IPB18
VRV-4735	Add support for 2525D Target Areas	Added support for Target Area tactical graphics: Area, Rectangular, Circular, Smoke, and Bomb.	VRV-3.1, VRV-IPB17
VRV-4738	Add environment variable for overriding DI-Guy log hiding	If you want to enable DI-Guy logging in VR-Vantage, create the environment variable VRV_DIG_LOGGING_ENABLE.	VRV-IPB17
VRV-4747	Add support for more 2525D area graphics	Added support for Base Camp, Guerrilla Base, Target Area of Interest, Assault Position, Attack Position, Detainee Holding Area, Refugee Holding Area, Forward Arming and Refueling Point, Brigade Support Area, Division Support Area, and Corps Support Area.	VRV-3.1, VRV-IPB18
VRV-4752	Remove use of boost::bind in vrvCigi	The CIGI code makes heavy use of signals and so moved to std::bind instead of boost::bind.	VRV-3.1, VRV-IPB19
VRV-4755	Support symbol decorations that are only shown on mouse over.	You can specify whether labels display all of the time or only when you mouse over simulation objects.	VRV-3.1, VRV-IPB18
VRV-4756	Support multiple positions for PVD Entity Labels	When simulation objects are close together, their labels can sometimes overlap in the Plan View. You can now select an entity and then press Ctrl+Shift+S to rotate the label through four cardinal positions. Continue cycling the label until it displays as desired.	VRV-3.1, VRV-IPB17
VRV-4760	Radar arrays (rotating, stationary) automatically.	Radar arrays now automatically rotate based on the configuration in a metafile. This has been set up for the surface watercraft that are included in the MAK data package for VR-Vantage 3.1 and complementary products.	VRV-3.1, VRV-IPB17
VRV-4763	Aircraft Flaps (full, mid, up) and Slats (up, down).	Added support for articulated parts that are configured on aircraft models, allowing simulation software to control them.	VRV-3.1

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4767	Add support for more 2525D lines	There is now support for other 2525D tactical graphics: Airborne Or Aviation Axis Of Advance, Bridgehead Line, BattleField Handover Line, Bridgehead Line, Common Sensor Boundary, Coordinated Fire Line, Delay Line, Final Coordination Line, Fire Support Coordination Line, Forward Edge Of The Battle Area, Intelligence Coordination Line, Limit Of Advance, Line Of Departure, Line Of Departure Or Line Of Contact, Probable Line Of Deployment, Release Line, Restrictive Fire Line.	VRV-3.1, VRV-IPB17
VRV-4780	Add support for Gladiator Airport Lighting Model	Airports in terrains can now display various aerodrome and runway lights.	VRV-3.1, VRV-IPB18
VRV-4781	Add support for more 2525D airspace control measures	VR-Vantage can display tactical graphics for these airspace control measures: Low-level Transit Route, Minimum-risk Route, Safe Lane, Special Corridor, Standard Use Army Aircraft Flight Route, Transit Corridor, Unmanned Aircraft (UA) Corridor.	VRV-3.1, VRV-IPB17
VRV-4782	Add support for 2525D Counterattack	VR-Vantage can now display the Counterattack linear tactical graphic.	VRV-3.1, VRV-IPB17
VRV-4784	Add support for 2525D Air Control Point	VR-Vantage can now display the Air Control Point circular tactical graphic.	VRV-3.1, VRV-IPB17
VRV-4787	Add support for 2525D Friend-or-foe lines	VR-Vantage can now display tactical graphics for Identification, Friend-or-foe Switch Off-line and Identification, Friend-or-foe Switch On-line.	VRV-3.1, VRV-IPB17
VRV-4788	Add support for 2525D Obstacle Control Measures	VR-Vantage can now display tactical graphics for obstacle control measures: Obstacle Belt, Obstacle Free Area, Obstacle Line, Obstacle Restricted Area, Obstacle Zone.	VRV-3.1, VRV-IPB17
VRV-4791	Add support for 2525D explosives and roadblock	VR-Vantage can now display tactical graphics for Planned Explosive State Of Readiness, Explosives, State Of Readiness 1 (Safe), Explosives, State Of Readiness 2 (Armed But Passable), Roadblock complete (executed).	VRV-3.1, VRV-IPB17
VRV-4792	Add ability to set distance between parallel line style to less than 1 km	Previously, the line style of two parallel lines was for air corridors, which was fixed at a minimum of 1 km. This line style is now used for other 2525D symbols, such as Planned Explosive State Of Readiness, and therefore can be set to be less than 1 km.	VRV-3.1, VRV-IPB19
VRV-4793	Add support for 2525D traffic routes	Added support for One-way Traffic and Alternating Traffic routes.	VRV-3.1, VRV-IPB18
VRV-4809	Add an Exhaust Plume visual type	There is now an Exhaust Plume visual type. You can use this to configure model definitions and also choose whether to display it in the Observer Settings.	VRV-3.1, VRV-IPB17

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4816	Abstract osg::texture to reduce the need for more OSG classes	There are model instance classes that are in the OSG project solely to use OSG file cache to load textures. Abstracting the texture interface means, for new tactical graphic models, there is only a need for two classes: model and modelInstance. The osgModel or osgModelInstance are not required.	VRV-3.1, VRV-IPB18
VRV-4826	Delete cache directory automatically if driver changes	The application now checks whether your graphics card driver version changes--either to an older or newer driver--and automatically removes cached shaders and so on from the directory. This prevents an error about binary compatibility that users previously experienced, where the cached data became invalid due to the changed driver.	VRV-3.1, VRV-IPB18
VRV-4856	Change 3D entity label to look more like 2D symbol decoration	The Symbol Decoration Settings page in Display Settings now allows you to control what labels display for each model set. Previously, it applied only to the 2D model set; the labels in the 3D model set were not configurable.	VRV-3.1, VRV-IPB18
VRV-4857	Add lines beneath routes and track histories	There are now height lines that display below route tactical graphics and entity track histories. These lines display in regular intervals along the routes and tracks, pointing towards the earth to help you see where they are positioned relative to the terrain. You can configure the height lines using the Visual Model Editors dialog box. To enable or disable the height lines, use the Enable Height Lines Along Routes check box in the Tactical Graphic Display Settings or the Height Lines check box in the Track History Settings.	VRV-3.1, VRV-IPB18
VRV-4864	Display indicator of successful IFF Lethal Interrogation	There is a visualization for lethal IFF interrogation reply interactions. If the target of the interrogation has Mode 5 available but has not enabled it, the interrogated entity briefly displays a V in the Plan View.	VRV-3.1, VRV-IPB18
VRV-4869	Create a tool that generates a bounding boxes config file for PE2 vegetation	The new simTreesTool is a command-line tool for reading vegetation models and getting the bounding box values or the sim trunk and crown values. It generates a file that VR-Forces uses to create simplified geometry when you enable vegetation for the simulation engine.	VRV-3.1, VRV-IPB18
VRV-4873	Show Laser Designator Line in PVD/XR	In the Visual Model Editors, you can now configure the 2D and 3D Laser Designators visualizer definitions for entities to display a line, and you configure the appearance of the line. Define the islaserlinevisualized, lasercode lodoutaltitude, laserlinestipplepattern, and laserlinecolor visual definition attributes.	VRV-3.1, VRV-IPB18
VRV-4885	Add support for 2525D Screen/Cover/Guard	VR-Vantage can now display the Cover, Guard, and Screen maneuver control tactical graphics.	VRV-3.1, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4887	Update Bing Imagery configuration to enable customer to add their own key	You can now get your own key to use Microsoft Bing imagery services and then configure it in the <code>./SharedData/17/latest/TerrainData/TerrainConfiguration/imagery.worldwide.BingMaps.online.xml</code> file. That file also includes information on how to get a key.	VRV-3.1, VRV-IPB18
VRV-4890	Add separate symbol decoration settings for each model set	The Symbol Decoration Settings page in Display Settings now allows you to control what labels display for each model set. You can also specify whether labels display all of the time or only when you mouse over simulation objects.	VRV-3.1, VRV-IPB18
VRV-4903	Support different cache directory for SensorFX	SensorFX information is now cached in its own directory. The default location is <code>./appData/cache/sensorFx</code> . You can customize this using the <code>JRM_CACHE_DIR</code> environment variable.	VRV-3.1, VRV-IPB18
VRV-4926	Add a new way to visualize 3D entity tactical decorations	There are more options for visualizations. For example, air entities in the Stealth and XR views can now show a heading indicator, a velocity indicator, and a height line. The latter is a narrow white line that is different from the height above terrain line.	VRV-3.1
VRV-4937	New attachment modes for tactical graphics attaching to entities	Added support to allow VR-Forces users to control the orientation/heading when attaching tactical graphics to entities. See VRF-6751 in the VR-Forces Release Notes.	VRV-3.1, VRV-IPB18
VRV-4944	Add platform type to symbol decoration settings	You can specify symbol decorations by platform (fixed wing, ground, lifeform, rotary wing, space, subsurface, surface).	VRV-3.1, VRV-IPB18
VRV-4954	Add ability to project tactical graphic areas on the terrain in 3D views	Areal tactical graphics now display in the 3D view more like they do in the 2D view. They also contour to the terrain, including any fill patterns. This helps users spatially identify the areas in 3D.	VRV-3.1
VRV-4956	Annotate Aerodrome runway state	When runways are active, text and an arrow indicate this.	VRV-3.1, VRV-IPB18
VRV-4972	Enable Feature reference in procedural buildings intersect block	Procedural buildings previously used OSM data intersected with a feature to mask areas where it should not render buildings because of an inset area. Now, you can use a feature reference, which allows you to define a mask feature outside of the buildings block. That enables you to have different mask areas without multiple versions of the XML file.	VRV-3.1, VRV-IPB19
VRV-4988	Support Rabbit Runway Lights	Airports in terrains can now display various aerodrome and runway lights. (Documentation updates will be covered separately from this particular ticket.)	VRV-3.1, VRV-IPB18
VRV-4989	Runway painted numbers in UK for procedural airports	In procedural airports, the runway numbers display in the manner expected for the countries where they are located.	VRV-3.1, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5014	Make SensorFX work with pageable terrain patches	Fixed timing issue to ensure pageable terrain patches display correctly with SensorFX. Added thread safety.	VRV-3.1, VRV-IPB18
VRV-5022	Add earth file parameters to overwrite large Z values scaling on GT trees (published by CAE Lithos tool)	Added support for CDB terrains published using the CAE Lithos tool. Added parameters to scale GT models, such as trees.	VRV-3.1, VRV-IPB18, VRV-3.0.3b
VRV-5025	Add support for 2525D Observation Posts	There is support for 2525D maneuver point tactical graphics, which include: CBRN Observation Outpost, Combat Outpost, Forward Observer Outpost, Outpost Unspecified, Reconnaissance Outpost, Sensor Outpost.	VRV-3.1, VRV-IPB19
VRV-5053	Add Sphere and Hemisphere tactical graphics	Use the new Sphere and Spherical Sector tactical graphics to define 3D areas in space: a full sphere and a hemisphere.	VRV-3.1, VRV-IPB19
VRV-5061	Add support for more 2525D Obstacle Control Measures	There is support for 2525D obstacle control measure tactical graphics, which include: Block, Disrupt, Fix, Turn.	VRV-3.1, VRV-IPB19
VRV-5062	Support CDB T2D dataset	Added support for the T2D dataset, which is tiled but contains only 1 LOD.	VRV-3.1
VRV-5086	Make osgEarth procedurally generated buildings destructible	For detonations of appropriate size near a vertex of a procedurally generated building, the buildings is replaced with a rubble model. This works for any osgEarth terrain using the osm.features.xml and the debris models provided in the MAK data package. For details about these files, see the Adding Content to MAK ONE Applications Reference Manual or the product help.	VRV-3.1
VRV-5106	Put log and dmp files into new Log directory	All MAK ONE log and dmp files are now saved in a central location. The default is C:/MAK/logs, which you can change by using the MAK_LOG_DIR environment variable to specify a different path.	VRV-3.1, VRV-IPB19
VRV-5111	Ship the VR-Vantage Quick Reference Card as a separate PDF	The VR-Vantage Quick Reference Card has been removed from the end of the VR-Vantage Users Guide. It is now a separate, easy-to-reference PDF included in the installation and available online on the VR-Vantage Products Specifications & Dependencies page.	VRV-3.1
VRV-5120	Need to template DtAerodromeStateInterceptor	This allows VR-Forces to provide the subclass of the aerodrome state repository that it needs to use.	VRV-IPB19
VRV-5122	Lat/Lon Strings should have leading 0 for <10 minutes	Latitude and longitude now correctly display a leading 0 for the minutes if the value is less than 0. For example, 21° 05' 07".	VRV-3.1, VRV-IPB19

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5139	Update Start Menu Links	To account for the "flatter" menu structure of Windows 10 and Windows 11, the Start menu links to VR-Vantage and its associated applications now display the version information. The documentation and tools are in versioned subfolders, and there are also versioned shortcuts on the Start menu to access the folders.	VRV-3.1, VRV-IPB19
VRV-5143	Add support for different models for the same airport light type	Airports in terrains can use different models to display various aerodrome and runway lights.	VRV-3.1, VRV-IPB19
VRV-5145	Add support for Land Platforms: Left/Right Indicator Lights and Emergency Lights	Added support for land platforms to control left and right indicator lights as well as emergency lights.	VRV-3.1, VRV-IPB19
VRV-5167	Support hiding OSM building with Indirect Rendering	Changes to support hiding instanced, non-instanced, and externally referenced buildings when rendered by indirect rendering. This is part of the work to allow for destroying buildings in terrains.	VRV-3.1
VRV-5170	Heading and Velocity indicator lines need to be force color	Heading and velocity indicators are colored for the force of the entity.	VRV-3.1, VRV-IPB19
VRV-5172	Add visual support for HDU Lights	Added visual support for air refuel platforms to turn HDU lights on and off.	VRV-3.1, VRV-IPB19
VRV-5178	Add visual support for more Maritime light types requiring controllable intensity (i.e. Flight Deck/Horizon Bar/Glide Path Indicator)	Added visual support for more maritime light types that allow for control of the lights' intensity. Some examples are flight deck lights, horizon bar lights, glide path indicator lights, and so on.	VRV-3.1, VRV-IPB19
VRV-5179	Horizon Bar Articulation	Horizon bars on surface vessels can now articulate such that they mimic the horizon of the world when the vessel rocks on the ocean surface. This articulation works only when the horizon bar lights are turned on.	VRV-3.1, VRV-IPB19
VRV-5180	Create generic particle system visualizer	There is a new conditional particle system visualizer that can be used for trail effects, flames, smoke plumes, and other visualizers.	VRV-3.1, VRV-IPB19
VRV-5183	Several Linear Objects need to use Projected 3d Graphics	These linear objects now use projected 3D tactical graphics: Phase Line, Line, and Battle Field Handover Line.	VRV-3.1, VRV-IPB19
VRV-5184	Add a 'Dome' tactical graphic	Added support for a Dome tactical graphic.	VRV-3.1, VRV-IPB19

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5189	Rotate Air and Munition entity icons with the entities heading independent of other icons	Rotating 2D icons to the simulation object's heading now works only for aircraft and munition entities by default. Other platforms do not rotate when you enable the Rotate Entity Military Standard Symbols to Heading setting unless you edit the rotateicontheheading definition for those entities.	VRV-3.1, VRV-IPB19
VRV-5194	Add "trait-required" attribute for assets	You can have biome-specific vegetation assets, such as crops or mown grass in urban locations, that render only when a trait is specified.	VRV-3.1, VRV-IPB19
VRV-5220	Taxiway Identifier Marker Board Lights Control	The lighting group buffer is now used in the compute cull shader to add group lighting control values to the visible dynamic lights. Taxiway signs are tagged with the airport + "TIML" lighting group in the DtTaxiwaySignManager (extended attribute in platform kind, air domain).	VRV-3.1
VRV-5221	Runway Taxiway Lead Off and On and Stop Bar Lights intensity control	Added support for controlling the Runway Taxiway Lead-Off and -On Lights and Stop Bar Lights intensities.	VRV-3.1, VRV-IPB19
VRV-5254	Aircraft taxi lights support	Added support for aircraft taxi lights (taxi_lights extended attribute in platform kind, air domain).	VRV-3.1
VRV-5255	Aircraft Formation Lights Luminance Support	Added support for Aircraft Formation Lights that have a Luminance associated with them (platform kind, air domain). These formation lights have emissive textures and have a slider to control intensity.	VRV-3.1
VRV-5265	Add support for controlling the on/off state of Distance-To-Go Signs	Added support to enable and disable Distance-To-Go signs.	VRV-3.1
VRV-5309	Create PDB installer for VR-Vantage	You now install PDBs, which supply data to inform the callstack.log file, using an executable. This is easier than manually unzipping and putting the files in the ./bin64 directory.	VRV-3.1
VRV-5376	Need a command line to override unit type mappings	Added a command-line argument, --overwriteMappingsOnMerge. When you use this option, any mapping merge specified on the command line overwrites mappings in the default files.	VRV-3.1
VRV-5403	Allow rendering a texture to fill an overlay polygon (2D)	Added support for rendering a texture to fill a polygon. You can set the IsTextureStipple parameter in the Visual Model Editors.	VRV-3.1
VRV-5421	Changed file format of SensorFX radiance output	The default file format for Radiance Data is now TIFF, not FPF. The TIFF format has image sizes built into the header and is recognized by most image viewing programs. Full precision of the data is preserved (32-bit floating point). FPF required manual edits.	VRV-3.1

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5451	Add 2 sensor configurations to default_Sensor.sfx for VR-Engage	Add two sensor mode configurations to default_Sensors.sfx for VR-Engage with SensorFX: LWIR BlackHot and Monochrome.	VRV-3.1
VRV-5546	Update exampleReadVideoShm to exemplify visualizing the video stream	Updated the API example to visualize the video stream in a Qt window.	VRV-3.1

Known Problems

Problems can arise with any product. MAK has a knowledge base of the problems that we know about, which is always changing as new problems are identified and new solutions are found. To learn how to address known problems with VR-Forces and other MAK ONE products, access the MAK ONE Product Support Knowledge Base:

<https://www.mak.com/knowledge>.

If the problem you are experiencing is not addressed in the knowledge base, contact support for assistance: <https://www.mak.com/mak-one/support/portal>.

For information about other issues that you might encounter while using the VR-Forces, see the [Troubleshooting](#) appendix in the *VR-Forces Users Guide*.