



VR-Forces 5.2 Release Notes

This release note contains release-specific information for VR-Forces 5.2.

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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, visit <https://www.mak.com/mak-one/support/help> and click the Hardware Requirements link.

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.

MAK RTI HLA 4 binary file names conform to the SISO-REF-075 standard, which includes a compiler marker to specify the compiler version. This prevents HLA applications from loading binary files from non-compatible compilers. The MAK RTI HLA 4 libraries are built using the Video Studio 2017 compiler and use the vc141 compiler marker.

Disk Space Requirements

A full installation of VR-Forces requires approximately 20.2 GB of disk space (including the user and developer documentation, which are installed separately on Windows) and an additional 82 GB for the complete makData 19 package, including the supplemental data package.

The makData Package

VR-Forces 5.2 is compatible with the makData 19 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 5.2 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>. You can also contact your MAK distributor or use the [Support Portal](#) at <https://www.mak.com/mak-one/support/portal> if you need assistance.

New Features and Major Changes

VR-Forces 5.2 has the following new features and updates.

- VR-Forces supports the new HLA 4 (IEEE HLA 1516-2025) interface specification.

Configuration and Startup

- VR-Forces now uses a single menu option to start the Launcher. You can choose which applications start, whether it's the GUI, the simulation engine, or both. You can also specify other applications to run at the same time. For details on using the new launcher, refer to the "Running VR-Forces" chapter of the help or the *VR-Forces User Guide*.
- When you connect to a simulation, the application uses the new exercise connection configuration (exConnConfig) file, *MAK-ONE-YYYY-Config.xml*, which specifies the basic set of connection settings. This information is included in the "Running VR-Forces" chapter, and there are more details in the *MAK ONE Products Interoperability Guide*.
- In the Scenario Startup dialog box, there is now a browse button for the Simulation Model Set, allowing you to select an SMS saved in a directory other than the default (which is *./data/simulationModelSets*).

Performance

- The new MAK Remote Debugger is a tool that developers can use to understand what is happening in the VR-Forces simulation engine. You can open it by running *makRemoteDebugger.exe* from the *./bin64* directory.
- In HLA scenarios, VR-Forces sim engines can now transfer entities from one sim engine and move them to another sim engine in the same exercise. Use the Sim Engine Load Distribution dialog box.

Simulation Objects

- The ground vehicle movement system has changed significantly. One result is the changes to movement tasks, summarized in "Consolidated Tasks" on page 7. There are also changes to the way ground vehicles decide how to move, and vehicles might take different paths or perform different collision avoidance than they did in previous releases. For more information, refer to the *VR-Forces User Migration Guide*.
- Fuel resources now display in the Last Clicked Object and Entity Control panels. The definition of the resource to display is controlled using the *default_guiConfiguration.gui* file, specifically keywords. The keywords are separate by semicolons (;) and options on the keywords by a plus sign (+). For example, the current definition for the last clicked object panel is:

```
keywords="vertical;title+Fuel;match+6 3 -1 2 -1 -1 -1+6 3 -1 3 -1  
-1 -1;width+16"
```

The keywords are: `vertical` specifies that bar should display vertically; `title` controls the text that displays for the resource; `match` defines multiple matching patterns to display the bars for; `width` is a fixed width (or height) of the bar; `grid` specifies a number of columns for displaying the resources in a grid.

- When you copy and paste an entity, the copied entity includes the original's state property values. This means that, when you set state properties for an entity and then copy and paste it, the duplicated entity has those same properties.
- You can now exclude clutter ships by their ISO or MMSI code by editing the *ship-clutter-area.sysdef* file. For details, see the "Wakes, Cockpits, 2D Icons, and Other Models" chapter of the help or *Adding Content to MAK ONE Applications Reference Manual*.
- The multi-hit actuator has been improved. Surface watercraft can now have the Surface Multiple Hit Damage system. Instead of a catastrophic kill, this system measures how much damage the entity has sustained. Its damage state is published to the network.

Surface watercraft configured with the Surface Multiple Hit Damage system have default settings to realistically represent multi-hit damage. The values are based on the size and durability of ships in a particular class (corvette, frigate, destroyer, and so on).

- The new DJI Mavic 3 Small Munition and DJI Mavic 3 Small Munition Fiber Optic entities are small drones equipped with a munition that can detonate on impact. The new Drone Attack scenario included with VR-Forces demonstrates the fiber optic model, showing five drones striking various targets.

New Simulation Objects

Humans

- Civilians: Civilian Adult Female, Civilian Adult Male, Civilian Child Female, Civilian Child Male, Civilian Decontamination Suit, Civilian Elderly Female, Civilian Elderly Male, Hazmat Civilian Level A, Hazmat Civilian Level B, Hazmat Civilian Level C, Singaporean Auxillary Police Officer, Singaporean Emergency Medical Technician, Singaporean Firefighter, Singaporean Firefighter Decontamination Suit, Singaporean Police Officer, Singaporean Traffic Police.
- Military: Canadian Soldier AT 84mm Gustav, Canadian Soldier C6A1 HMG, Canadian Soldier C7A2, Canadian Soldier C7A2 M203, Canadian Soldier C8A3, Canadian Soldier C8A3 Medic, Canadian Soldier C8A3 Radio Operator, Canadian Soldier C9A2 LMG, Canadian Soldier M72A5, Counter Terrorism Soldier, Israeli Soldier, US Army Driver.
- Transportation: Civilian BMX Bicycle, Civilian Mountain Bicycle, Civilian Small Mountain Bicycle.

Aircraft

- Fixed Wing: Antonov An-124 Condor, RQ-12A Wasp, RQ-15 Neptune, ZALA Lancet 3.
- Rotary Wing: DJI M200 Quadcopter, DJI Mavic 3 Pro, DJI Mavic 3 Small Munition, DJI Mavic 3 Small Munition Fiber Optic, Flare Rapider 4 Quadcopter, Mi-24 Hind D, Mi-24P Hind F, Mi-35P, Parrot Anafi Quadcopter, RQ-16A T-Hawk, Vampire Hexacopter, Vampire Quadcopter.

Ground Vehicles

- Civilian: Electric Mobility Scooter, Electric Wheelchair, Motorcycle Cruiser Harley, Motorcycle Dirt Bike Yamaha, Motorcycle Sport Ducati, Police Motorbike Patrol, Police Motorbike Traffic.
- Wheeled: Bison 81mm Mortar, Bison Ambulance, Global G-2875ER Deicer, Iveco VM 90 LSVW Ambulance, Iveco VM 90 LSVW Canvas Cargo, Iveco VM 90 LSVW Comms, Iveco VM 90 LSVW MP, Light Strike Vehicle MK II (LSV), Krasukha 4 Radar Jammer (1RL257), M1278 L-ATV-HGC (JLTV), M983 HEMTT EPP-III Patriot Power Generator, Murmansk BN HFGCS Jammer, TAPV General Utility (GU), TAPV Reconnaissance (Recce), Toyota Pickup M240, Ural 43203 R330Zh Zhitel Jammer, VSHORAD Gun System.
- Tracked: Leclerc XLR MBT, Leopard 1 (POL), Leopard 1 Tank, Leopard 2A4 Mine Plow, Leopard 2A4M, Leopard 2A6, MT-LBu APC, MT-LBu PPRU-1M-2 Radar (9S80M1-2), SA-6 Gainful TEL (2K12).

Units

- Rifle Platoon HQ Section (CAN), Vehicle Team (CAN).

Watercraft

- Surface Watercraft: Bay Class DLS, Legend Class Cutter, Saar 6 Class Corvette, Sovremenny-class Destroyer, Type 23 Duke-class Frigate, Type 42 Sheffield-class Destroyer, Type 45 Daring-class Destroyer, Type 80-class Large Patrol Boat, Type 903 Fuchi-class Support Ship.

Munitions

- M1 105mm HE, Meteor Missile, RIM-116 Rolling Airframe Missile (RAM), SBU-64 AASM HAMMER, SCALP-EG Cruise Missile, Storm Shadow Cruise Missile, Tamir Missile.

Cultural Features

- Dumpster Gray, Dumpster Orange.

New and Updated Tasks and Sets

- You can now quickly task an entity to move to location or fire on a target using keyboard shortcuts and the mouse. You select the entity, press the shortcut combination, and then click on the location or simulation object. The default shortcuts are **Ctrl+M** to move and **Ctrl+F** to fire. See the "Assigning Tasks" chapter of the help or the *VR-Forces User Guide* to learn more.
- The AI Enabled set data request was renamed to Autonomous Actions Enabled, which more accurately reflects its functionality. Additionally, the AIEnabled state property has been renamed AutonomousActionsEnabled. Update any Lua scripts that reference this property to use the new property name.

Engagement

- The Fire At task (fire_at) now has an additional option, Stop Firing When Target is Destroyed (stopFireAtDestroyedTarget). This causes the entity to stop firing when the target is destroyed or when the maximum number of rounds has been fired, whichever comes first. When it is not selected, the tasked entity fires the maximum number of rounds, regardless of whether the target was destroyed.
- The Fire Cruise Missile task has been updated to allow you to target locations as well as simulation objects.
- Entities equipped with a Javelin can now use the Fire Javelin at Target to attack tanks and other targets. You can choose either Top Attack or Direct Attack, with the former being the default.
- VR-Forces can now simulate unguided (dumb) bombs. Some aircraft entities are configured with the US Heavy Bomber Bomb Bay system, which allows them to deploy MK-82 and MK-84 bombs using the Release Unguided Bomb task.

Air Domain

- You can now task aircraft to perform the Fly Cloverleaf Pattern, Fly Figure 8 Pattern, and Sector Search tasks.
- The new set data request GPS Jamming enables entities with the GPS Jammer system to jam the GPS receiver on air entities that are equipped with that system. This causes those entities to perceive that their current location is different from that of their ground truth and, as a result, go off course. The power of the GPS jammer and the distance between the two entities determine how far the air entity's perceived location is offset from its true location.

Ground Domain

- The new set data request Collision Avoidance Enabled allows you to control whether an entity's ground collision avoidance controller is enabled. You might want to disable this behavior when you need more direct control over the entity during movement planning tasks.
- The Move Next to Target task is now available on the **Task > Movement** menu and also on the Command Panel at the tertiary level. This allows you to make entities to move next to another entity or a point tactical graphic without creating a point tactical graphic.

Surface and Subsurface Domains

- The Deploy Sonobuoy and Deploy Sonobuoys Along Route tasks now allow you to specify which entities should receive spot reports. This allows entities other than the one deploying the sonobuoys to receive spot reports generated by the sonobuoys.
- As part of the improvements to the multi-hit actuator, the Damage Percentage set data request allows you to set the percent damage sustained by a surface watercraft equipped with the Surface Multiple Hit Damage system.

Consolidated Tasks

Tasks that included parameters for locations, waypoints, or other targets of focus have been combined into single tasks. This was done as part of the major changes to the ground vehicle movement system mentioned below.

- The tasks for moving to a location or waypoint have been combined into Move To tasks that allow you to specify a location, waypoint, or point tactical graphic. The new tasks are:
 - Entity- and aggregate-level: Move To
 - Aggregate-level only: Move To Retrograde
 - Ground vehicle units now default to using the new Maneuver To task when they are assigned the Move To task. They use Move To only if they are not configured with Maneuver To.
- Other tasks that used either a location or a waypoint have also been combined. The parameters for those new tasks allow users to select which they want to use.
 - The Crowd Around task combines the Crowd Around Location and Crowd Around Object tasks.
 - The Pattern Hold task combines the Pattern Hold (Location) and Pattern Hold (Waypoint) tasks, where the only difference was specifying the position for the aircraft pattern.

- Separate engagement tasks for firing on location, entity, or point have been combined into single tasks that allow users to select which they want.
 - Fire for Effect combines Fire for Effect on Entity, Fire for Effect on Location, and Fire for Effect on Target.
 - Lase Target combines the Lase Location and previous Lase Target tasks, allowing you to specify a location, entity, or point.
 - Provide Suppressive Fire combines the Provide Suppressive Fire at Location and Provide Suppressive Fire at Object tasks.
 - Release Bomb combines the Release Bomb on Location and Release Bomb on Target tasks.

Refer to the help or the *VR-Forces User Guide* for details on any of these tasks. To learn how these changes affect the code, refer to the "VR-Forces 5.2 API Migration Guide" topic in the *VR-Forces Developers Guide*. Note that the old tasks, while not in the UI, have been preserved for backward compatibility with scenarios created before VR-Forces 5.2.

Visuals

- In the Observer Control Panel, the LOD Distance Scale is now separated into two different sliders: one for entities and one for terrain. This gives you greater control over what displays in the window. For example, you can choose to see entities that are farther away from the observer without showing a higher level of detail for distant terrain.
- In the Spot Report Settings, you can now choose whether to show entities in the 3D (stealth) observer view when their ground truth would otherwise be hidden. This adds more realism during fog-of-war scenarios, where a person might be able to see something when it hasn't been detected by an entity.

The fog-of-war settings also apply to force-specific scenario events.

User Interface

- There is a new text chat feature. It was developed for use with VR-Engage, but it also works between two or more GUI windows. See the "*GUI Controls, Layouts, and Behaviors*" chapter in the help or the *VR-Forces User Guide*.
- The Scenario Event Toolbar was renamed to Next Scheduled Event Toolbar.

Terrain

- You can now define a terrain-specific land cover mapping that overrides the global one, for example, *myTerrain.landCoverDataSurfChar.map*. Refer to the "Composing a Terrain from Source Data" chapter in the help or *Adding Content to MAK ONE Applications Reference Manual* for details.
- You can make a change to the *biome.vegetation.config.xml* file to improve performance when you do not need close-up details of procedural terrains. For details, see "Using the Terrain Index to Reduce Polygon Counts" in the help or the *Adding Content to MAK ONE Applications Reference Manual*.

- The simTreesTool has been updated. The default behavior is now to process only files with sim models. You can use command-line options to process non-sim models. To learn more, refer to the help or the *Adding Content to MAK ONE Applications Reference Manual*.
- There are now variations on the areas for forcing terrain to page in that do not load the vegetation in the terrain data: Terrain Page-In Area (no vegetation) and Blocking Terrain Page-In Area (no vegetation). This is useful when you have a scenario that does not need terrain, such as a flying simulation. For details, see the help or the *Adding Content to MAK ONE Applications Reference Manual*.

Scripts and Lua

- The WeaponInfo class in Lua now has the getMaximumRange and getMinimumRange functions. See the *VR-Forces Lua Documentation* for details.

API Changes

- VR-Forces now supports C++20.
- State and parameter properties are an easy way to extend the internal or external state of an entity. VR-Forces now has a concept of internal state properties, which can be added by sim components or Lua scripts. For more information, see "State and Parameter Properties" in the *VR-Forces Developers Guide*.
- There are new functions that can pass back geometry using instanced objects. These are `DtTriangleOutputInterface::processTerrainInstance()` and `enableTerrainInstanceProcessing()`, and also `DtTerrainInterface::trianglesForGeometry()`. Refer to the *VR-Forces Developers Guide* for details.
- Developers can configure VR-Forces to save internal state data to a database, recording what happens in a simulation. They can then use that data for analysis. Configure this using the `./appData/settings/databaseConfig.mtl` file, which includes comments that explain how to use it. This feature was introduced in 5.1.1 and expanded for 5.2.

VR-Forces 5.2 supports SQLite as the built-in database implementation, which was introduced in 5.1.1, and adds support for MySQL as a plug-in example.

See the new SDK toolkit examples:

- VR-Forces 5.2 includes a new example, `databaseConnection`, which shows how to connect to a different type of database: it adds support for MySQL when loaded.
- `addDatabaseEvent` and `databaseClients` were included with 5.1.1.

SQL database logging also now supports aggregate-level simulations. The data includes: engagement result info (high-level engagement results, casualties, equipment damage, specific attacks, and specific defenses) and resources.

To learn more about saving data to a database, see "Database Logger" in the *VR-Forces Developers Guide* (found under "2. Simulation Services" in the "Miscellaneous" section).

- There are two new functions, `getIffSystem()` and `getIffModeData(mode)`, on the `SimObject` in Lua. They return a table of settings for the IFF system of the given entity and a table of parameters for given IFF mode, respectively. Refer to the *Lua API Documentation* for usage information.
- When you load a scenario that requires specific plug-ins which you have not loaded, there is now an error message that displays in the VR-Forces GUI to inform you that they are missing.

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

Documentation

- The *VR-Forces User Guide* and the corresponding portion of the help have been reorganized to better inform you of the differences between entity- and aggregate-level modeling. As a result, some section numbers changed in the PDF.
- The *VR-Forces Entity Model Catalog* has been replaced by the *MAK ONE Model Catalog*.

Fixed Bugs

Table 1. Fixed Bugs

Key	Summary	Release Notes	Fix versions
ART-2776	None of the Harris terrains seem to be working	Deprecated the HarrisAfghanVillageFlatEarth.mtf, HarrisAfghanVillageFlatEarthMetaFlight.mtf, and Test-HarrisAfghanVillageUTM.mtf terrains. The first two terrains were available in the supplemental data package. (The HarrisAfghanVillageGeocentricMetaFlight.mtf and HarrisAfghanVillageFlatEarthMetaFlight.mtf terrains are still available and load as expected.)	VRV 3.1.1 VRF 5.1.1 VRE 2.1.1, VRV 3.2 VRF 5.2 VRE 2.2
ART-2784	Remove Nellis terrain from SupplementalData	Deprecated the Nellis.mtf terrain.	VRV 3.2 VRF 5.2 VRE 2.2
DIG-627	Aiming changes to character aren't applied if character is paused.	Aiming a paused character will now update aim to the requested aim angle without animating the aim.	DIG-IPB20, DIG-13.8
DIG-735	Reset scenario button doesn't reset chosen action.	Updated reset logic to re-select default action to avoid immediately resuming playback upon reset.	DIG-13.8
DIG-789	Content assist pop-up doesn't close when switching off of code editor window.	Fixed issue in the Character Viewer where the content assist pop-up was staying open when users exited the script editor	DIG-IPB20, DIG-13.8
DIG-894	Fix package naming and install location.	Updated the DI-Guy package naming conventions and default installation locations to be consistent with other MAK ONE products.	DIG-IPB20, DIG-13.7.1, DIG-13.8
DIG-926	Scrubber always disabled in CV	Logic for resetting the Active check box was interfering with normal operations. This is fixed.	DIG-IPB20, DIG-13.8
DIG-929	Texture Viewer doesn't show when selected from menu.	Fixed issue that would prevent the Texture Viewer from showing.	DIG-IPB20, DIG-13.8
DIG-971	M4 and M16 variants are all different sizes	The sizes of the M4 and M16 variants are now more in line with each other.	DIG-IPB20, DIG-13.8
DIG-1014	Alphabetical ordering in CV action list splits out capitalized actions differently.	The sorting in the Character Viewer Action list is no longer case sensitive and simply sorts alphanumerically.	DIG-13.8

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
DIG-1019	Update Content Reference Manual with instructions for customizing and setting up new hand items.	Added information to the DI-Guy Content Reference Manual. See the chapter on customizing content.	DIG-13.8
DIG-1045	Weapon aiming drifts to the side	Fixed issue preventing aim nodes from being placed under a 2D blend node.	DIG-13.8
VRF-3770	GUI: Moving an area should not change its elevation above terrain	Previously, moving an Area tactical graphic preserved the vertices at the original height, causing them to float above or move into the terrain if the new location was at a different elevation. The area's vertices now remain ground-clamped.	VRF-5.2
VRF-4226	Separate turret default angle and center angle	Turrets now have a "resting" angle based on the default angle configured for the part. The resting angle no longer has to be the center angle of the range.	VRF-5.2
VRF-5029	vrfSimDIS tries to make a Qt Dialog when no license is available	Fixed to display better output and ensure that the program ends as expected.	VRF-5.2
VRF-5145	Building examples on Linux prints "skipping incompatible libc.co"	The message no longer displays.	VRF-5.2
VRF-5315	VR-Forces does not load landcover data when there is a mask	Fixed the terrain data.	VRF-5.2
VRF-5575	Walking through car after disembarking from it	Improved how human entities move around vehicles to prevent them from moving through them.	VRF-5.2
VRF-6640	SH-60 should have MK46 torpedo, not MK48	All non-subsurface entities previously using Homing-torpedo-fwd-launcher.sysdef have been updated to use the new Homing-torpedo-aerial-and-surface-fwd-launcher.sysdef	VRF-5.2
VRF-6855	Test in new task (move-to-location-plan-path, errors in calculation of initial point)	Updated the default offroad path weight and removed the task visualization that was introduced inadvertently.	VRF-5.2
VRF-6950	Wheeled .entity files should not have "can-pivot" set to true	Corrected the "can pivot" setting for a number of entities.	VRF-5.2
VRF-7049	Parachute to Target task should set a default value for Elapsed Time to Deploy	The task now defaults the value to zero. The parameters also more clearly show that the user has the choice to select either Deploy Parachute at Altitude or Deploy at Elapsed Time.	VRF-5.2
VRF-7081	Improve console error for creating port connection	Made the information in the message clearer.	VRF-5.2
VRF-7100	Ala Moana beach near airport has deep river soil type	Fixed shader in third-party product.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-7135	VRF Launcher does not handle FOMs outside of bin64 directory	The HLA Evolved connection now works correctly when using FOM modules files that are not in the ./bin64 folder. File duplication is also handled to avoid adding multiple files with the same name.	VRF-5.2
VRF-7437	Track history line for spot/TDL reports does not always display	Made changes to ensure that the track histories for spot reports and TDL reports display correctly.	VRF-5.2
VRF-7515	(DIGuy) Movement / loop counts seem to ignore any transitions that may be present.	The function now returns an error code appropriate for whether the transition was found, and only populates the transition info with data when an actual transition exists.	VRF-5.2
VRF-7550	Apron Flood lights are very bright on initial creation of Aerodrome	The scale for light intensity is 0-1, not 0-100. Fixed in the code and noted in the API documentation.	VRF-5.2
VRF-7603	Go To Location Panel is limited to only Lat/Long (DMS)	The Go To Location panel now allows you to specify which coordinate system to use.	VRF-5.2
VRF-7650	Vehicle Spawn/Sink can cause very long off-road rail paths	Spawn patterns have been updated to use the new Move To task, therefore the dialog box now has an option for the spawned entities to Prefer Roads instead of Use Roads.	VRF-5.2
VRF-7702	SOE: Symbol decoration issue in Formation Editor	Fixed an issue where some entities in the Formation Editor would be missing their symbol decoration the second time a user opened the editor.	VRF-5.2
VRF-7748	SIM: DtMaintainFormationMonitor problematic use of position and orientation of subordinate units	The application now uses state property for living position and orientation of subaggregates when evaluating whether to tell subordinates to accelerate or decelerate.	VRF-5.2
VRF-7781	csvScenarioImporterExporter example does not co-exist with built in CSV importer	The example now uses the file extension example-csv to ensure that it does not conflict with other importers. Refer to the documentation on this example in the VR-Forces Developers Guide (Importing/Exporting Scenarios from Different File Formats (csvScenarioImporterExporterGui and csvScenarioImporterExporterSim)).	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-7783	GUI: In task UIs that accept object selection, they lose input context if the user misses.	When a user assigns a task that has boxes for selecting simulation objects, the box would lose focus if the user accidentally clicked on the terrain instead. It now retains focus to allow the user to click again without reenabling object selection for the task parameter.	VRF-5.2
VRF-7819	Make a more reasonable default tick period variance	The negative values of minTickPeriodVariance are now returned as 10% of minTickPeriod.	VRF-5.2
VRF-7877	Scenario Event Toolbar name is misleading	The toolbar is now called the Next Scheduled Event Toolbar.	VRF-5.2
VRF-7921	Script angle parameter defaults to heading, not metadata default or state property	The Angle script parameter dialog box now has a check box, Angle Entry, that specifies whether the entry is an angle instead of a heading. By default, the entry is a heading and initializes with the heading of the selected object. If the Angle Entry check box is selected, it initializes with either the default value or state property value, not the heading of the selected entity.	VRF-5.2
VRF-7922	DtWeatherStateProvider::lineQueryAtmosphericState() - improve the calculation of the segments positions	Modified the calculation of the segments along the query line. Instead of manual calculations, the application now uses the DtChord::computePoint() function to calculate the positions of the segments' end points.	VRF-5.2
VRF-7924	Units don't respond to Set ordered speed during a task	Fixed to ensure that a ground unit performing a movement task changes its speed when the unit is given a new ordered speed. Previously, its speed would not change until the next movement task.	VRF-5.2
VRF-7925	Computed route generation can fail if the road/terrain are too high fidelity	Added checks in vrfGeometryStateComponent to check for entities with position vectors over 2000 points. In those cases, the points will be snipped off, ensuring that no entity's vertices list exceeds 2000 points. Added the helper function DtVertexList::copyListMaxCount to aid in one of the list copies.	VRF-5.2
VRF-7927	SOE: Export Visual Models is not working	Fixed to allow the SOE to export .leaf directories, model definitions, and mappers that are specific to the loaded SMS to the given directory.	VRF-5.2
VRF-7967	Unit formations not preserved after rotation	Fixed to ensure that unit formations are unchanged after using the Heading set data request.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-7968	Plan editor should not delete the entire plan when user uses the context menu to delete a trigger line	Fixed to allow users to right-click on a trigger line and select Delete to delete only that trigger line.	VRF-5.2
VRF-7979	Entity Control Panel doesn't warn you that it will abandon your plan	When you use the Entity Control Panel to assign a task, a dialog now displays to alert you that the entity is executing a plan and will abandon it to execute the task, where you can either confirm or cancel the new task.	VRF-5.2
VRF-8009	VR-Forces GUI Fog of War doesn't filter scenario events for specific force type	When a VR-Forces GUI has spot reports enabled, it now respects scenario events as well as simulation objects. For example, when the GUI is set to show only friendly force information, it no longer displays scenario events that are specifically for opposing forces.	VRF-5.2
VRF-8034	Naval gun systems put an art part on refueling drogue	Changed all drogue articulated parts to the appropriate gun part type or launcher type.	VRF-5.2
VRF-8054	Units on paged terrains do not always respect formation on heading change	For units placed onto paged terrains, if changing the unit's heading does not preserve formation, the application now creates a terrain page-in area around the unit before setting the heading to ensure all terrain is paged in.	VRF-5.2
VRF-8063	Publisher should handle missing FOM classes more gracefully	Added checks in the vrVrlinkExt publishers and reflected lists before trying to access any VR-Link hlaObjects. The application also now prints a warning. Prevented crashes related to this issue.	VRF-5.2
VRF-8086	Fast Rope Insertion doesn't disembark self after task is done.	When an aircraft entity performs a Fast Rope Insertion task to insert entities on another entity, it would become embarked on that entity while performing the task. The issue arose because it did not disembark after completing the task, and therefore it could have problems completing subsequent tasks. It now disembarks itself.	VRF-5.2
VRF-8096	Very rarely, the CH-47 Chinook can get into a state where it spins	Fixed a bug in the movement control system.	VRF-5.2
VRF-8116	Rotary wings do not follow route altitude on last leg of route	Fixed an issue where rotary-wing aircraft would move to the final vertex's altitude when it reached the second-to-last vertex of a route. The aircraft now follow the route more closely.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8136	Put Move Next To Target task on the task menu and command panel by default	The Move Next to Target task is now available on the Task > Movement menu and also on the Command Panel at the tertiary level. This allows you to make entities to move next to something without creating a point tactical graphic.	VRF-5.2
VRF-8150	GUI terrain closes on sim engine close even if configured not to be closed	Fixed to continue to show the terrain when the GUI is configured to Always Join Session with Currently Open Database and Show Session Terrain Change Prompts are disabled.	VRF-5.2
VRF-8160	Humidity doesn't update immediately like other weather parameters in the GUI	Fixed to correctly display the humidity in the Weather page of Environment Conditions when you choose the Rainy from the Environment Condition list of preset weather conditions for a loaded scenario.	VRF-5.2
VRF-8182	GUI zoom extents sometimes changed on scenario save-as	Fixed to not change the zoom extents when someone uses File > Save As on a scenario multiple times.	VRF-5.2
VRF-8195	SOE: Pressing Esc key while editing assemblies closes panel, loses work	Pressing Esc no longer exits the Edit Assemblies dialog box.	VRF-5.2
VRF-8197	Inconsistency in destroyed building and sim model	Fixed to ensure that the sim model also changes when the visual model is destroyed.	VRF-5.2
VRF-8199	SIM: aggregate-level detection fails with larger footprints	Updated to allow one aggregate-level simulation object to detect another even when the other's center does not fall within its range rings.	VRF-5.2
VRF-8208	Script Manager not managing folder open/close well	Changed the behavior of the Scripts dialog box. No folders are expanded when you first open it. If you search for scripts, unexpanded folders will expand to show any matching results, but they collapse again when you clear the search. Only folders that you expand manually remain expanded.	VRF-5.2
VRF-8209	Object Console Summary panel hard to read	Updated to use colors that contrast better with the background in both dark and light modes, improving the readability of the text.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8229	Sim models do not match all procedural buildings	Procedural buildings in the Boston area of the MAK Earth (online) terrain now have simulation models that line up correctly with the footprints from the data.	VRF-5.2
VRF-8238	SOE "Display Vertices" in the Edit Tactical Graphic dialog is no longer needed	Display Vertices was removed from the SOE as it is no longer relevant	VRF-5.2
VRF-8243	Launching torpedos creates extra inert torpedos	Improved the tasks related to torpedos to ensure that they fire as expected.	VRF-5.2
VRF-8247	Incorrect display of orientation In the Information dialog box	The Information dialog box now respects the Display Units Settings to determine how to display an entity's orientation in the Information dialog box. Previously, it always used degrees.	VRF-5.2
VRF-8253	Barrel on tank twitches when targetting entity through smoke	The application now keeps a low priority connection on the aiming port for an untrackable target to keep the turret from starting to revert to default position.	VRF-5.2
VRF-8256	The Interest Management Settings page should be disabled in VR-Forces	Interest Management Settings does not apply to VR-Forces. That page is no longer shown in Display Settings. Also removed the --useGeographicDdm command-line option.	VRF-5.2
VRF-8257	MAK Radio does not include default frequencies on Linux	There is now a makRadio directory in ./appData/settings to ensure files install correctly on Linux.	VRF-5.2
VRF-8259	Hostility Matrix fourth column shows unexpected values	Fixed to show "Uncategorized" for forces that are not assigned to a country, instead of the first country in the alphabetical list.	VRF-5.2
VRF-8260	Erroneous search results come up when searching "5-ton truck" in Create Object Palette	When the user searches for simulation objects that begin with a number, the application no longer performs a wildcard search.	VRF-5.2
VRF-8261	Obsolete VR-Forces menu reference in Developer's Guide	Updated the example documentation to use the earth layers in the terrain settings to display the forest layer in Bakersfield for the addSensorPropagator scenario.	VRF-5.2
VRF-8263	Car Door Swing Rate has no effect on actual car door swing rate	Fixed to ensure that the application respects the specified swing rate. Previously, it always used the maximum rotation value.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8267	Small bush is configured with a sim model in the terrain	Fixed in the data package.	VRF-5.2
VRF-8269	SIM: Limited_Munition_Attack.lua spamming "CANCEL: VRF_UUID<other-text>"	When an entity is unable to perform a munition attack it was tasked to perform, its message is now set to Info instead of Warn. If you need to know why the entity isn't firing artillery, check the task status (for example, in the Information dialog box) or switch the notify level to Info (printInfo()) or higher.	VRF-5.2
VRF-8285	Clicking "Defaults" on Hostility Matrix clears hostility settings on custom forces	Fixed an issue that cleared all check boxes for any custom forces in the Hostility Matrix when users clicked the Defaults button. It now resets them to the values found when the user of the VR-Forces GUI first opened the dialog box.	VRF-5.2
VRF-8286	EventIdentifier field is not set in the EmitterBeam object - HLA1516e	Event ID now set for emitter beams.	VRF-5.2
VRF-8291	IADS launcher script assumes system name to be "weapon" but SOE doesn't set it that way	Improved the application's method for determining whether an entity should launch another missile.	VRF-5.2
VRF-8300	Establish Refueling Station should have different default units	Distance entries (small and large), when defined in scripted tasks, can be assigned to have a preset unit that does not respond to unit changes from the Display Unit Settings page of Display Settings. (The default is to update based on the Display Unit Settings.)	VRF-5.2
VRF-8305	Reset Changes tool does not work as expected and Reset Damage does not remove craters	The Reset Dynamic Terrain Changes dialog now shows only No Change and Reset as the options. Also updated Remove Damage to remove craters in the specified area as well as other changes to dynamic terrain.	VRF-5.2
VRF-8323	Fix missing descriptor documentation via header file comments	Added documentation comments for descriptors that did not have them.	VRF-5.2
VRF-8324	GUI Crash when moving GUI between monitors	Fixed an issue that occurred when moving the VR-Forces GUI between monitors with different DPI settings.	VRF-5.2
VRF-8326	Aircraft Clutter split between Friendly and Clutter object filters	Fixed to ensure that clutter objects are put only in the clutter grouping, not in the force groupings, in the Objects List Panel.	VRF-5.2
VRF-8327	Tab order for parameters in Entity In Area conditional is not intuitive	Fixed to ensure that the field at the top of the dialog box has focus when it first opens, not the one at the bottom.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8331	Deleting controller can corrupt script component system	Fixed to prevent a crash that could occur when a system was deleted while an object is still valid in a Lua script.	VRF-5.2
VRF-8334	SOE is not creating visual config files	Fixed an issue that occurred when users added a fly-out munition. Visuals are saved only when they are changed, and a flag was not being set to true for new fly-out munitions.	VRF-5.2
VRF-8335	SOE doesn't list additional-match-types when entity file contains entries using the super type	Fixed to ensure that promoted objects copy over the additional match types.	VRF-5.2
VRF-8349	Fixed wing aircraft fly back to original orbit location if moved while they are executing a default circle behavior.	Updated default circle controller to recalculate the orbit location when the entity receives a setLocation message.	VRF-5.2
VRF-8367	Fire missile Launcher task doesn't fail or complete when target is not appropriate target.	Added a check to allow the task to fail or complete.	VRF-5.2
VRF-8375	"Fire At..." should print notification when it is waiting for target	If an entity is tasked with the Fire At task but cannot fire on the specified target, the application prints a statement on the console (notify level 2, Info).	VRF-5.2
VRF-8382	VR-Forces does not launch through Linux due to incompatibility with --showConsole	Fixed the vrflauncher for Linux.	VRF-5.2
VRF-8385	Object Console Summary text is unreadable in dark mode	Text in the Object Console Summary Panel now uses the same colors as the Object Console in the Information dialog box.	VRF-5.2
VRF-8405	Clean up the (deprecated) fire-at-target task	The fire-at-target task is now marked as deprecated in the Lua API Documentation and points to the Fire At task (fire_at). The Fire At task now has another option, Stop Firing When Target is Destroyed (stopFireAtDestroyedTarget). This causes the entity to stop firing when the target is destroyed or when the maximum number of rounds has been fired, whichever comes first. When it is not selected, the tasked entity fires the maximum number of rounds, regardless of whether the target was destroyed.	VRF-5.2
VRF-8410	GUI should use terms "GUI" and "Sim Engine"	For consistency and clarity, updated the VR-Forces user interface to use the terms "GUI" and "sim engine" instead of "front-end" and "back-end".	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8417	SIM: getObservedHostileContacts() should be deprecated	The getObservedHostileContacts method was removed when behaviors were introduced. Use the getAllHostileContacts method instead.	VRF-5.2
VRF-8427	integrated-laser-guided-launcher-controller-descriptor does not use launch-offset for createBombObject function	The application now takes the descriptor parameters into account.	VRF-5.2
VRF-8441	Jammer/emitter High density flag cannot be set to true	Fixed to ensure that the use-high-density-jamming-at-start and use-high-density-tracking-at-start flags in the radar-jammer descriptor set the high-density flag in the network packets for the emitter.	VRF-5.2
VRF-8445	GUI: disappearing Order of Battle Panel	Fixed the issue, which was related to the computer display and how it worked when the Order of Battle Panel was undocked.	VRF-5.2
VRF-8448	aerodromesScenario included with VRF SDK uses deprecated aerodromes	Removed the obsolete examples.	VRF-5.2
VRF-8449	SIM: food, water, etc. required for things that don't use them	Changed the update combat effectiveness Lua script to only set the HaveFoodWater property if the unit has base food or water and a consumption rate. The movement actuator checks HaveFoodWater. If the property does not exist, the simulation object moves. If the property exists and is true, the sim object moves. If the property exists and is false, the sim object doesn't move.	VRF-5.2
VRF-8456	Setting force does not change force node on Objects List for neutral entities	When you change the force on a neutral entity, it now moves to the correct force grouping in the Objects List instead of remaining in the Neutral grouping.	VRF-5.2
VRF-8463	vrfSimHLA1516e executable should not have --enableMetoc	The --enableMetoc command-line option is no longer needed and was removed. METOC is the method MAK ONE applications use for weather publishing.	VRF-5.2
VRF-8466	RegExprMatch does not work from a terrain SurfChar.map	Fixed to look up the values correctly.	VRF-5.2
VRF-8468	Tasking a civilian to Riot indefinitely without being restricted to area with Start Fires enabled and Riot Points placed causes error in Riot Lua script	Fixed the Riot system to ensure that it works correctly.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8481	Throw Grenade at Target task only throws m67 grenades even after selecting different type trunk	Fixed a typo in the code to ensure the task works correctly.	VRF-5.2
VRF-8483	Import VR-Forces Scenario doesn't include the observer views	The documentation and GUI now reflect the fact that observer views are not imported.	VRF-5.2
VRF-8486	Several UAVs are not marked as destroyed in Objects List when destroyed	Fixed to ensure that the icons of destroyed UAV entities correctly reflect that state in the Objects List.	VRF-5.2
VRF-8490	Terrain paging is slower than expected on terrains with max_lod less than 13	There is a new entry in terrainInterfaceConfig.mtl called min-dynamic-elevation-lod, which allows you to turn off the dynamic elevation system in the terrain when the max level of all elevation layers is less than a specified value.	VRF-5.2
VRF-8500	SIM: "Could not open comm model configuration file for reading"	Removed this warning that was printed in error in some cases.	VRF-5.2
VRF-8515	Aggregate-level engineering objects do not affect entities on remote sim engines	Moved the aggregate dynamic feature controller to a manager. That manager looks at object additions and removals to check whether they are engineering objects. If so, the application creates features around those sim object references (local or remote published). Updated state property values on first discovery to ensure they were copied over.	VRF-5.2
VRF-8519	SOE does not support End of Barrel position	Fixed issues to support the @dis annotation end_of_barrel.	VRF-5.2
VRF-8521	Lifefrom models aren't always aiming at their target when firing	DI-Guy entities once again correctly turn to face in the direction that they are firing.	VRF-5.2
VRF-8527	Visual Model Editor adds Main Object parameter when saving	VR-Forces no longer adds that unneeded parameter when the user saves a entry in the Visual Model Editor.	VRF-5.2
VRF-8549	Clicking Stop in the Scenario Event Manager doesn't send a stop but a reset	The Stop button in the Scenario Event Manager now correctly stops the event. You can then trigger the event again if desired.	VRF-5.2
VRF-8563	Last Clicked Environment soil type doesn't match Last Clicked Location	Fixed to ensure that the two panels use the same method to get the soil type and therefore return the same information.	VRF-5.2
VRF-8564	Add Formation doesn't use the desired formation to start from.	Fixed to load and fully populate formation entry before adding it to the table.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8565	Formation editor Auto Layout doesn't seem to do what's promised	Fixed the Column formation in Auto Layout to be more staggered.	VRF-5.2
VRF-8576	osgEarth createStandaloneTile take a very long time	Fixed by improvement to low fidelity elevation intersections.	VRF-5.2
VRF-8585	RadarCoverage is slow and crashes after a while	Fixed to ensure that radar coverage calculates in a timely manner.	VRF-5.2
VRF-8601	GUI should respect state-data set in the sysdef file	When you set a State Property in a sysdef file, the application now respects that value.	VRF-5.2
VRF-8609	Nav data not regenerating in all affected sectors on terrain change	Corrected the calculation that determines the length of a dynamic terrain change in navigation cell position coordinates. This ensures that the whole sector of the dynamic range change is included in the calculation, not only the center.	VRF-5.2
VRF-8617	Fire TOW At Target task not working if TOW is in the middle of deploying when tasked.	The application now checks whether the weapon is in a transition state to see whether it is being deployed or stowed. If the weapon will be in a deployed state, the entity fires the weapon after deploying it. If the weapon will be in a stowed state after the transition, the entity quits the task without firing.	VRF-5.2
VRF-8640	Blowing Sand does not show up under advanced weather after changing	This has been fixed by implementing the blowing particle matter changes made in VR-Vantage.	VRF-5.2
VRF-8644	Deadlock in sim engine after a long execution time	Fixed with an improvement to low fidelity elevation intersections.	VRF-5.2
VRF-8645	When creating engineering areas, right-click did not exit creation mode	This problem affected engineering areas that start with a fixed size. The application now cancels the creation of the selected engineeringArealFixed object on a right-click.	VRF-5.2
VRF-8656	Multi-selected entities won't execute new tasks if being interrupted	Fixed an issue that prevented entities from properly abandoning a previous task in favor of the new one. This occurred when a user selected multiple entities and gave them all a task.	VRF-5.2
VRF-8713	First and every other click on category in Visual Model Editor sets selection to the Entity Definition Editor page	Fixed an issue with changing pages in the Visual Model Editor.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8731	Remove code for Use Retro Icons option	Removed the code that supported this option, which was removed from the GUI in the previous release.	VRF-5.2
VRF-8735	Spot Reports not generated for destroyed entities	Fixed an issue where radar sensors stopped generating spot reports after an entity was destroyed when the sensor was set to detect destroyed objects.	VRF-5.2
VRF-8738	SOE: disallow "delete" function in object list when subordinate is highlighted	Fixed to ensure that delete only removes subordinates from the hierarchy, rather than deleting the entity entirely.	VRF-5.2
VRF-8739	Window Layouts Manager issue with a custom layout	Fixed to ensure that only visible tabbed docked widgets are used when users create and save custom layouts.	VRF-5.2
VRF-8742	Pinned task visualizations can disappear	Fixed to ensure that entities pinned to display task visualizations continue to do so when the user selects another simulation object.	VRF-5.2
VRF-8746	Radar Coverage should work on paged terrains	Fixed an issue with elevation intersections to allow radar coverage calculations to work with paged terrains.	VRF-5.2
VRF-8758	Selecting "No Change" for certain options in the Surface Vessel Lighting Panel turns off the light instead	Fixed to correctly send the value.	VRF-5.2
VRF-8777	Human on top of building left floating in mid-air when building is destroyed	Fixed an issue that left lifeform entities floating when a building they were on was destroyed. Note that the scenario must be running; the entity does not die or fall when the scenario is paused.	VRF-5.2
VRF-8780	Can get into infinite art part loop in SOE	The Articulated Part Edit dialog box no longer allows you to attach a part to a child of the part. This was what caused the infinite loop problem.	VRF-5.2
VRF-8783	Large memory consumption over time	Improved intersections with trees to resolve this problem.	VRF-5.2
VRF-8786	Sim object nav data is not taken from parent SMS	The application can now find the nav data for entities (such as on the decks of ships) for entities in derived SMSs.	VRF-5.2
VRF-8796	GUI: script UI for boolean doesn't respect default check state when using .ui	Implemented check state property to correctly set default value.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8798	Tasks are not available from the GUI when both GUI and SIM are launched from the Launcher in combined mode with the scenario to load passed through --simArgs	This is fixed.	VRF-5.2
VRF-8799	Entities tasked to wander can get stuck on uneven terrain	Fixed in third-party product, Gameware Navigation.	VRF-5.2
VRF-8806	Lua doc incorrect for DtLuaFeatureGeometry DtLuaFeatureGeometry::closestPointTo	Corrected the usage section.	VRF-5.2
VRF-8809	VR-Forces GUI hangs for considerable time when creating entities on CDB terrains	This has been fixed by the improvements to loading CDB terrains.	VRF-5.2
VRF-8811	Inserting a phase as the first phase does not reset current phase in sync matrix	Fixed to allow users to set a new first phase.	VRF-5.2
VRF-8813	Sim: DtRadarObjectSensorPSR::myEmitterSystemOn is out of phase with emitter status after initial creation.	Fixed an issue that occurred when users created a unit but did nothing to change its enabled state or emitter state. The result was that the unit would have the Emitter State turned on but PSR saw the emitter as off.	VRF-5.2
VRF-8816	GUI: scenario event pick list for trigger condition in Global Plan doesn't list all events	Global Plans can now see scenario events that are for a specific force. Previously, the Scenario Event selection in trigger conditions could only see scenario events marked as Available to All Forces.	VRF-5.2
VRF-8819	A few artillery do not perform Indirect Fire task following completion of countdown	Fixed the artillery entities that didn't correctly perform the task: AHS Krab Howitzer, 2S7M M-1975 Malka, RT-M2 RAIADO Mortar, and Type 66 Howitzer.	VRF-5.2
VRF-8822	Incorrect parameter creation dialog for Lua offset-location parameter	The Default value for an offset location now takes three values, not one. Unless otherwise specified, the default is x=10;y=20;z=30.	VRF-5.2
VRF-8828	Vehicle drives into ocean and does not stop when expected	Updated the code to ensure that entities stop when they reach the ocean.	VRF-5.2
VRF-8833	Deselecting underwater visibility check box in weather dialog turns whole screen blue	Fixed an uninitialized variable.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8850	SIM: have to close VRF to pick up new loadout	Fixed to ensure that VR-Forces picks up any changes to the selected SMS after unloading the SMS and loading another scenario or SMS without exiting and then restarting VR-Frces.	VRF-5.2
VRF-8851	DtWeatherStateProvider :: lineQueryPrecipitationState() returns incorrect result	Fixed an issue when a horizontal query line is supplied where the start and end point of the query line have the same altitudes. Extended the bounding volume hight of the precipitation areas that are intersected by the query line. Applied a similar fix for the cloud layers query function.	VRF-5.2, VRF-5.1.1-a
VRF-8857	Database logging for sim objects from Lua should log their UUID	If you pass a sim object as a parameter when logging to the database from Lua, it is now written out by UUID and not by name.	VRF-5.2
VRF-8862	DtArticulatedPartManager needs to handle art parts getting removed at runtime	VR-Forces no longer publishes articulated parts after they have been removed from a local entity. It also supports the addition of articulated parts at runtime.	VRF-5.2
VRF-8863	In Lua task dialogs, Choice (Multiple Option Buttons) does not populate from state property	Improved the check for the option type to ensure the parameter displays correctly.	VRF-5.2
VRF-8866	Escape SQL strings	Escape characters are now added where appropriate in string values in SQL statements.	VRF-5.2
VRF-8875	Missiles should fire on destroyed entities when explicitly tasked	To allow entities to fire on destroyed targets, made the control of this the responsibility of the targeting control logic, not weapon controllers.	VRF-5.2
VRF-8877	Ground entities have a strange "jump" when crossing tile boundaries and terrain is not paged in yet.	Fixed to ensure that entities maintain the correct altitude when they move onto a tile where data has not paged in yet.	VRF-5.2
VRF-8879	Lua function getAeroromeLightIntensity() - name is misspelled	Corrected the typo to "getAerodromeLightIntensity()". There is no compatibility for the old name because it is an obscure function not referenced in scripts packaged with the application. Update any code you may have that uses the old name.	VRF-5.2
VRF-8891	SA-21 and Patriot object groups contain a circle object that is positioned incorrectly during placement	Fixed to ensure that the entities in a simulation object group are placed as expected, that is, as they display when the object is attached to the mouse before you click to place them.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8895	Weather area locations are published with incorrect values	Fixed to ensure correct calculations.	VRF-5.2
VRF-8898	Task visualization spheres can only have integer radius.	The size of point task visualizations can now be specified as a floating-point value instead of only integers.	VRF-5.2
VRF-8903	Contact list is persistent during rewind in the GUI	Fixed the GUI issue that was not clearing sensor contacts when users rewound a scenario.	VRF-5.2, VRF-5.1.1-b
VRF-8904	MAK Radar Beam Radar Mode should be removed and its attributes moved to an existing radar mode	The MAK Radar Beam mode (mak-radar-mode) was erroneously included in radar sysdef files. It has been removed. The parameters it was used to test are still available for use by integrators who need them.	VRF-5.2
VRF-8916	Copying a Create Object plan statement can cause duplicate object UUID	Fixed to ensure that entities created in plans have unique UUIDs.	VRF-5.2, VRF-5.1.1-a
VRF-8917	Global plans not being removed from GUI when deleted	Cleaned up the code for renaming Global Plans.	VRF-5.2
VRF-8920	Weather Area's Air Pressure is not Persistent	Fixed the converter to ensure that the Air Pressure setting for weather areas retains the user value.	VRF-5.2
VRF-8923	Database events can be held in queue for a long time	Added a periodic wakeup based on the log period to ensure that queued events are logged on a routine basis.	VRF-5.2
VRF-8924	Warhead type not always set	The warhead type for munition fire and detonation interactions is now set to the configured warhead type value in ammunitionParams.mtl of the SMS.	VRF-5.2
VRF-8925	Problem landing plane on some aerodromes	Fixed issues with the Tu-160 Blackjack aircraft.	VRF-5.2
VRF-8927	Minefield user documentation requires clarification	Updated the documentation to reinforce that Minefield Conventional and Minefield Scatterable require the user to specify the mines in the minefield, whereas Minefield RAAM-ADAM already includes two types of mines.	VRF-5.2
VRF-8929	Create sensor view within a plan creates a view for all connected applications instead of the desired front end only	Fixed to ensure that creating a sensor view in a plan creates that view only for the intended instance.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8931	AppID for GUI can be overwritten by other GUI instance if both are started in quick succession	Fixed an issue that occurred when a user launched a second GUI instance seconds after launching the first one. When they specified different app IDs, the second ID would overwrite the first one, which caused the problem. The application now ensures that this does not occur.	VRF-5.2
VRF-8934	Move to controller not updating time to destination when destination changes.	Added logic to update ETA when move-to destination changes.	VRF-5.2
VRF-8941	Set Subordinate Function command and Lua API functions don't work	Fixed issue with UUID formatting.	VRF-5.2
VRF-8942	Scripted task parameter "Subordinates" generates the wrong data type	The Subordinates parameter for scripted tasks and sets now correctly lists the subordinates in the selected unit. It no longer includes a filter or a picker for selecting entities outside of the unit.	VRF-5.2
VRF-8946	Comment for setGlobalIdentifierForPublication gives bad advice	Fixed the information on DtLocalObject for the function setGlobalIdentifierForPublication. Added to the objectManager example to demonstrate how to override the global ID for a new local object.	VRF-5.2
VRF-8949	Changing unhosted components to hosted components does not reset the internal state data pointer	Fixed to set the state data pointer, regardless of the current value, when rehosting the component.	VRF-5.2, VRF-5.1.1-b
VRF-8952	Lighting conditions flash to default when rewinding a scenario	On scenario rewind, the global environment now preserves the and then resets to the saved values in the order of battle. This prevents flickering in the UI for time changes and environment changes when the environment is removed and then restored.	VRF-5.2
VRF-8953	Underwater visibility always starts at 0	Fixed default to allow for some underwater visibility.	VRF-5.2
VRF-8961	Potential need to remove _needed_attribute_ for a new leaf creation	When users create new element definitions, the application does not add the attribute. You must remove it manually from any definitions that have a problem with the attribute.	VRF-5.2
VRF-8966	Cruise missile destroyed due to an invalid terrain intersection	DtWarheadDetonationActuator::checkForGroundImpact now checks to ensure the terrain is available (paged in), before deciding that the missile has hit the terrain.	VRF-5.1.1-b

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8967	Copying and pasting a plan utilizing plan variables in a sync matrix causes plan variables to be misnamed and not selectable	Fixed to ensure that, within a sync matrix, you can copy a plan that has a trigger and a plan variable and paste it into another phase.	VRF-5.2
VRF-8968	Tasking a mechanized platoon to Move Along Route fails unless the scenario is saved and rewind	The application now waits until a unit's formation is considered valid before initiating the movement for that unit.	VRF-5.2, VRF-5.1.1-b
VRF-8969	DtMissileMoveToControllerComponent and DtCruiseMissileLaunchController should support targeting a location	Updated the systems to ensure that they can fire on a location as well as a simulation object.	VRF-5.2
VRF-8974	Planes sometimes think they should take off when following a route and the terrain isn't fully loaded	Fixed to not make decisions about take-offs or landings when no terrain data is available for the next vertex on the route.	VRF-5.2, VRF-5.1.1-b
VRF-8976	Cruise missile destroyed due to an invalid collision with another entity	Updated the way DtWarheadDetonationActuator::checkForGroundImpact uses the previous tick position to determine collisions.	VRF-5.1.1-b
VRF-8977	Fixed-wing model throws an exception in some cases when frame times are long	Fixed by limiting the max length of terrain intersections done for fixed-wing terrain avoidance and by checking for terrain crashes to avoid a crash when a long frame is encountered with high acceleration.	VRF-5.2
VRF-8979	Load plug-in command-line options for VR-Forces GUI don't work	Fixed issues with the --loadPlugin and --doNoLoadVrfPlugins command-line options.	VRF-5.2
VRF-8987	Changing the number of entity tick threads in the Performance Monitor panel causes a long frame in the sim engine	This is fixed, preventing entities from performing strange behaviors.	VRF-5.2
VRF-8988	Global Dynamic Terrain processor check box in GUI does not reflect the sim engine	The dynamic terrain server is hosted only when is local and published.	VRF-5.2, VRF-5.1.1-c
VRF-8994	Edit Panel input tab order is not intuitive	Improved Edit Panel for entities to allow users to more easily tab through each option in a logical order.	VRF-5.2
VRF-8995	Many of the tactical graphics are missing descriptions	Added descriptions for more tactical graphics to display in the Create Object Palette's preview.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-8997	Minefield task visualizations don't work	When you show the task visualization for a minefield, the minefield controller now shows the location of the mines. If the minefield is recreated, such as when the geometry or mine content changes, the visualization updates.	VRF-5.2
VRF-8998	Mine munition enumeration mismatch	Corrected enumeration for the M21 AT (anti-tank) Mine munition to ensure that minefield detonates correctly.	VRF-5.2
VRF-8999	Global environment object still created when disabled	When you create a scenario with the global environment disabled (an option in the Advanced tab of the New Scenario dialog box), the application does not create one.	VRF-5.2, VRF-5.1.1-c
VRF-9000	Minefields create multiple mines at the same location	Updated the methodology for computing the number of mines to create based on the bounding extent of the minefield object. Mines are also better distributed when the minefield is small relative to the density of the mines.	VRF-5.2
VRF-9004	Crash when setting modulation parameters to be blank and then setting to some other value	The application now clears the modulation parameters pointer after freeing memory when setting the modulation parameters does not set a new value.	VRF-5.2, VRF-5.1.1-c
VRF-9007	Soldier appearance "FiringPosition/WeaponinUse" does not display correctly	Fixed logic with Weapon/Implement appearance setting. This issue occurred only in HLA scenarios.	VRF-5.2
VRF-9008	Cannot specify FOM modules with spaces in the name	Fixed to enable command-line options to process FOM modules that have a space in the name.	VRF-5.2
VRF-9009	Missile launchers can sometimes prioritize targets outside their Sector of Responsibility when they should not	The application now avoids tasking the same weapon twice to account for situations where a weapon doesn't immediately change to the busy status and so cannot reliably expected to be kept off the available weapon list.	VRF-5.2
VRF-9010	SimEngine database event does not need a scenarioRunId parameter	DtVrfDatabaseEvent now has a function called setExcludeDefaultScenarioParameters, which allows you to specify that this event should not have any of the default scenario parameters added. It is now used for the SimEngine event.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-9028	Ballistic missile changes position immediately after creation	Updated the DtMissileTargetController to ensure that, upon creation of a ballistic missile, the altitude of its start (creation) position adjusts according to the clamp type of the phase from the scripted movement object.	VRF-5.2, VRF-5.1.1-d
VRF-9048	Remove one of Windows/Windows64 options from the Plug-ins editor	MAK ONE products are only supported on Windows64, therefore only Windows64 is included in the Plug-ins editor. Windows was omitted for simplicity.	VRF-5.2
VRF-9058	Detaching tactical graphics eventually stops working	The application now validates the world position regardless of whether it changed.	VRF-5.2, VRF-5.1.1-c
VRF-9064	Lua API docs for some weaponUtil methods have incorrect return value descriptions	Corrected the descriptions for weaponUtil method return values where they were inaccurate.	VRF-5.2
VRF-9065	Dev Guide should define world, local, and parent coordinates	The VR-Forces Developer's Guide has a new topic, "Coordinate Systems in VR-Forces", that explains the terms used in certain functions and parameters	VRF-5.2
VRF-9067	SIM: Sync matrix continued plans should be considered as part of the phase exit criteria.	When a plan is continued from one phase to another, and that latter phase requires that all plans complete before moving on to the next phase, the application now considers that plan as well as all others.	VRF-5.2
VRF-9080	Path planning weights in rail path controller are invalid	Corrected the road class weights in the rail-path-movement descriptor to be ≥ 1.0 in all cases. This ensures that the path search algorithm plans the shortest-distance path.	VRF-5.2
VRF-9087	"Marine Vegetation" Props - spelling error	Fixed the typo in VRF3DTerrainPropCategories.xml.	VRF-5.2
VRF-9089	MetaFlight terrain UTM/South Hemisphere not working	Fixed how the application handles MetaFlight terrains to correctly display UTM coordinates based on the UTM zone origin, not the terrain database offset.	VRF-5.2
VRF-9090	Set Heading sometimes uses Task Heading instead when using VRF Remote Controller	Fixed the issue where DtVrfMovingObjectStateRepository::tick() accessed its heading in current frame instead of next frame.	VRF-5.2
VRF-9092	Move Along Route with Actions task parameters - OK button disabled	Fixed an issue that caused the OK button to be disabled occasionally.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-9098	API: DtSimObject/DtLocalObject isEntity() call returns true for some things that it should not	Fixed isEntity() to check for the entityStateComponent.	VRF-5.2
VRF-9104	VR-Forces sim engine can sleep too long and cause frame overruns on Windows	Prevent Windows from decreasing the timer resolution when the sim engine is in the background, and request a 1 ms timer by default.	VRF-5.2, VRF-5.1.1-g
VRF-9106	DtRequestSpawnDataType has incorrect integer	Corrected DtRequestSpawnDataType is to 205 from (305).	VRF-5.2
VRF-9108	Import Simulation Objects feature does not create object names correctly	Fixed to parse and assign the imported object names correctly.	VRF-5.2
VRF-9117	Dynamic terrain does not work with multiple sim engines	Fixed to correctly assign dynamic terrain state data is assigned to the remote object class, ensuring that simulation objects on one sim engine can interact with dynamic terrain on another sim engine in the same scenario.	VRF-5.2
VRF-9121	Description of effects of soils on vehicle mobility in User's Guide are a little confusing.	Added clarification to the topic "Entity Movement and Soil Type" in the user documentation.	VRF-5.2
VRF-9122	Documentation clarification for lua init() function	Updated the documentation to correctly explain the behavior of init() in Lua script entry points.	VRF-5.2
VRF-9125	Ground vehicles do not provide a warning when running out of fuel.	Fixed to ensure that ground vehicles print a warning to the console when running low on fuel. The application prints the warning only when changing from non-0 to 0 when moving.	VRF-5.2
VRF-9127	Clutter aircraft areas don't make enough entities in some cases	Fixed to ensure that clutter areas populate with the correct number of entities.	VRF-5.2
VRF-9134	Edit dialog for Atmospheric Conditions changes values when reopened	Fixed an issue that occurred when users made changes to a local weather area and then reedited the weather. The atmospheric condition settings now persist.	VRF-5.2
VRF-9136	Rope.entity is miscategorized as a 3D entity model when it is a tactical graphic	Corrected the category.	VRF-5.2
VRF-9137	The Switchblade 600 Launcher should be categorized as a Ground Vehicle	The Switchblade 600 Launcher's categories now match those of the Switchblade 300 Launcher.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-9141	DtRadioTransmitterRemoteNetInterface::updateComponent() crash because radioTransmitterStateComponent is null	Added a check to prevent the crash.	VRF-5.2, VRF-5.1.1-d
VRF-9143	Active sonar sensor descriptor has redundant parameter	Removed detection-period from DtActiveSonarSensorDescriptor because it was redundant. The parameter is also included in DtObjectSensorDescriptor.	VRF-5.2
VRF-9146	Incorrect detection-probability entry in sensor descriptors in user documentation	The code example in the "Specifying Sensor Detection Probabilities" topic in the user help and VR-Forces User Guide includes the rounding entry (round-down 1).	VRF-5.2
VRF-9147	Issue in Aggregate-Level scripts for higher-echelon units	Added a check in entityDestroyed() as well as some safeguards to prevent an error that previously displayed in the console when a higher-echelon unit was destroyed or destroyed.	VRF-5.2
VRF-9148	Rotary wing does not fall if destroyed before running simulation	Set rotary wings to not-landed if their altitude is set via a Set Altitude set data request on the same frame that the change happens.	VRF-5.2
VRF-9149	GUI crash with modified DtSpotReportSelectedStatusCompactData	Spot report items are now more robust, allowing developers to modify the application such that they can be used on the Last Selected Object Panel.	VRF-5.2
VRF-9150	Ballistic gun cannot fire after an Aiming set data request	Updated the sysdef file to improve weapon performance.	VRF-5.2
VRF-9154	Clicking on icon in Last Selected Object Panel to center in on object doesn't fully reorient camera in stealth view	When you click the entity icon in the Last Selected Object panel, the application centers the entity in the window and now also attaches the observer to the entity.	VRF-5.2
VRF-9160	Cannot edit altitude for locally created waypoint	Fixed the issue for GUI-only waypoints.	VRF-5.2
VRF-9162	Aircraft should not autonomously fire when on the ground	When on the ground, aircraft no longer fire air-to-air weapons.	VRF-5.2
VRF-9165	AggregateLevelSimulationOverview scenario has filled in weather area	Fixed the weather color appearance so that it is not opaque.	VRF-5.2
VRF-9166	Changing active sonar mode with 2+ beams to mode with 1 beam causes crash	Made code improvements to prevent the crash.	VRF-5.2, VRF-5.1.1-d

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-9167	Do not allow Air Bases to add RWs as equipment	In aggregate-level scenarios, VR-Forces now prevents the user from adding rotary-wing entities to air bases as equipment. The air base's Launch Flight task does not support launching rotary-wing aircraft, only fixed-wing.	VRF-5.2
VRF-9169	Aircraft at AggregateLevel airbases not damaged when apron is damaged	Fixed an issue where aircraft were not being removed on destruction when an air base was attacked.	VRF-5.2
VRF-9172	Setting a property map with an empty table doesn't work	Separated the functions that set list state properties from map state properties. Maps must be set differently than lists.	VRF-5.2
VRF-9173	VR-Forces sim engine crashes when you exit RTI connection window without choosing a connection	When you click Cancel to close the RTI connection window without connecting to an RTI instance, the sim engine now exits gracefully.	VRF-5.2
VRF-9175	In rare cases terrain interface call trianglesInArea() can generate triangles with NAN vertex values	Fixed an issue that occurred when creating triangles from heightfield data, where the application would read beyond the end of the heightfield array for the northwest corners of tiles. There is now logic to ensure prevent the application from doing that.	VRF-5.2, VRF-5.1.1-d
VRF-9176	There should be an error notification when user loads same plug-in twice	There is now a warning in the console for both the GUI and sim engine if users add the same plug-in multiple times to be loaded. Any repeated plug-ins are loaded only once.	VRF-5.2
VRF-9177	Crash when there are multiple time and date objects	Reworked how the VR-Forces GUI and sim engine handle date/time objects to ensure that only one is used on a reflected basis. That will be the first one the application discovers.	VRF-5.2
VRF-9181	DtHazardAreaManager::processHazardAreaAdded not working	Fixed the code to ensure that it iterates correctly.	VRF-5.2
VRF-9185	Entity Control Panel bottom buttons disappear after rewind	Fixed to ensure that the buttons do not disappear from the Entity Control Panel when users rewind the scenario.	VRF-5.2
VRF-9199	Fly Right to heading demand does not behave as expected	Corrected the calculations to ensure that aircraft tasked to fly right when the task is set to use magnetic north do so correctly.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-9206	Major VRF sim performance penalty for remote entities inside navigation areas	The application no longer loads navigation areas when remote entities are in them, only when local entities are present in the area. This improves sim engine performance.	VRF-5.2
VRF-9225	Using F2 to rename shouldn't work by default	To use the F2 keyboard shortcut to rename an entity in the Objects List, you must select the Object Renaming Directly in Objects List check box in the GUI Settings.	VRF-5.2
VRF-9238	Set Capabilities no longer works but it should	Updated the code to read the new SISO format.	VRF-5.2
VRF-9241	VRF Launcher does not respect updated appData paths for plug-in selection	The VR-Forces Launcher now supports the --appDataDir command-line option.	VRF-5.2
VRF-9249	AIS data not saved in scenario	Ship AIS data is now saved as part of the scenario and restored on scenario load.	VRF-5.2
VRF-9251	Grenades get stuck inside buildings	Updated the code to account for using grenades when underneath parts of the terrain, that is, under a roof (inside buildings).	VRF-5.2
VRF-9252	Time of Day incorrect from the Remote Control API	Made improvements to how the application synchronizes time of day in the scenario between the sim engine and the GUI.	VRF-5.2
VRF-9253	Crash with multiple remote objects with same Entity ID	Some environmentals and entities might not have a UUID and might have the same entity ID in MAK Data Logger tapes. In those cases, the UUIDs are formed from the entity ID. VR-Forces now adds additional text to the UUID to ensure they are unique.	VRF-5.2, VRF-5.1.1-e
VRF-9254	addStateProperty example not updated for NETN FOM	VrfStateProperty_evolved.xml now subclasses HumanWithAccuracyStats from NETN_Human. HumanWithAccuracyStats.ope specifies hla-fom-class. Removed the HLA 1516-2000 and HLA 1.3 versions of the example FOM, as those are no longer supported.	VRF-5.2
VRF-9255	Fire Missile Launcher task sets an incorrect altitude of the target location	Fixed to ensure that target location's altitude is that of the place clicked on the terrain, not the height of the tasked entity.	VRF-5.2
VRF-9259	Heading on creation not relative to selected North	Fixed to ensure that the heading is calculated correctly when using magnetic north instead of true north.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-9260	Cannot nest lists or maps in state properties	Fixed to support nesting of lists within lists and maps within maps in OPE files.	VRF-5.2
VRF-9262	--appDataDir is not processed until after attempting to load config files and many instances of hard-coded relative paths	Fixed to ensure that the data files are loaded correctly when using this command-line option.	VRF-5.2
VRF-9263	Moving the mouse over the “Embedded Entities” entry in context menu makes the other menu options appear unresponsive	Fixed by ensuring that the menu entry displays as disabled when it does not apply to the selected simulation object.	VRF-5.2
VRF-9265	loadPlugin command-line options for VR-Forces sim engine should work	Fixed issues with the --loadPlugin and --doNoLoadVrfPlugins command-line options.	VRF-5.2
VRF-9270	Nav areas not always shown	Fixed an issue that could occur when the user displayed navigation areas, ran a scenario, then loaded or created another scenario on the same terrain.	VRF-5.2
VRF-9277	nonstandardStatePropertyTypes.h should have a better name	Renamed the file as vrfStatePropertyTypes.h.	VRF-5.2
VRF-9283	Lua documentation for land at aerodrome was incorrect	Added tool tips and updated taskSetBuilder to implement aerodrome type for Lua documentation.	VRF-5.2
VRF-9287	Fire and Detonation interactions are not created or sent when simpleCGF is used	Fixed to ensure that all the correct event handlers required for the sim engine are added. Also set DIS to not be self-reflecting.	VRF-5.2
VRF-9288	Sim engine crash when using nonexistent route in Patrol Route task	The application now checks whether the route is a valid simulation object before initializing the Patrol Route task.	VRF-5.2
VRF-9290	Entities can dead-reckon after stopping their movement.	Updated the listeners used to check for changes to simulation objects' velocities to ensure that the application promptly processes zero velocity values.	VRF-5.2
VRF-9330	Weapon with multiple munitions for different target types - firing incorrect munition after running out of the assigned munition	For ballistic weapons, the application now checks whether the munition loader has preloaded the correct munition for the target. It also checks whether the controller has ammunition for a specific target. Autonomous firing checks whether the controller has ammunition for a specific target. In the case that it does not, the application does not create or assign a task to the controller.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-9334	It should be easier to edit the Fire Cruise Missile task parameters in a plan	Fixed issues that caused the OK button to be disabled when editing the task in a plan.	VRF-5.2
VRF-9335	Air Base tasked to Prepare QRA at nighttime leaves the aircraft indefinitely In Preparation state	If not available for nighttime, do not leave in preparation state (abort the mission).	VRF-5.2
VRF-9341	Surfaces are not mapping to correct faces for cruise missiles in multihit damage actuator	Fixed a known issue where a cruise missile with a proximity set would still detonate exactly on the target. This previously led to an inability to determine the angle of incidence unless the proximity was set to 0.	VRF-5.2
VRF-9342	Harpoon Missiles frozen in mid-air after launch	Fixed a known issue where anti-ship or anti-submarine missiles if they went beyond their range would simply freeze and never be removed from the simulation. This issue was particularly apparent for air-launched missiles.	VRF-5.2
VRF-9344	Possible threading crash related to DtRemoteComponentAttachmentManager::processRemoveFromArrivals()	Fixed to prevent threading crashes related to removing things from myRecentArrivals in parallel.	VRF-5.2
VRF-9358	Set Sensor Aim using Aim at Point copies the altitude from the entity instead ground level	Set Sensor Aim now uses the ground level altitude of the target location clicked on the map instead of the altitude of the entity.	VRF-5.2
VRF-9360	Display Settings dialog box doesn't fit on screen	Added the scrollbar capability to the Display Settings dialog box. Pages with many options now allow you to scroll through the options, rather than making the page too large for normal computer screens.	VRF-5.2
VRF-9367	Update documentation for move-to and move-to-direct in the Luadocs (task-set documentation)	Updated the Lua API Documentation for move-to-direct, ground-vehicle-move-to, and other move-to wrapper scripts.	VRF-5.2
VRF-9368	Sim crash with target objects deleted/added to network	Made code improvements to prevent crashes.	VRF-5.2
VRF-9374	IFF tasks in Lua API Documentation need better detail on what the parameters do	Improved the documentation on the IFF tasks.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-9383	Plug-in information in SMS should differentiate between protocols for plug-ins	In the .sms file, there are now four separate plug-in settings each for the sim engine and GUI to support the different protocols. They accept a semicolon-separated list of strings enclosed in quotes. The application compares the strings to the pluginName specified in the plug-in code in the DtPluginInformation function. For more information, refer to the VR-Forces Developers Guide.	VRF-5.2
VRF-9385	Set Ammo Resource in aggregate level does not keep partial changes	Fixed to ensure that other values are not lost when users make a change to only one.	VRF-5.2
VRF-9388	Crash when editing scripted task from DtScriptedTaskDialog	Added check to ensure that the application doesn't crash.	VRF-5.2
VRF-9393	Intensity for precipitation (weather) is half what the slider indicates	Adjusted the conversion from VR-Link to VR-Vantage for precipitation intensity values. The code now correctly maps incoming 0 to 200 (in mm/hr) to match needed values for VR-Vantage.	VRF-5.2
VRF-9400	"Autonomous Fire Multitarget" - reactive task should remain disabled after scenario reload	Fixed to ensure that, when the reactive task is disabled through the Disable Reactive Task set data request, it remains disabled when a user rewinds the scenario.	VRF-5.2
VRF-9410	Remove the selfReflect option from the sim	The --selfReflect command line option has been removed and is no longer supported in the sim engine.	VRF-5.2
VRF-9412	Behavior Engine does not set checkpoint-state-only	Added a call in the behavior engine to set the checkpoint mode to checkpoint State Only.	VRF-5.2
VRF-9422	Setting weapon state doesn't work while scenario is paused.	Fixed issue where changes to weapon state wouldn't be applied to entity if scenario was paused.	VRF-5.2
VRF-9430	CDB Tool need to be packaged with the VR-Forces installer	The cdbTool utility is now included in the VR-Forces installation. Use it to compress CDB models and textures offline to speed up initial load times and improve runtime performance.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-9434	DtLuaPlaceFormationJob never ends	DtLuaPlaceFormationJob now unregisters its tick callback once it has completed to ensure that it is not ticked unnecessarily. Also updated the jobNode script of the behavior engine to ensure that it clears out jobs once they finish and the result has been copied out.	VRF-5.2
VRF-9453	Plane can skim too close to terrain and accidentally land when avoiding mountains.	Improved the terrain avoid check for aircraft to help prevent controlled flight into terrain.	VRF-5.2
VRF-9456	Civilian crowds have some tasks available that don't work / don't make sense	The Disembark All task should not have been available to crowds. It has been removed.	VRF-5.2
VRF-9528	Soil type does not look correct when clicking on buildings	There is now a default soiltype of Building in the MAK Earth (online) terrain for pagedNode2.	VRF-5.2
VRF-9529	Paratrooper Air Drop task input is confusing	Updated the Paratrooper Air Drop parameters to require at least one Paratrooper in the Entities to Drop list.	VRF-5.2
VRF-9554	Brooklyn terrain need two navigation areas (lifeform and ground)	The Brooklyn terrains now have two separate navigation areas: one for lifeforms and one for ground vehicles.	VRF-5.2
VRF-9565	Retract Towed Array Decoy task should not show an icon in the menu	Removed the icon from the task menu for the Retract Towed Array Decoy task. It was incorrect.	VRF-5.2
VRF-9567	Information in Terrain Profile Line is hard to see (dark mode)	The line and text in the Terrain Profile Line dialog box are now yellow, drastically improving the visibility.	VRF-5.2
VRF-9595	Bad sensor signature values	Added a small objects standard signature and altered others to be more reasonable.	VRF-5.2
VRF-9596	Internal Transfer of Fuel does not make use of real world units	The Internal Transfer Fuel task parameters now display the units of measurement for the entity's fuel amount and the rate at which to refuel it.	VRF-5.2
VRF-9597	IFF System Identifier is blank for IFF interrogation and reply	Fixed the interrogating system ID.	VRF-5.2
VRF-9623	Weather area (ellipse) needs to be removed	You can no longer create Weather (Ellipse) local weather areas. They are not supported. (This change is backward-compatible.)	VRF-5.2
VRF-9628	Reduce notify level of port connection errors	Fixed to be Info, not Error.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-9631	Cannot build examples solution	Added CMAKE file to support building examples solution.	VRF-5.2
VRF-9639	Verify that remoteController example is not missing dependencies	Updated the example to ensure that it pulls in the correct files.	VRF-5.2
VRF-9641	Tasking tanks to fire with specific weapon without enabling preferred specific weapon yields mixed results	The Preferred Weapon option is now disabled until you select the Prefer Specific Weapon check box.	VRF-5.2
VRF-9661	In the Command Panel, the Paratrooper Air Drop task does not clearly display all parameters	The parameters of the task now display vertically, allowing users to see all of them in the Command Panel.	VRF-5.2
VRF-9662	Phrase "The Master Scenario Settings Dialog." shows up in multiple API docs places for multiple classes	Made updates to improve the class documentation.	VRF-5.2
VRF-9677	Torpedos print errors about active sonar mode	Defined an inactive mode for simulation objects that create their sonars. The default is inactive.	VRF-5.2
VRF-9693	Example AddSensorPropagator needs to migrate to MAK Earth Aggregate since Bakersfield is going away	Changed the terrain used in the example.	VRF-5.2
VRF-9719	SOE: fascam.sysdef not being incorporated during rollup	Fixed so that the application would also look at included SMSs for systems as well as the current one.	VRF-5.2
VRF-9724	Aggregate Level launch-flight task does not work	Updated the launch-flight script. Previously, it tried to look up state properties from a test unit on the same tick it was created. Newly created entities require a tick before they are created and initialized, therefore the state properties were not available.	VRF-5.2
VRF-9771	Improve documentation about the importance of FOM module ordering	Added a section to the MAK ONE Interoperability Guide, "Using Custom FOM Configurations", which provides information and guidelines on the correct order of FOM modules.	VRF-5.2
VRF-9782	Continue to flag is not working in the rotary wing Move To tasks	Added checks in the simple rotary-wing pilot controller for the Continue On flag that is set in its process state repository.	VRF-5.2
VRF-9798	Ships and subsurface vehicles do not stop if last Move To task has the Continue On flag set to true	When the Continue On option is selected in the Move To task and there are no further destinations or other movement tasks, the entity now slows to a halt. Note that, as in previous releases, Continue On applies only when the Move To task is in a plan.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-9804	M1A2 SEP - Broken visual model, when creating new model (copy) - SOE	Fixed how the application merges element definitions: when the dictionaries are the same, no need to merge.	VRF-5.2
VRF-9808	SOE tooltip spelling error	Corrected a typo in the tooltip for the Can Be Embarked On option.	VRF-5.2
VRF-9814	Debug Simulation Terrain Tool can hang the sim engine when using draw areas larger than the default 1000 m	There is now an option in the Feature page of the tool to ground clamp to features in the elevation.	VRF-5.2
VRF-9853	Gumballs, etc., missing from UI when playing back aggregate-level scenarios from MAK Data Logger	When starting the front-end for playing back a logger tape that is an Aggregate Level tape, the front-end must be started with the --defaultSimulationModeSet ..\data\simulationModelSets\AggregateLevel (or AggregateTacticalLevel).sms in order to view the data correctly,	VRF-5.2
VRF-9878	Ground vehicles no longer show ETA when moving.	The ETA display for ground vehicle movement has been removed for entity-level scenarios. This is due to the significant improvements to the way in which ground vehicles move across terrain.	VRF-5.2
VRF-9917	GUI created detonations have incorrect Event ID in HLA	The application now uses the exercise connection to choose the next event ID when generating detonations in the GUI.	VRF-5.2
VRF-9922	setNavigationEnabled functions are not documented as being for humans only.	Updated the Lua API Documentation for these functions to ensure that it was clear.	VRF-5.2
VRF-9926	SOE: Weapon systems copied another system cause models to stop functioning	This occurred due to the way removing and adding a system was previously implemented. When replacing a system, the application now keeps existing configuration with articulated parts and system variables.	VRF-5.2
VRF-9927	GUI: DtFilteredSubordinatesListView is not populating properly	The application checks the filter to add to ensure it works correctly.	VRF-5.2
VRF-9939	RangelItem FOM data type does not match encoded data	Fixed the attribute in the FOM to match what VR-Forces actually sends.	VRF-5.2
VRF-9941	Reopening scenario while in the same GUI session with a remote entity causes said remote entity to not be reported as a contact on the GUI sensor contact dialog in entity info	Fixed by removing the code in DtSensorInformationPageLogic that caused the issue. It was no longer needed.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-9953	Entities with multiple of the same weapon can only be tasked to fire one	If an entity has more than one weapon of the same kind, they are now differentiated with incremental numbers (1, 2, and so on). Previously, it was impossible to differentiate and which could lead to the user being unable to select the desired weapon.	VRF-5.2
VRF-9956	Triton ocean sea state swaps between Local weather area settings and global	Fixed an issue where local weather information related to sea-state was processed as both local and global, causing conflict.	VRF-5.2
VRF-9964	GUI: "psuedo" spelled wrong in IFF set dialog	Corrected typo in parameters for IFF set data request. It is now "pseudo".	VRF-5.2
VRF-9967	Features in Debug Simulation Terrain don't always display	This is fixed. The application was not setting the feature data in degrees but radians, even when the values were in degrees.	VRF-5.2
VRF-9971	Custom SMS saves config files in a way that is inconsistent with SharedData	The ommx files are now in the subdirectory of current model definitions for non-shared visuals. Shared files are still in the userData directory.	VRF-5.2
VRF-10006	Mouse cursor can get in permanently hidden state in VRF GUI	Fixed an edge case where making changes to entities, such as editing an aircraft's altitude, and then clicking the right mouse button caused the cursor to disappear.	VRF-5.2
VRF-10008	Show/hide occupants flag is handled incorrectly	The HideOccupants extended data flag is now an override to the default entity display settings. There is now a third option to remove the HideOccupants extended data to return to the settings value. This allow applications such as VR-Engage to control whether the driver displays based on whether a player is engaged in the driver role.	VRF-5.2
VRF-10013	Schiebel UAVs'visual sensor not configured correctly	Corrected the range and sensor location for both S-100 Schiebel Camcopter Black and S-100 Schiebel Camcopter White.	VRF-5.2
VRF-10046	Created objects are selected erroneously in multi-object input widget	When simulation objects, such as munitions, are created in VR-Forces while parameters for entering multiple objects are open, those objects are not added to the list of objects.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-10051	Crash when disabling move-to controller	Prevented a crash that could occur when a ground vehicle's movement system definition file disables the move-to component.	VRF-5.2
VRF-10056	Road preferences aren't respected after re-enabling navigation	Previously, when a vehicle was set to prefer roads and then the navigation was disabled and then reenabled, it would not resume preferring roads. This is fixed.	VRF-5.2
VRF-10058	Plan cannot be removed from a sync matrix	Fixed an issue where a plan might persist in a sync matrix when a user tried to remove the plan from a phase	VRF-5.2, VRF-5.1.1-g
VRF-10060	Fixed wing entities will fail to execute a follow task if they were previously following an entity which was later deleted.	There was an issue where, if an entity was following one entity then performed another task before later following a different entity, the second follow entity task would fail if the entity it was first following was deleted from the scenario. This has been fixed.	VRF-5.2
VRF-10081	Remove the QualNet_HLA_interface_RPR-FOM 1.0_extensions_ICD3.pdf document from docs	This file was removed from the installation. For up-to-date information, refer to the MAK ONE Interoperability Guide.	VRF-5.2
VRF-10100	Search and rescue fly patterns does not work	Changed the default Turn Acceleration for the Fly Creeping Line Pattern and Fly Expanding Square Pattern search and rescue movement tasks to ensure that they work correctly even when the user makes no changes to the parameters.	VRF-5.2
VRF-10115	DtVrfRemoteController::createControlArea does not fill out DtAppearance correctly for control area, spawns area that looks filled	Add appearance as a parameter to create control area and create a default appearance that is unfilled.	VRF-5.2
VRF-10153	SOE crashes after creating a new unit and trying to set a formation	This issue occurred when a user created a new unit from scratch because there were no formation table entries. The SOE now creates a default one that the user can then edit as needed.	VRF-5.2, VRF-5.1.1-g
VRF-10169	vrfGui crash when the Info dialog IFF tab gets selected , with the entity IFF system disabled	Updated the logic to correctly add or remove pages and items when all pages are removed.	VRF-5.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRF-10203	Nav generator producing overly detailed nav data	If required for the terrain you will use in your simulation, you can specify which soil types are tagged with surface characteristics using a new configuration option in navigationProfiles.mtl. This option, soil-types-to-tag-with-surface-char, lists soil types. Only soil types included in the list will generate navigation tags specific to that soil type. Other soil types receive the default navigation tag.	VRF-5.2
VRV-2260	Vantages crashes when CIGI component controls try to set values on Entities with no model / model failed to load	Fixed an issue that occurred when a third-party tool using CIGI had any invalid entity mappings and would therefore send Component Control messages for those entities.	VRV-3.2
VRV-3586	Dialog boxes should be (more) resizable	Added the scrollbar capability to the Display Settings dialog box. Pages with many options now allow you to scroll through the options, rather than making the page too large for normal computer screens.	VRV-3.2
VRV-4761	Heads wiggle when weight is increased	Fixed issue where body weight scaling was applied to LODs that don't support it.	VRV-3.2
VRV-4907	Mouse over symbol decoration settings are not selected when always on check box is selected	When you select the On/Off check box to indicate that the label should display regardless of the mouse cursor's position, the On Mouse Over check box is now disabled.	VRV-3.2
VRV-4933	There's a distance between Ocean Spray and Wave Splash where neither visual works	Specified minimum and maximum intensity levels to ensure that the effects display well.	VRV-3.2
VRV-4967	DtEntityEmitterVolumeVisualizer continually calls removeModel on scene objects, even when it doesn't need to	Fixed by refactoring the code.	VRV-3.2
VRV-5011	MGRS grid lines do not respect fixed spacing option	Implemented fixed spacing for MGRS map sheets.	VRV-3.2
VRV-5039	Procedural airport displaced threshold graphics & lighting incorrect	Corrected the displaced threshold lights and the end lights for the opposite runway.	VRV-3.2
VRV-5068	Can't deselect element definitions	Fixed to allow users to deselect element definitions. Previously, if they selected any definition, they could not return the element editor to state where nothing was selected	VRV-3.2
VRV-5072	No 'session' backup for element definitions	Made improvements to the way in which the application restores to start up settings.	VRV-3.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-5151	Multiple power towers in some locations	Third-party fix in osgEarth.	VRV-3.2
VRV-5238	Vehicle entities noticeably stall the main thread when loading	Some indirect GPU buffers are now updated in chunks rather than all at once, which improves GPU-OpenGL driver interaction. Added a creator class for DtIndirectModelInfo in the API.	VRV-3.2
VRV-5259	DI-Guy logging output doesn't go to log file.	Fixed to ensure that, when DI-Guy logging is enabled, it is printed to the log file. Previously, it only displayed in the console.	VRV-3.2
VRV-5314	Frame drops in VRV - caused by a suspicious boost mutex	Refactored application code to be more thread-safe.	VRV-3.2, VRV-3.1.1d
VRV-5365	There are several issues with threshold and end lights	The edge lights behind the displaced threshold are now unidirectional red and placed in the DTHR light group. The end lights behind the displaced threshold are now omnidirectional red lights placed in the opposite runways END light group.	VRV-3.2
VRV-5394	Not able to override the DtOverWaterUpdater	Added a creator class for DtOverWaterUpdater, which DtSurfaceClampingUpdater now uses. This is to allow developers a way to implement better water to ground clamping.	VRV-3.2
VRV-5399	Bushes and trees are not affected by shadows when viewed at a distance	Restored self-shadowing on vegetation with low LODs. (Previously, for performance reasons, there was a change to disable self-shadowing on vegetation with low LODs. Since that time, vegetation fidelity has improved and it is no longer an issue.)	VRV-3.2, VRV-3.1.1b
VRV-5408	Crash when selecting draw bounding volume in Terrain Information Panel	Updated for cast safety.	VRV-3.2
VRV-5412	Go To Location Panel should follow Display Units Settings	The Go To Location Panel now allows you to use any of the supported coordinate systems.	VRV-3.2
VRV-5472	VR-Vantage applications should not ignore published parts not in the model	The observer can now attach to articulated parts that have been set by the network but do not exist in the model's scene graph.	VRV-3.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-5514	Move the numberFomModules in the HLA 1516 Evolved.DtHla1516eDriver to the top	In the HLA 1516e connection XML file, the numberFomModules item is now at the top. When you add a new FOM, you must increment that value. Placing it at the top of the file makes it easier to remember to update the value.	VRV-3.2
VRV-5543	exampleSensorSetting key controls not fully working	Included a startup script for Linux. Updated the example's documentation to address some nuances about certain sensor settings.	VRV-3.2
VRV-5545	Restoring sensor setting to factory defaults will cause SensorFX scenes to render all white.	Fixed an issue where the wrong sensor settings were applied, which occurred because the active sensor was tracked incorrectly during a factory reset.	VRV-3.2, VRV-3.1.1g
VRV-5585	Symbol decoration settings don't work with example tactical graphics	Fixed to ensure that the symbol decoration settings apply to the tactical graphics example.	VRV-3.2
VRV-5588	Debug Visuals - Debug Texture does not reload	Fixed by adding a status to check for when the user loads a texture. This status allows the logic to display the debugging texture virtual program regardless of whether the texture was newly loaded or pulled from the memory cache.	VRV-3.2
VRV-5654	ModRad still writes to Shared Data	Updated to have ModTran output to a SensorFX cache directory.	VRV-3.2
VRV-5668	DtLineIndicatorSymbolDecorationUpdater does not check for active model set	The application now updates only when the model set is active.	VRV-3.2
VRV-5675	SensorFX automatic gain changes should not be instantaneous	Fixed to make the rate of gain changes slower and therefore more realistic.	VRV-3.2
VRV-5707	Entities are very slow to appear in SensorFX	Fixed the compounding issues that caused long delays before an entity would be visible in SensorFX views.	VRV-3.2, VRV-3.1.1g
VRV-5727	Loading Yemen CDB is slower than before	This is fixed by the improvements to loading CDB terrains.	VRV-3.2
VRV-5781	VR/MR - SensorFX Speedtree shaders need reviewing for multiview VR	Updated multiview implementation to support passing on viewVertex.	VRV-3.2
VRV-5785	Elevation road flattening is broken	Restored OSG Earth configuration for road flattening on hilly terrains.	VRV-3.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-5789	Crash when changing Window Type to Fullscreen while in Plan View mode	Fixed issues with texture bookkeeping.	VRV-3.2, VRV-3.1.1n
VRV-5807	Approach lights name missing in debug at Heathrow Airport	Fixed a typo to ensure that names of approach lights display in the Developer Debug Overlay.	VRV-3.2
VRV-5811	Warning: makVrv::DtIndirectGeometryCallback::processLayer	Refactored some code in DtIndirectGeometryCallback to account for non-opened layers, which are layers that are in the earth file but disabled. They are no longer added to the indirect management system unless they are opened.	VRV-3.2
VRV-5827	Tactical Graphic Vertex Selection and Hover Events Broken	Fixed issues with the events related to selecting and hovering over vertices.	VRV-3.2
VRV-5830	FBX external reference not working when converted to MEDF	Fixed the node comment to ensure that external references work with the medfTool to convert to MEDF (MAK Encrypted Data Format).	VRV-3.2
VRV-5838	Dynamic lights on entities not working	Fixed to reenable dynamic lighting on entities.	VRV-3.2
VRV-5865	VR-Vantage with shadows enabled can generate OpenGL errors in the indirect system	Improved the logic to ensure the indirect GPU culling buffers are only updated once per frame. This change prevents camera staging buffers from getting out of sync with the GPU buffers.	VRV-3.2
VRV-5874	Single point touch events are ignored	Added mouse emulation for single point touch events. Added API overridable methods to allow plug-in uses to override this behavior. This corrects an issue in VR-Engage where GLS cockpits did not respond to users tapping a touchscreen.	VRV-3.2
VRV-5877	FBX Loader does not support End of Barrel Comment	Added an empty degree-of-freedom (DOF) node when the comment "@dis annotation end_of_barrel" is present.	VRV-3.2
VRV-5887	Intervisibility Fans do not display the expected outer blue ring except in Plan View	Fixed to ensure that the outer circle displays for intervisibility fans.	VRV-3.2
VRV-5888	Dynamic Lights on HNL Airport terminal are non-functional	Fixed to enable dynamic lighting at Honolulu airport in MAK ONE terrains.	VRV-3.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-5889	Rotary wing entities can sometimes stop animating in the raid demo scenario	Fixed an issue that arose when an entity with rotor blades spinning at full speed moved between grids. The rotory velocity updates are now received, ensuring that the blade animation continues as expected.	VRV-3.2
VRV-5897	SensorFX: Changing the Current Time while in a SensorFX view may cause the screen to flicker repeatedly	Fixed a flicker that could occur in SensorFX views, which was caused by processing entity thermal hot spots in a parallel thread.	VRV-3.2, VRV-3.1.1a
VRV-5900	DI-Guy characters are not appearing in SensorFX modes unless the observer is extremely close to the entity	Fixed issue where some DI-Guy LODs, primarily lower LODs, did not appear when using a SensorFX observer mode.	VRV-3.2, VRV-3.1.1c
VRV-5916	SensorFX: Entities do not visually cool off after turning off their power plant	Fixed issue where entity's active regions would not visually cool off after being activated.	VRV-3.2, VRV-3.1.1o
VRV-5936	CameraFX: Night vision is very blurry and noisy	Updated the default settings for NVG (CameraFX) observer mode.	VRV-3.2
VRV-5958	Crash when closing map - BiomeLayer tracker token	Fixed in makOsgEarth.	VRV-3.2, VRV-3.1.1b
VRV-5962	Ground clamping updaters are created if no clamp mode is specified in the element definition	The default allowed clamp mode is now clampNone. No ground clamping updater will be created unless a clamp mode is set in data for that element.	VRV-3.2
VRV-5975	Example customShaders documentation does not appear in the online documentation	Add exampleCustomShaders to the page that lists Graphics examples.	VRV-3.2
VRV-5977	exampleEffectTexturePlugin should use available model	Updated the model and texture used in this example to ones in the current MAK ONE data package.	VRV-3.2
VRV-5981	exampleSymbolFacade broken	The DtWidgetLabel objects created by exampleSymbolFacade now use the ConstrainToBounds size policy, because it is not setting a test string on the label. It relies on a specific set size onto which it renders a texture, not determining a size based on a text string.	VRV-3.2, VRV-3.1.1b
VRV-5984	SensorFX: Multiple channels configured with different SensorFX sensors do not display correctly	Fixed to display the correct sensors when multiple sensors are in use, each in a different channel. Previously, data was generated for a single type of sensor even when different ones were set to display.	VRV-3.2, VRV-3.1.1a

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-5987	VR-Vantage loads lower LOD tiles when changing from Stealth to Plan View	Fixed by changing the 2D cull altitude.	VRV-3.2
VRV-5997	DtIndirectSwitchManager::updateSwitches() is very slow	Optimized DtIndirectSwitchManager::updateSwitches() to utilize multithreading, which improves performance.	VRV-3.2, VRV-3.1.1d
VRV-6004	SensorFX: VREngage Display anomaly in Chose Role after selecting an entity	Fixed issues with shader compilers related to shadows, SensorFX, and VR-Engage's effect textures.	VRV-3.1.1a
VRV-6010	Ship and boat propeller wash wakes stop rendering due to application-wide limit on the number of propeller wash wakes and it is not obvious that the limit is being exceeded	There is now debug information in the Developer Debug Overlay under Ocean Settings where users can see the max prop wash setting.	VRV-3.2
VRV-6017	GARS fixed spacing broken	Corrected to properly convert the degrees to radians when rendering the GARS grid lines.	VRV-3.2
VRV-6020	Tactical graphic embarkation on aggregates does not work	Fixed to ensure that users can attach tactical graphics to units in VR-Forces.	VRV-3.2
VRV-6025	Add command-line argument to turn off GL buffer tracking	The new --disableGIBufferTracking command-line options turns off GL buffer tracking, which can improve performance in cases such as CDB.	VRV-3.2, VRV-3.1.1b
VRV-6026	Add shared locks to DtReadFileCallback	Added shared locks so that reads do not block each other. This improves how the application handles CDB terrains.	VRV-3.2, VRV-3.1.1b
VRV-6027	Use shared locks in indirect containers so that reads do not block other reads	This change improves performance on CDB terrains.	VRV-3.2, VRV-3.1.1b
VRV-6029	Stop CDB from adding indirect models in the main thread because it causes stalls	Made improvements for CDB performance.	VRV-3.2, VRV-3.1.1b
VRV-6030	Procedural height map issue	Fixed in third-party software.	VRV-3.2
VRV-6034	Handle the case when articulated parts stop being published by an entity	Removal of art. parts now removes pose overrides from DI-Guy characters, returning them to their expected pose.	VRV-3.2
VRV-6036	Enabling "Omit Overlays - 32bit floating point" on a video stream causes the image to take on a greenish-yellow tint	Fixed to render into RGB.	VRV-3.2, VRV-3.1.1a

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6038	Reconnecting an RDE causes a crash	Fixed the remote display engine (RDE) to ensure that, on reset, it clears the queue of items the RDE had not processed when it disconnected.	VRV-3.2, VRV-3.1.1a
VRV-6039	Disconnecting an RDE can sometimes crash with overlay widgets present	Fixed the remote display engine to prevent classes from trying to access freed (invalid) objects, which caused the crash.	VRV-3.2, VRV-3.1.1a
VRV-6040	Reconnecting an RDE can sometimes disable alpha to coverage	Fixed the indirect entity manager to ensure the global alpha to coverage (ATC) setting is applied correctly, even when the ATC settings change.	VRV-3.2
VRV-6041	Changing a channel's frustum causes shadows to render incorrectly	Updated the code that computes the near and far frustum points from the viewing camera frustum.	VRV-3.2
VRV-6042	Improved Mixed Reality mask anchoring	Added support to improve anchoring and alignment of masks in mixed reality mode for Varjo. There is a new option in the Developer Debug Overlay (accessed by pressing F4), VR Anchoring, where you can enable anchoring and interactive calibration of the tracking space. Refer to the help or the VR-Vantage Users Guide for more information.	VRV-3.2, VRV-3.1.1a
VRV-6051	Range line heading does not respect Application/Heading display unit setting on creation	Previously, when you drew a range line, it always displayed the heading as relative to true north, even when your settings were set to display headings as relative to either magnetic or grid north. This is fixed.	VRV-3.2, VRV-3.1.1b
VRV-6055	Provide a way to completely remove the performance penalty for user input, such as keyboard/mouse events	When you define the NoExternalInput channel keyword for all active channels, the application no longer performs an event traversal of the scene graph. The event traversal and the event queue are no longer populated to begin with, making the application more efficient.	VRV-3.2, VRV-3.1.1b
VRV-6056	Use shared locks when looking up singleton instances rooted in the DtDe	Previously, looking up rooted singleton instances in the DtDe used a unique lock, preventing threads from doing lookups concurrently. Since no modifications are made to the lookup data structure, this is now a shared lock.	VRV-3.2, VRV-3.1.1b
VRV-6059	SpeedTrees are missing from Ala Moana inset when using SensorFX on Linux	Fixed SpeedTree shader compilation issue.	VRV-3.2, VRV-3.1.1a

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6060	Crash on reload when using SensorFX on Linux	Fixed to prevent the crash.	VRV-3.1.1a
VRV-6061	Software Patch letters are not being set in the About Box	Patch versions are now correctly reflected in the About dialog box.	VRV-3.2, VRV-3.1.1a
VRV-6062	Deselecting underwater visibility check box in weather dialog turns whole screen blue	Fixed an issue that caused the display problem.	VRV-3.2
VRV-6069	Dt3DEllipseVisualizer default physical line height getting overridden	Fixed by setting network values after visualizer values.	VRV-3.2
VRV-6072	Update decoding of geometry from METOC weather layers in HLA	Updated the decoding of the weather area information to ensure that it matches what is sent from VR-Forces.	VRV-3.2
VRV-6074	DtOsgWidgetLabel does not support altitude based scaling when using ConstrainToBounds policy	Updated to make use of the altitude-based scales when determining the sprite bounds for various altitude configurations.	VRV-3.2
VRV-6076	Starting in SFX sensor while loading terrain from command line can result in some sensorized objects not being rendered properly	Fixed an issue that was seen when starting in SAR mode while loading a terrain, which could result in the procedural ground not being set up with the correct shaders.	VRV-3.2, VRV-3.1.1b
VRV-6079	DtObserverAnimator is not easily extendable	Toolkit users can now more easily extend the DtObserverAnimator class and control whether or not it linearly interpolates from the start orientation to the end orientation.	VRV-3.2
VRV-6080	Minor orientation fluctuations cause change signals to fire constantly.	Updated with a better approach to prevent the Orientation Changed signal from firing in the case of minor rounding errors.	VRV-3.2
VRV-6081	SensorFX: Some placed entities are starting with parts like treads and weapons heated up	Fixed an issue where temperature data was not properly updated which could cause active regions to render with wrong temperatures.	VRV-3.2, VRV-3.1.1g
VRV-6087	SensorFX: Section of terrain is very dark upon first terrain load with fresh install	Fixed intermittent shader linking errors that can occur when starting up SensorFX without a valid shader cache.	VRV-3.2
VRV-6091	Missing GS models on CDB terrains	Fixed issues with paging LODs.	VRV-3.1.1c

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6093	Video Stream metadata Velocity value warning causes performance issue.	Removed velocity out-of-range warnings in favor of following the MISB ST 0601.8 spec. Set the velocity value to $-(2^{15})$ as an "out-of-range" indicator.	VRV-3.2, VRV-3.1.1c
VRV-6094	HAT line measurements should update when user changes the measurement in Display Settings	Made a change to update the measurements displayed for height-above-terrain (HAT) lines when the user changes Display Units Settings.	VRV-3.2, VRV-3.1.1d
VRV-6098	simTreesTool generating incorrect values for vegetation model bounding boxes	Fixed the simTreesTool so that, when it is used to generate the height and width of the non-sim engine model, the generated values are correct.	VRV-3.2
VRV-6100	cdbTool doesn't support cache directories not inside a vantage install	Use the new <code>-a --AppDataPath</code> command-line option to specify the directory to use for CDM XML mappings. The default value is <code>./appData</code> . See the help or the Adding Content to MAK ONE Applications Reference Manual to learn more about the cdbTool.	VRV-3.2, VRV-3.1.1e
VRV-6102	Gimbal sensor overlay does not show sensor azimuth correctly	Corrected the numbers that display the gimbal sensor's relative offset.	VRV-3.2
VRV-6109	Weather areas only affect a small area within the larger area	Fixed to use the METOC approach to weather, removing the previous system for processing incoming local weather data.	VRV-3.2
VRV-6110	CDB Bathymetry working with Camp Pend. but not with Yemen CDB	If you experience issues with the bathymetry in your CDB database, try the following alternative. Add the <code>no_data_value</code> and set it to 0. This acts as a mask in both the elevation and bathymetry datasets. Also, try placing the bathymetry information first in the earth file because the resolution is typically lower than the elevation. For an example, please refer to "Configuring the Elevation Dataset (001)" in the Adding Content to MAK ONE Applications Reference Manual.	VRV-3.2
VRV-6113	SensorFX: Procedural texture splatting stops working after shader reload	Fixed an issue that prevented Procedural Texture Splatting from functioning in SensorFX after a shader reload.	VRV-3.2, VRV-3.1.1d
VRV-6119	Water in sensor modes are not visible at higher altitudes	Updated the MCOD driver to make use of OSM water data, which allows the application to classify bodies of water as the water material system. Bodies of water are now more visible at higher altitudes where the MCOD EMAT textures are the only EMAT textures used.	VRV-3.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6121	SensorFX: The material numbers in the documentation's Texture File Mapping table are incorrect	In the chapter Material Classification for SensorFX, the Material Classification Process Overview listed the material numbers as 1-6, but they are actually 0-5. The documentation has been corrected.	VRV-3.2
VRV-6125	Remove Entity State Object and Fire Interaction State Object and their related classes (dead code)	Removed state views and sim data from VR-Vantage. This code was previously used by VR-Forces, and it has been refactored to remove the need for this infrastructure. Refactored sensors' field of view to no longer use this infrastructure and instead use agents, which is more consistent with how MAK ONE products move information from the network thread to the main thread.	VRV-3.2
VRV-6127	Indirect rendering time budgets are not accurate when VSync or FPS limiting is enabled	Improved the application to wait on the GPU when doing time budgets for buffer updates. Also restored the proper FIFO order for items that need to stay in the queue. Added some additional GPU arena stats to the F2 ImGui stats to monitor behavior.	VRV-3.2, VRV-3.1.1d
VRV-6128	CDB models can randomly fail to load and be missing depending on hardware speed	Fixed the logic in DtGpuCulling::updateGpuBuffers that was previously returning false when it should have returned true to indicate more updates are required.	VRV-3.2, VRV-3.1.1d
VRV-6130	Switching between saved observer views with SensorFX enabled causes a memory leak	Fixed an issue where the texture buffer coordinates were not being recycled.	VRV-3.2, VRV-3.1.1d
VRV-6132	VRV Build System should be improved	Improved the way in which VR-Vantage is built and packaged.	VRV-3.2
VRV-6133	SensorFX: specifying land use textures does not work on osgEarth Terrains	The osgEarth image layers now use the correct shader.	VRV-3.2, VRV-3.1.1d
VRV-6154	SensorFX: Reduce latency caused by updating of inactive sensors	Optimized SensorFX processing when multiple sensors are configured. The system now performs work for only Sensors that actively in use.	VRV-3.2, VRV-3.1.1g
VRV-6155	CIGI HATHOT responses zero out when running single-threaded connection	Fixed an issue where users could see traffic between a CIGI host and VR-Vantage and the requests coming from VR-Vantage, but there was no valid response sent back to the host.	VRV-3.2, VRV-3.1.1d

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6173	exampleWindowObjectHud does not set the window size correctly	Fixed the setting of the window size in exampleWindowObjectHud. Updated the example documentation to clarify what it does and why.	VRV-3.2
VRV-6189	MetaFlight terrain UTM/South Hemisphere not working	Fixed how the application handles MetaFlight terrains to correctly display UTM coordinates based on the UTM zone origin, not the terrain database offset.	VRV-3.2, VRV-3.1.1e
VRV-6191	DtImageSymbolVisualizer can cause crash	Made code improvements to avoid the crash.	VRV-3.2, VRV-3.1.1e
VRV-6199	DtOsgEarthDynamicTerrainFeature uses hard-coded value for dynamic terrain LOD, making VR-Engage gunnery ineffective.	Added set/get for LOD, and use creator to allow applications (for example, VR-Engage) can override the settings.	VRV-3.2
VRV-6203	CDB Tool does not run successfully on Linux	Updated the tool to ensure that it runs on Linux machines.	VRV-3.2
VRV-6204	Wheels wobble severely in player-controlled ground vehicles	To improve visuals in VR-Engage, added code to detect manual and network updates to the orientation of articulated parts. When the application detects a manual or network update, the application disables internal auto-updates. When no manual or network updates have been applied for three seconds, the auto-updates resume.	VRV-3.2, VRV-3.1.1f
VRV-6206	Version header template file should not be shipped with VR-Vantage	The installer does not include the igVersion.h.in file. It's needed only for building.	VRV-3.2
VRV-6208	DtGarsCoordinateDisplay::convertToGeocentric Method is not implemented	Implemented the method to support the Last Clicked Location panel in VR-Forces.	VRV-3.2
VRV-6211	Apply shadows to ambient option should also apply to environment light	Updated the shaders to include environment light with the Apply Shadow to Ambient Lighting feature. Also made improvements to performance. The shader variable vrv_applyShadowToAmbientLighting is now in the range of 0.0 to 1.0 rather than -1.0 to 1.0.	VRV-3.2, VRV-3.1.1e
VRV-6219	Update / correct Add Feature Layer dialog box	Updated "Front-End" to "GUI" to follow new naming standard.	VRV-3.2
VRV-6227	Pausing MAK Data Logger with Enable Articulated Part Smoothing causes parts to continue moving linearly and rotationally	Fixed to ensure that art parts, such as wheels, remain in place when a Logger tape is paused.	VRV-3.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6229	CIGI Entities do not respect application-wide Smooth settings	CIGI entities now respect the application-wide settings for smoothing.	VRV-3.2
VRV-6235	Add Terrain Patch with FBX causes VRV to crash	Modified the "vrvAppDataDir" used specifically for CDB, to instead be vrvCDBAppDataDir. This avoids the naming conflict between CDB and the FBX loader code paths.	VRV-3.2, VRV-3.1.1f
VRV-6239	VRF's network dialog can stop working if you filter unchanged network settings in the common connection configuration file	Added optional argument saveAllParameters to DtDriver to allow for more control over the behavior of the createConfiguration function.	VRV-3.2
VRV-6244	Occupants should animate	DI-Guy characters that are occupants of a vehicle can now perform animations.	VRV-3.2
VRV-6253	CIGI Attached View Orientation can get out of sync with the Attached Entity Position	Added infrastructure to the CIGI implementation to allow properties coming from the same CIGI frame to be applied in the same render frame.	VRV-3.2, VRV-3.1.1f
VRV-6263	Ground DB2 destructible buildings start with wrong state in VRF Sim	Added code to sort the order of the state nodes under the damage_structure switch to account for terrains where they are not in the order expected by MAK ONE applications.	VRV-3.2
VRV-6269	Weather area ground fog does not fill entire area	Fixed to use the METOC approach to weather, removing the previous system for processing incoming local weather data.	VRV-3.2
VRV-6272	Crash in DtElementEditorLogic	Added a check to prevent the crash.	VRV-3.2, VRV-3.1.1g
VRV-6280	SensorFX - Once DI-Guy entities flickered unless the observer was extremely close to them	Fixed issue where DI-Guy characters becoming uninstanced would result in a one-frame pop.	VRV-3.2, VRV-3.1.1j
VRV-6282	Ground DB 2 runway lightpoints are not culling properly	Fixed in the code for indirect geometry bound box calculations.	VRV-3.2
VRV-6291	Non indirect entities can disappear with node visualization active	The application now marks the OSG shader state "dirty" after drawing lines/spheres from component system. Also improved/simplified some of the logic in DtSceneGraphTreeLogic class.	VRV-3.2
VRV-6296	RDEs crash when using CIGI View Control packets	The application now uses the observer object manager.	VRV-3.2, VRV-3.1.1h

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6298	Error dialog spew when using CIGI that attaches observer to an object	Improved the logic in the application's attach manager to be more robust in how it detaches observers from objects that no longer exist.	VRV-3.2, VRV-3.1.1i
VRV-6305	If a user sets an appDataDir path, it is set too late to be caught by the DtApplicationSettingsManager	Fixed to ensure that the data files are loaded correctly when using this command-line option.	VRV-3.2
VRV-6307	resolveDots method in the DtVrfFilesystem.cxx messes with a valid windows path to make it invalid	Fixed an issue that occurred using the --appDataDir command-line option, where some file paths were not processed correctly.	VRV-3.2
VRV-6310	Sensor Control CIGI Packets causes constant file writes to the sensor configuration file even when no sensor properties have changed	The application will not signal that a sensor property has changed if it did not actually change.	VRV-3.2, VRV-3.1.1i
VRV-6311	Remote graphics fill patterns broken	Fixed stippling for normalized screen space graphics (remote graphics, CIGI symbols, and so on). Updated the shaders to correctly calculate the UV coordinates, which are needed for normalized graphics.	VRV-3.2
VRV-6320	MAK Earth can sometimes load without grid labels	Updated the logic responsible for enforcing the use of grid types that are compatible with the application's current coordinate system.	VRV-3.2
VRV-6321	Animals sometimes don't show up unless selected	Fixed the setting for animal entity appearance when they are first placed. This was an issue for animal entities that have multiple appearances.	VRV-3.2
VRV-6325	CIGI reapplying sensor settings if a track mode is used	Added a separate signal for the view controller (a one-shot request) as opposed to the sensor controller (a request that can be processed every frame).	VRV-3.2, VRV-3.1.1j
VRV-6326	Entities can dead-reckon after stopping their movement.	Updated the listeners used to check for changes to simulation objects' velocities to ensure that the application promptly processes zero velocity values.	VRV-3.2
VRV-6332	VR-Vantage applications should print warning when UTF8 string is corrupt instead of throwing and (often) crashing application	Updated the code to change how the error is returned to prevent the crash.	VRV-3.2, VRV-3.1.1j

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6335	CameraFx environment overrides not working	Fixed to ensure that the Entity Itensity Minimum value applies to indirect entities.	VRV-3.2, VRV-3.1.1j
VRV-6345	SensorFX - SpeedTrees render incorrectly in some multi-channel configurations.	Fixed issue where SensorFX shaders were not applied for SpeedTrees, Dynamic Ocean, Sky, and Clouds in some multi-channel configurations.	VRV-3.2, VRV-3.1.1k
VRV-6347	CIGI view controls get stuck to one entity when switching between entities	Fixed to enable VR-Vantage to reattach the same observer to another entity in the simulation.	VRV-3.2, VRV-3.1.1j
VRV-6351	Frustum based view magnification calculated incorrectly with default frustum	Corrected the calculation.	VRV-3.2, VRV-3.1.1j
VRV-6354	SensorFX - If multiple channels are active, switching to a SFX mode in one channel may cause buildings to disappear in the other	Fixed issue where the SensorFX texture sampler state was incorrectly set up for the Stealth view, thereby causing some draw operations to fail when using multiple observers.	VRV-3.2, VRV-3.1.1j
VRV-6360	Linux reporting erroneous Active Image Threads count in Developer Debug Overlay stats	Corrected a calculation to ensure the correct information displays.	VRV-3.2
VRV-6367	A slow memory leak occurs when leaving the program running at the Ala Moana inset	Made fixes to the particle system.	VRV-3.2
VRV-6374	Portions of a Radio Communication Line can be easily clipped out of the scene	Enabled depth clamping on 3D segmented lines. This prevents radio communications lines from being clipped when portions of the line are closer to the eyepoint than the computed near plane.	VRV-3.2
VRV-6385	CIGI HOT Requests have location drift	For HOT requests in geodetic, ignore altitude and use 100000.0 instead as the start point for the intersector.	VRV-3.2, VRV-3.1.1j
VRV-6386	Large number of CIGI python scripts broken	Corrected the mappings in the scripts to ensure they set frame numbers correctly.	VRV-3.2, VRV-3.1.1k
VRV-6391	Edit Element Definition context menu is broken	When you right-click on models in the window and choose Model Configuration > Edit Model Definition, the associated element definitions now display correctly. It looks for the entity element definitions directly, not the associated model definitions.	VRV-3.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6396	Custom VR-Vantage apps crash on CIGI connection	Fixed by force registering the DtRenderSideCigiFrame agent creator.	VRV-3.2, VRV-3.1.1k
VRV-6398	Water On Screen post processor effect shaders do not reload when user clicks 'Reload Shaders' button in Render Settings	Updated DtWaterOnScreenDrawable and DtWaterOnScreenEffect to reload shaders.	VRV-3.2
VRV-6399	Local weather precipitation not working	Fixed to use the METOC approach to weather, removing the previous system for processing incoming local weather data.	VRV-3.2
VRV-6400	Entity Wheel Updater inefficiently searches for objects every update	The application now has a cache of wheeled articulated models after finding those objects. It also now inform the entity wheel updater when an object is destroyed so that it can clear its internal references and not reference the deleted object.	VRV-3.2
VRV-6402	Remove use of std::unary_function as it's deprecated in C++17	Removed the function.	VRV-3.2
VRV-6407	CIGI disconnecting and reconnecting breaks view control packets	Made fixes to code related to attachments.	VRV-3.2
VRV-6410	Test-HarrisAfghanVillageUTM has no visible terrain at its default "Afghan Village" view	GDAL now requires more information to define the projection. Modified the earth file to include the additional configuration.	VRV-3.2
VRV-6415	Loading the VirtualReality_prototype display engine configuration may crash if an additional window is already open	This crash could occur when VRV_GL_DEBUG was enabled. The application now ensures that OpenGL context is active before calling OpenGL commands specific to the debugger.	VRV-3.2
VRV-6440	VR-Vantage application fails to load some CDB buildings from certain terrains	Added a warning when CDB medf loads fail. This can occur if there is an error when caching the CDB terrain prior to loading.	VRV-3.2
VRV-6445	exampleSendDrawControl and exampleSendControl should have a local version of the DIS startup script	Added Linux startup scripts for running exampleSendControl and exampleSendDrawControl using the default DIS localhost configuration.	VRV-3.2
VRV-6447	Editing particle systems crashes VR-Forces	Fixed an issue that caused a problem when users renamed particle systems.	VRV-3.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6450	Precipitation intensity is not interpreted correctly from the network	Adjusted the conversion from VR-Link to VR-Vantage applications for precipitation intensity values. The code now maps incoming 0 to 200 (in mm/hr) correctly to match needed values for VR-Vantage applications.	VRV-3.2
VRV-6463	Terrain Cache tool could use further improvement	- The title bar in the dialog box is now Generate Cache, matching the button text in the Terrain Editor Panel. - The tool now respects the values for Lowest and Highest LOD level. - Users can only generate a cache for an area, not the entire world. - The dialog box remains open while the tool generates the cache, displaying a progress bar. The user can cancel the caching process. - The progress bar provides a more accurate estimate of the percentage complete. - Cache coordinates map to axis aligned geodetic coordinates, and the tool respects any repositioning of the observer. - The tool's performance has been improved, allowing the cache to complete more quickly. - The area specified for caching remains visible while the cache is generated, allowing the user to see what is still being processed.	VRV-3.2, VRV-3.1.11
VRV-6467	In installations, Visual Studio projects for examples use specific Windows SDK	Updated the specific Windows Target Platform string in exported example project files to use the latest Windows SDK.	VRV-3.2
VRV-6469	VRV needs to decode unsupported cloud types on the network	Current METOC cloud types are now properly decoded along with the custom types MAK implemented for ground fog and sandstorm (DtCloudTypeEnum32_GroundFog = 1014, DtCloudTypeEnum32_SandStorm = 1015). Blowing sand, dust, and snow have moved to particulate matter types decoded with DtLandSurfaceStateInterceptor::decodeVrlBlowingParticulateMatterType using DtBlowingParticulateMatterEnum16.	VRV-3.2
VRV-6490	Circle weather area has incorrect label	The label appearance is now consistent with that of the other weather areas.	VRV-3.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6500	Procedural runway disappears when observer is close to it	Fixed a bug in the bounding sphere calculation when seeding aerodromes.	VRV-3.2
VRV-6506	Default decimal space for small distances should be 1, not 0	The Distance (Small) now defaults to 1 decimal place. You can change this as needed in the Display Units Settings.	VRV-3.2
VRV-6509	Clouds can render inconsistently between channels	Fixed in third-party product, SilverLining. The fix applies to local weather areas, allowing them to sync regardless of channels. This fix applies only to non-infinite layers.	VRV-3.2
VRV-6514	The 'Scale' model definition property (for 'Entity' model definitions) does not work for indirect entities	Improved support for model definition-based model scaling. This previously worked for non-indirect entities and now also works for indirect entities.	VRV-3.2
VRV-6517	Flicker (maybe Z-buffer issue) when driving ground vehicles fast (above 70/75 km/h).	Fixed the calculations regarding the earth-up vector to remove the timing issues that caused delays between the computed ground height and current observer locations.	VRV-3.2
VRV-6536	SensorFX - Hot spots not correct at startup	Fixed hot spot starting states in SensorFX.	VRV-3.2, VRV-3.1.1n
VRV-6540	lightning class requires toolkit access to modify lighting bolt lifetime	Removed static values from the class and added an overridable method for min/max lightning bolt alive time range for use with the toolkit API. Also made a small change to the shader and alive times for visual effect (the hits were mostly too short).	VRV-3.2
VRV-6557	Model Definition path doesn't use SHARE_DATA_DIR when navigating from drive	Fixed to ensure that relative paths are used if the user navigates to a data directory outside of the ./SharedData/###/latest directory.	VRV-3.2
VRV-6558	Opening a terrain while connected to an RDE does not add it to the Open Recent Terrain list	Fixed to ensure that the application algorithm does not get into a bad state and a terrain that you select while connected to the Remote Display Engine will be included in the list of recently selected terrains.	VRV-3.2
VRV-6564	Issue in introductory paragraph for makVrv::DtCloudTypeMapper Class Reference	Corrected the paragraph to be a bullet list instead of a sentence with bullet icons in it.	VRV-3.2
VRV-6566	Apron Flood lights are very bright on initial creation of Aerodrome	The scale for light intensity is 0-1, not 0-100. Fixed in the code and noted in the API documentation.	VRV-3.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6572	Heightmap not capturing height when terrain is at higher altitudes	Changed the clip range for heightmap capture. This affects culling, not height precision. This change ensures surface weather effects display correctly.	VRV-3.2
VRV-6581	Model Preloader does not work with indirect	Updated the Model Preload Configuration feature to support indirect.	VRV-3.2
VRV-6582	Ocean state in VR-Forces fights with local ocean state	Fixed by adding the missing logic used weather area IDs from environment layers for controlling items related to the ocean.	VRV-3.2
VRV-6584	Shifting the viewport causes the user to be unable to interact with some or all of the F2 and F4 debug menus	Added code to ensure advanced users can interact with the Framerate Statistics (F2) and Developer Debug (F4) overlays.	VRV-3.2
VRV-6586	SensorFX does not render correctly when it is not the last post processor in the pipeline	Fixed the black screen and OpenGL error that could occur in SensorFX when any other post processor was loaded after SensorFX.	VRV-3.2, VRV-3.1.11
VRV-6587	OpenGL errors occur with CameraFX when it is not the last post processor in the pipeline	Fixed OpenGL error that could occur in CameraFX when any other post processor was loaded after CameraFX.	VRV-3.2, VRV-3.1.11
VRV-6596	Tracers don't display in SensorFX MWIR, LWIR or NVG	Made improvements to better support tracers in SensorFX. Updated the WeaponEffectsRifleTracers model definition to use the WeaponEffectsRifleTracersPS particle system.	VRV-3.2
VRV-6597	Move down the signal_preTick/signal_postTick from the individual connection classes to DtBaseConnection	This change ensures that protocol-dependent plug-ins load for applications such as VR-Engage.	VRV-3.2
VRV-6603	Tracked vehicles with broken pivot animations	Fixed the calculation for track width and made sure that the track speed considers the distance traveled by the tank. There is also now support for model artists to use comments to customize the distance travelled by a single flipbook animation instead of the default.	VRV-3.2
VRV-6618	Some materials listed in the 'Material (SensorFX)' dropdown in Particle System Editor are not all mapped to SensorFX PIP files	The application now outputs a warning to the console if a particle system material does not have a mapping. The console output includes the model definition name so that you know which model definition you need to update.	VRV-3.2
VRV-6623	Canceling a tile load with a bridge layer in it before it fully loaded could cause a crash.	Modified the indirect cull shader.	VRV-3.2

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix versions
VRV-6637	VR-Vantage calculates the center point of destroyed buildings using the destroyed node geometry not healthy	Refactored the code to ensure that destroying buildings, particularly one corner, works correctly.	VRV-3.2
VRV-6651	CIGI HAT/HOT Extended response can return nan elevation	The application now ensures that the normal vector in use is normalized.	VRV-3.2, VRV-3.1.1n
VRV-6656	Crash in indirect renderer/Driver	Fixed by modifying the indirect cull shader.	VRV-3.2
VRV-6662	Models or geometry that have not completely loaded yet can sometimes cause a crash	Fixed by modifying the indirect cull shader.	VRV-3.2
VRV-6668	SensorFX: Engine swaps to hot as engine is cooling when incrementing clock	Fixed issue where active region temperatures would be incorrect after being activated and then the time was changed.	VRV-3.2, VRV-3.1.1o
VRV-6671	Adding Ala Moana.earth file as a patch does not display as expected	The way we build the local Ala Moana terrain has changed. Updated the instructions in the VR-Vantage First Experience Guide.	VRV-3.2

Feature List

Table 2. Feature List

Key	Summary	Release Notes	Fix versions
VRF-579	Improve the multi-hit damage actuator	Surface watercraft can now have the Surface Multiple Hit Damage system. Instead of a catastrophic kill, this system measures how much damage the entity has sustained. Its damage state is published to the network.	VRF-5.2
VRF-4184	Display a GUI indication of sim engine terrain paging status/time	The new MAK Remote Debugger includes information about the terrain.	VRF-5.2
VRF-4404	DtContactFusionController is cloning contacts much more than necessary and is slow	Optimized DtContactFusionController and added a map to DtSensorContactInfoList for fast lookups by UUID.	VRF-5.2
VRF-4420	Refactor vrfSim terrain change notifications to fix various bugs.	Made improvements to how ground vehicle and human entities interact with the terrain after there is a dynamic terrain change, such as when a building or bridge is destroyed.	VRF-5.2
VRF-4660	Refactor VRF Sim Resource System	Resources now have consistently sensible names. Each system definition no longer has its own resource manager. There is now have a centralized list of resources.	VRF-5.2
VRF-5628	Update documentation to describe VRF terrain soiltypes	The user documentation has more details about configuring the soiltypes for VR-Forces. See the help or the Adding Content to MAK ONE Applications Reference Manual.	VRF-5.2
VRF-5702	Make various aircraft movement tasks available on the task menu	You can now task aircraft to perform the Fly Cloverleaf Pattern, Fly Figure 8 Pattern, and Sector Search tasks.	VRF-5.2
VRF-5768	Improve error reporting when importing MSDL without locations as a laydown	There is now a message in the GUI if you attempt to import a Military Scenario Definition Language (MSDL) file that does not include valid locations for the simulation objects.	VRF-5.2
VRF-5804	Allow autotest system to support testing with multiple sim engines	Updated MAK Technologies' internal scenario autotest system to account for scenarios that use more than one sim engine.	VRF-5.2
VRF-5863	Improve Anti-Tank Guided Missile (ATGM) Model (javelin and others)	Entities equipped with a Javelin can now use the Fire Javelin at Target to attack tanks and other targets. You can choose either Top Attack or Direct Attack, with the former being the default.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-6151	Ceiling Extended Data for Extruded Circle tactical graphics is not exposed in Lua	Added a new Lua create keyword, ceiling, to allow for the definition of a ceiling for extruded objects.	VRF-5.2
VRF-6324	Add ability for rotary wing Move Along controller to consider altitude before moving to next vertex	The Move Along Route with Actions task doesn't require the RW to reach route altitude if it has an ordered altitude. That value overrides route altitudes.	VRF-5.2
VRF-6362	Add tactical smoke effects to IR sensing	IR sensors can no longer see through tactical smoke.	VRF-5.2
VRF-6732	SIM: add subordinate functions CSV for AggregateLevel	Added the subordinateFunctions.csv file for the aggregate-level, which is useful when you want to write behavior scripts.	VRF-5.2
VRF-6835	Create realistic default detonations for munitions	When missiles hit water, there is now a water detonation.	VRF-5.2
VRF-7031	Consolidate into one task those that had separate tasks for locations, waypoints, or simulation objects	Many tasks that specify either a location, waypoint, or other target have been combined into single tasks. Refer to the help or the VR-Forces Users Guide for details on any of these tasks. To learn how these changes affect the code, refer to the "VR-Forces 5.2 API Migration Guide" topic in the VR-Forces Developers Guide. Note that the old tasks, while not in the UI, have been preserved for backward compatibility in scenarios created before this release. - Move To tasks that allow you to specify a location, waypoint, or point tactical graphic. The new Move To tasks are: Move To (entity- and aggregate-level), Move To (Plan Along Roads) and Move To (Plan Path) (entity-level only), and Move To Retrograde (aggregate-level only). - At the entity-level, the Crowd Around task combines the Crowd Around Location and Crowd Around Object tasks. - The Pattern Hold task combines the Pattern Hold (Location) and Pattern Hold (Waypoint) tasks, where the only difference was specifying the position for the aircraft pattern. - Fire for Effect combines Fire for Effect on Entity, Fire for Effect on Location, and Fire for Effect on Target. - Lase Target combines the Lase Location and previous Lase Target tasks, allowing you to specify a location, entity, or point. - Provide Suppressive Fire combines the Provide Suppressive Fire at Location and Provide Suppressive Fire at Object tasks. - Release Bomb combines the Release Bomb on Location and Release Bomb on Target tasks.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-7074	Have one landCoverDataSurfChar.map by terrain	You can now define a terrain-specific land cover mapping that overrides the global one, for example, myTerrain.landCoverDataSurfChar.map. Refer to the "Composing a Terrain from Source Data" chapter in the help or Adding Content to MAK ONE Applications Reference Manual for details.	VRF-5.2
VRF-7147	SOE should allow users to toggle new vehicle lights	You can now change light groups in the SOE to be on or off for those models that support it. Note that light groups display in the list regardless of whether or not the model can turn them on or off. Use the switch nodes to preview available lights on the model.	VRF-5.2
VRF-7152	If a terrain cannot be found on scenario load, open a dialog allowing user to pick terrain	If the selected scenario uses a terrain that is not available, you are given the option to select another terrain. The message informs you that a different terrain may affect the simulation.	VRF-5.2
VRF-7181	Improve the Launcher	VR-Forces now uses a single menu option to start the Launcher. You can choose which applications start, whether it's the GUI, the simulation engine, or both. For details on using the new launcher, refer to the user documentation.	VRF-5.2
VRF-7249	Add fuel resources to the Entity Control and Last Selected Object Panels	An entity's current fuel resources, if any, now display on the Last Selected Object and Entity Control panels. The definition of the resource to display is controlled using the default_guiConfiguration.gui file, specifically keywords. The keywords are separate by semicolons (;) and options on the keywords by a plus sign (+).	VRF-5.2
VRF-7257	Add special selection combo that selects the parent unit of an entity.	If you right-click an entity and then choose Select Superior, and that object has a superior, the application selects that entity's superior in the Objects List.	VRF-5.2
VRF-7261	Lua API: articulated part classes need isValid functions	Added a function called isArticulatedPartValid to vrfutil. It takes a string of the part name and returns true or false	VRF-5.2
VRF-7295	Add configuration to featureconfig.txt for road following along OSM road data	Added a section to the ./appData/settings/featureconfig.txt file for OSM roads. It now uses only 1 or 2 lanes to match the visual rendering of roads in the GUI.	VRF-5.2
VRF-7622	Allow AGL option in Move to Altitude Task	You can now specify altitude using AGL as well as MSL.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-7686	GUI: no way to tell object type of unit in OOB panel	When you mouse over a simulation object in the Order of Battle Panel, you now see the object's type (for example, M1A2 SEP Abrams or Field Artillery Battery (USA) M777).	VRF-5.2
VRF-7705	Add Mark 82 Dumb Bomb to SMS	The EntityLevel.sms now includes the MK-82 bomb munition.	VRF-5.2
VRF-7706	Add Mark 84 Dumb Bomb to SMS	The EntityLevel.sms now includes the MK-84 GAMS bomb munition.	VRF-5.2
VRF-7707	Create a dumb bomb movement system	VR-Forces can now simulate unguided (dumb) bombs. Some entities are configured with the US Heavy Bomber Bomb Bay system, which allows them to deploy MK-82 and MK-84 bombs using the Release Unguided Bomb task.	VRF-5.2
VRF-7777	Multipoint phase lines	You can now draw the Phase Line tactical graphic using more than two points.	VRF-5.2
VRF-7992	Replace QualNet doc with an ICD for the External Comms	There is a new chapter in the Interoperability Guide, "VR-Forces External Communication Server Interface", which details the message formats that VR-Forces uses to interface to an external communication effects server. This replaces the QualNet_HLA_interface_RPR-FOM 1.0_extensions_ICD3.pdf document.	VRF-5.2
VRF-8070	Remove usage of std::auto_ptr	auto_ptr is not supported in newer versions of C++, and so it was replaced with unique_ptr. The latter differs from the former, so other code changes were made to account for that.	VRF-5.2
VRF-8071	Upgrade to Boost 1.84.0	Upgraded the Boost version for compatibility with C++20.	VRF-5.2
VRF-8072	Use std C++ pointers instead of Boost	This change is part of supporting C++20.	VRF-5.2
VRF-8074	State Data page in Info dialog should be sortable by name	In the simulation object Information dialog box, you can now sort the State Data page by name. Simply click the column heading to toggle the sort by ascending, descending, or default order.	VRF-5.2
VRF-8078	Remove DtObjectType	The removal of the DtObjectType basically means is that anything that was saved to a scenario -- .entity, .sysdef or any file with the "super type" entry -- will be read in, but the super type will be discarded. Whenever any of those files are saved out, they will be saved without the super type. Any previous version of VR-Force will no longer be able to read those files correctly. (They will either fail or the super type will be read as the entity kind.) If you change any files that have an entity type in them, they can no longer be merged to any previous version of VR-Forces.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-8081	More compact format for ADS-B data	Converted ADS-B data to use a more compact format, which saves a lot of memory.	VRF-5.2
VRF-8173	Display error in GUI when necessary plug-in is not loaded	When you load a scenario that requires specific plug-ins which you have not loaded, there is now an error message that displays in the VR-Forces GUI to inform you that they are missing.	VRF-5.2
VRF-8177	Create upgrade class to update object data from older to newer scenarios	When you load scenarios created in previous versions of VR-Forces, object data updates automatically. For more information, refer to the VR-Forces User Migration Guide and the VR-Forces 5.2 API Migration Guide page of the VR-Forces Developers Guide.	VRF-5.2
VRF-8212	Update GUI for Last Clicked Location to use labels and not text boxes.	The Last Clicked Location Panel now shows the information as simple text.	VRF-5.2
VRF-8214	Aggregate Level: Russian Mechanized Battalion Tactical Group	Added Battalion Tactical Group (BLR, Mech) to the Aggregate Tactical Level SMS.	VRF-5.2
VRF-8218	Aggregate Level: Russian Tank Battalion Tactical Group	Added Battalion Tactical Group (BLR, Tank) to the Aggregate Tactical Level SMS.	VRF-5.1.1
VRF-8222	Add Fire task to Fire on Entity Until Destroyed	The Fire At task allows you to specify whether the entity should stop firing when its target is destroyed.	VRF-5.2
VRF-8227	Add callbacks for scenario close that work for rollback and quit	For callbacks that users can register for close-scenario events, there is now a step that invokes pre- and post-scenario close callbacks during a rollback or application quit.	VRF-5.2
VRF-8233	GUI: it's too easy to hit "delete" scenario event by mistake	When you choose to delete a scenario event in the Scenario Event Manager, there is now a confirmation message to allow you to cancel the deletion if it was unintentional.	VRF-5.2
VRF-8237	Add Lua binding so missiles can know what their current target is	Added a Lua binding for missiles to allow Lua scripts to query the missile's current target.	VRF-5.2
VRF-8241	Add range attribute for aggregate indirect fire controller that can be accessed by Lua	Added the attribute to DtAggregateIndirectFireController so that it can provide its range to Lua scripts.	VRF-5.2
VRF-8242	Reinitialize specific entities	You can now reinitialize an individual simulation object, which resets the object. It clears any process state information.	VRF-5.2
VRF-8277	Aggregate Level: Russian motorized and airmobile battalions	Added assemblies and units to enable creation of motorized and airmobile Russian units.	VRF-5.1.1

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-8298	Bounding volume surface strings should be defined in a header	Added more information to the header files, better documenting these strings.	VRF-5.2
VRF-8303	Add image preview to Prop Palette	The Props Palette can now display a preview image of objects where an image exists for that prop.	VRF-5.2
VRF-8313	Aggregate Level: Anti-tank Battalion (RU)	Added Russian anti-tank battalion to the Aggregate Tactical Level SMS.	VRF-5.1.1
VRF-8318	Aggregate Level: Russian Mech Infantry Brigade supporting units, assorted	Added Engineer Company (RU, Mech), Signal CO (RU), Transport CO (RU), Medical CO (RU), and Support BN (RU) to Aggregate Tactical Level SMS.	VRF-5.1.1
VRF-8325	Missiles should have debug lines that show what they are tracking when you click on it.	Added task visualization to the warhead actuator to display a line from the missile to its target. The line's default color is red-orange to differentiate it from other lines. For more complex munitions such as loiter munitions, the visualization displays as green while the munition is moving into position, then changes to orange when it moves to impact the target.	VRF-5.2
VRF-8337	Aggregate Level: Poland Units	Added a number of units for Poland to the Aggregate Tactical Level SMS.	VRF-5.1.1
VRF-8338	Aggregate Level: Lithuania Units	Added a number of units for Lithuania to the Aggregate Tactical Level SMS.	VRF-5.1.1
VRF-8340	Aggregate Level: Enhanced Forward Presence Units	Added a number of enhanced forward presence units for Poland and Lithuania to the Aggregate Tactical Level SMS.	VRF-5.1.1
VRF-8347	Add option when loading CDB data to convert altitudes from Ellipsoid reference to Geoid reference	The application can now process CDB geodetic (ellipsoidal, or HAE) elevation data and interpret those values as inverted MSL values. For details, see "Referencing an Earth Gravitational Model (EGM)" in the the help or the Adding Content to MAK ONE Applications Reference Manual.	VRF-5.2
VRF-8368	Add terrain intersection options to allow excluding the trees and buildings	There are category mask parameters in platform files where you can specify TerrainSkin, Structure, and Vegetation. Terrain categories not included in the mask can be ignored by entities using that platform file. For details, refer to the VR-Forces Developer's Guide.	VRF-5.2
VRF-8369	Using terrain index on vegetation tiles to reduce polygons count for high flyers	You can make a change to the biome.vegetation.config.xml file to improve performance when you do not need close-up details of procedural trees. For details, see "Using the Terrain Index to Reduce Polygon Counts" in the help or the Adding Content to MAK ONE Applications Reference Manual.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-8401	Add support for GPS jamming and related error in perceived location	The new set data request GPS Jamming enables entities with the GPS Jammer system to jam the GPS receiver on air entities equipped with that system. This causes those entities to perceive that their current location is different from that of their ground truth and, as a result, go off course. The power of the GPS jammer and the distance between the two entities determine how far the air entity's perceived location is offset from its true location.	VRF-5.2
VRF-8406	Add command line options to new Launcher	Added --gui and --sim command line arguments to run applications that have vrfGui or vrfSim in them. If there is no autoconnect, it uses the last selected connection before app exit as default for running. If both arguments are given, they are run in separate, not combined, mode.	VRF-5.2
VRF-8425	Add an option to allow LOS to ignore specific entity types	Added a parameter to physicalWorldParams.mtl called entity-types-ignored-for-los. You can use this to specify types of entities that should not be checked when making calls to check line of sight. You might use this to improve performance. Refer to the physicalWorldParams.mtl file for details.	VRF-5.2
VRF-8426	Refactor terrain intersection calls to remove features query option	Terrain intersection API calls no longer accept a feature query parameter. This functionality was obsolete and has not provided useful results for many versions.	VRF-5.2
VRF-8434	New version of Lua function getAllHostileContacts that limits return list size	For optimization, added a version of getAllHostileContacts that can limit the return list size.	VRF-5.2
VRF-8467	Move joystick controllers to an example	Moved the ballistic gun, fixed-wing, rotary-wing, and human joystick controllers to exampleJoystick. The default is now that those controls are not in the VR-Forces Application Settings. Only basic ground vehicle movement is supported out of the box.	VRF-5.2
VRF-8491	Allow missiles object type in DtLaunchExpendableResourceController to be changed through ammo select table	Counter Measures can now be launched against any missile type.	VRF-5.2
VRF-8533	Copy the state properties when copying and pasting an entity	When you copy and paste an entity, the copied entity includes the original's state property values. This means that, when you set state properties for an entity and then copy and paste it, the duplicated entity has those same properties.	VRF-5.2
VRF-8556	Rewrite remoteControl Text Interface class to use current C++ concepts	Updated the class to ensure that it can support C++20.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-8630	Combine Crowd Around Location and Crowd Around Object tasks similar to Move To tasks	These tasks have been combined into a single Crowd Around task, which allows the user to specify either a location, a simulation object, or a point tactical graphic, as the place where the crowd should gather.	VRF-5.2
VRF-8635	Move DtEnumDictionary and related classes to VRL	The DtEnumDictionary, DtEnumLoader, and DtEntityTypeRange classes have been moved from the vrfutil library to the VR-Link vl library.	VRF-5.2
VRF-8744	SOE: enable "additional systems" screens for echelon groups	For aggregate-level SMSs, there is now a tab that allows you to add additional systems to pseudo-aggregates.	VRF-5.2
VRF-8754	Add disembarkation technique to float along egress route	This can be used to animate an entity performing embarkation or disembarkation without worrying about the geometry of the entity. For instance, if normally a wall or door might block the egress point, this allows the entity to ignore that.	VRF-5.2
VRF-8761	Add Lua functions to get IFF data	There are two new functions, getIffSystem() and getIffModeData(mode), on the SimObject in Lua. They return a table of settings for the IFF system of the given entity and a table of parameters for given IFF mode, respectively. Refer to the Lua API Documentation for usage information.	VRF-5.2
VRF-8778	databaseClients config file should be updated for version automatically	The vrfSql.ini now updates the database name automatically. It uses the version number, which was previously hardcoded.	VRF-5.2
VRF-8784	GUI: alphabetize aggregate as dialog pick list	The list of unit options in the Aggregate As dialog box is now sorted alphabetically.	VRF-5.2
VRF-8788	Need better mechanism to identify which vegetation affects VRFSIM	The simTreesTool has been updated. The default behavior is now to process only files with sim models. You can use command-line options to process non-sim models. Refer to the help or the Adding Content to MAK ONE Applications Reference Manual for details.	VRF-5.2
VRF-8801	Add minimum and maximum range to Lua script WeaponInfo	The WeaponInfo class in Lua now has the getMaximumRange and getMinimumRange functions. See the VR-Forces Lua Documentation for details.	VRF-5.2
VRF-8815	Move Bakersfield aggregate-level scenarios to new MAK Earth Aggregate (Online)	These example scenarios included with VR-Forces now use the MAK Earth Aggregate (Online) terrain: CST Demo Scenario.scnx, AggregateLevelBakersfieldDefense.scnx, AggregateLevelSimulationOverview.scnx, and AggregateLevelAirOverview.scnx	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-8818	Add set request to disable collision avoidance	The new set data request Collision Avoidance Enabled allows you to control whether an entity's ground collision avoidance controller is enabled. You might want to disable this behavior when you need more direct control over the entity during movement planning tasks.	VRF-5.2
VRF-8837	Improve reporting of measurements for resources	FOMs now explicitly describe the units that are published. The information is reflected in the GUI. The values for aircraft are now more realistic than in previous releases.	VRF-5.2
VRF-8839	Improve Lua function isInsidePolygon to correctly handle entities on the far side of the earth	Improved the code to perform more accurate checks.	VRF-5.2
VRF-8840	Remove HawaiiGround scenario	There are numerous scenarios included with VR-Forces that better demonstrate ground entity behaviors. Removed this scenario from the installation package.	VRF-5.2
VRF-8846	Add ability for tactical graphics to create dynamic features	The Road and Obstacle terrain objects are now available at the entity level, not only the aggregate level. They add feature data that entities in a scenario can interact with as if they were part of the terrain.	VRF-5.2
VRF-8847	Add limited support for NETN ETR module	For information, see "NETN ETR Tasks" in the VR-Forces Developers Guide and "NETN FOM Support" in the MAK ONE Interoperability Guide.	VRF-5.2
VRF-8854	SOE: aggregate-level resupply rates display and input	The resupply properties in the SOE for aggregate-level SMSs previously displayed as units per second and were limited in the number of decimal places. They now display as units per day. This simplifies logistics planning for the aggregates.	VRF-5.2
VRF-8855	Add database logging for AggregateLevel	SQL database logging now supports aggregate-level simulations. The data includes: engagement result info (high-level engagement results, casualties, equipment damage, specific attacks, and specific defenses) and resources.	VRF-5.2
VRF-8856	Make it easier to log database events using Lua	There is a new configuration option for additional-event-types in ./appData/settings/databaseConfig.mtl. Use this to define new event types that can be logged to a database. The databaseConfig.mtl file explains how to use the SQL database logging feature for VR-Forces.	VRF-5.2
VRF-8878	Publish data for Air Turbulence Area in METOC	Air turbulence area data are now published as part of METOC.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-8882	Improve API doc on the separation of the sim and network threads	The new section "Simulation and Network Separation" on the VR-Forces Simulation Engine Architecture page of the VR-Forces Developers Guide provides an overview on the topic and links to more information.	VRF-5.2
VRF-8897	Upgrade TBB	Upgraded TBB version to OneTBB 2021.12 for C++20 compatibility.	VRF-5.2
VRF-8905	Quick entity tasking	You can now quickly task an entity to move to location or fire on a target using keyboard shortcuts and the mouse. You select the entity, press the shortcut combination, and then click on the location or simulation object. The default shortcuts are Ctrl+M to move and Ctrl+F to fire. See the "Assigning Tasks" chapter of the help or the VR-Forces Users Guide to learn more.	VRF-5.2
VRF-8933	Fix visibility access in DtRemoteEnvironmentController and Change Weather Command.	Implemented visibilityAndObscurant accessor functions to set/get both the visibility and the obscurant of the wind levels. The previous visibility set/get functions have been removed. Related functions implemented in the DtChangeWeatherCommand class.	VRF-5.2
VRF-8935	Allow configuration of fuel efficiency in SOE and move fuel efficiency parameters to movement actuators	Movement actuators now have a fuel efficiency parameter. The sysdef files for ground vehicles, rotary-wing aircraft, and surface watercraft include a parameter for fuel efficiency. The actuators perform calculations based on this parameter. Fixed-wing aircraft's fuel efficiency has been updated to be consistent with the other platforms.	VRF-5.2
VRF-8936	Configure VRF entities to have reasonable fuel amounts	Entities that use fuel resources have been configured with more realistic starting amounts, measured either in weight or volume units.	VRF-5.2
VRF-8938	Upgrade SQLite to newest version	Updated to SQLite 3.47.2.	VRF-5.2
VRF-8940	Exit sim engine gracefully with an error when required FOM modules are not loaded for entity creation	There is now a file, ./appData/settings/vrfSim/requiredFomClasses.mtl, which lists required object and interaction classes that must be found in the loaded FOM modules. The VR-Forces sim engine now reads this file after joining the federation. If the required classes are not present in the FOM, it exits with an error.	VRF-5.2
VRF-8944	Add functionality for chat messages	There is a new text chat feature. It was developed for use with VR-Engage, but it also works between two or more GUI windows. See the "GUI Controls, Layouts, and Behaviors" chapter in the help or the VR-Forces User Guide to learn how to use this feature.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-8947	Add the ability for injured humans to move	There is now a human.sysdef parameter "enable-movement-if-injured" to enable the human entities to move when injured. The new parameter is added to the human-movement-actuator and is disabled by default. Updated DtHumanMovementActuator to allow injured humans to move when the parameter is enabled.	VRF-5.2
VRF-8951	Add right click Copy Value to information dialog page	You can now open copy the text of an item in the Value column in a page of the Information dialog box by right-clicking on it and then choosing Copy Value.	VRF-5.2
VRF-8973	Prevent lua scripts from being able to make system calls.	In Lua scripts, functions in the "os" subsystem are not longer available to scripts.	VRF-5.2
VRF-9014	Option to show 3D models even when ground truth is hidden by Spot Report settings	In the Spot Report Settings, you can now choose whether to show entities in the 3D (stealth) observer view when their ground truth would otherwise be hidden. This adds more realism during fog-of-war scenarios, where a person might be able to see something when it hasn't been detected by an entity.	VRF-5.2, VRF-5.1.1-c
VRF-9016	Include simTreesTool in install	The VR-Forces installer now includes the simTreesTool.exe utility. To learn more about this tool and how to use it to get the bounding box dimensions for geometry within an OpenFlight or FBX model, please refer to the help or the Adding Content to MAK ONE Applications Reference Manual.	VRF-5.2
VRF-9037	Add option for sim engine to block on asynchronous operations	This applies only to scenarios that are set to run in a fixed frame clock mode (Fixed-Frame Best-Effort or Fixed-Frame Run-To-Complete). It allows you to run those faster-than-real-time scenarios with reliable results, for example, to run it for analysis or to train AI systems.	VRF-5.2
VRF-9050	Add new Terrain Page-In Area objects that don't page in vegetation	There are now variations on the areas for forcing terrain to page in that do not load the vegetation: Terrain Page-In Area (no vegetation) and Blocking Terrain Page-In Area (no vegetation). This is useful when you have a scenario that does not need terrain, such as a flying simulation. For details, see the help or the Adding Content to MAK ONE Applications Reference Manual.	VRF-5.2
VRF-9051	Add spot report receivers input to the Deploy Sonobuoy and Deploy Sonobuoy Along Route tasks	The Deploy Sonobuoy and Deploy Sonobuoys Along Route tasks now allow you to specify which entities should receive spot reports. This allows specific entities other than the one deploying the sonobuoys to receive spot reports generated by the sonobuoys without requiring the Spot Reports set data request for the deploying entity.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-9054	Improve Launcher HLA and FOM configuration	When using an HLA protocol, you now specify a configuration file (MAK-ONE-YYYY-Config.xml) to specify the FOMs to use in the session. When running from the command-line, this is far simpler than specifying each FOM you want to use. For more information, refer to the MAK ONE Interoperability Guide, VR-Forces help, or VR-Forces User Guide.	VRF-5.2
VRF-9081	Provide road category weights for path planning from Lua	Made the road weights in the descriptor for the DtRailPathController available in a member function of that controller. The Lua API call computePathThroughFeatures calls code that gets that component and the weights associated with it to pass to the job that computes the path.	VRF-5.2
VRF-9084	Ownership transfer between VRF sims	In HLA scenarios, VR-Forces sim engines can now transfer entities from one sim engine and move them to another sim engine in the same exercise. Use the Sim Engine Load Distribution dialog box.	VRF-5.2
VRF-9094	HawaiiNaval scenario improvements	There are new vignettes in the HawaiiNaval scenario: air attack and collision avoidance. The vignettes now begin when you start a quick launch event, allowing you to view the vignettes on demand.	VRF-5.2
VRF-9095	Regenerate navigation data	Regenerated the navigation data for terrains included in the MAK ONE data package. Terrains that were still using the old, inefficient areas that had multiple platforms have been separated into overlapping ground and lifeform areas to improve entity movement.	VRF-5.2
VRF-9096	Add navigation data in Switzerland	Added navigation areas for ground platforms and lifeforms in Thun, Switzerland location on MAK Earth (online).	VRF-5.2
VRF-9105	Add configuration option to exclude specific clutter ships	You can now exclude clutter ships by their ISO or MMSI code by editing the ship-clutter-area.sysdef file. For details, see the "Wakes, Cockpits, 2D Icons, and Other Models" chapter of the help or Adding Content to MAK ONE Applications Reference Manual.	VRF-5.2
VRF-9128	Configure damage settings for ships	In conjunction with VRF-579, surface watercraft configured with the Surface Multiple Hit Damage system have default settings to realistically represent multi-hit damage. The values are based on the size and durability of ships in a particular class (corvette, frigate, destroyer, and so on).	VRF-5.2
VRF-9132	Add Callsign to state data page	The Callsign NETN attribute is now included on the State Data page of the Information dialog box.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-9138	VRF GUI does not easily allow you to select an SMS outside of data\simulationModelSets folder	In the Scenario Startup dialog box, there is now a browse button for the Simulation Model Set, allowing you to select an SMS saved in a directory other than the default (./data/simulationModelSets).	VRF-5.2
VRF-9144	Global Plan window alpha order	The Global Plan dialog box is now sorted alphanumerically.	VRF-5.2
VRF-9182	Add HLA 4 support to the VRF Launcher	HLA 4 is supported out of the box. It is a connection option in the VR-Forces Launcher.	VRF-5.2
VRF-9183	Add HLA 4 support to the VRF GUI and Sim	The VR-Forces GUI and VR-Forces sim engine support the HLA 4 protocol.	VRF-5.2
VRF-9188	Make Markings an HLA attribute in VrfExtendedAttributes	Update the FOM to make Markings a true HLA attribute in VrfExtendedAttributes, rather than a simple state property. It is no longer sent when any state property updates, only when it is changed.	VRF-5.2
VRF-9193	Add new entity-level simulation objects	The new simulation objects associated with this work item are: Bison 81mm Mortar, Bison Ambulance, Leopard 2A4 Mine Plow, and sound entity files (Factory Machinery Close, Factory Machinery Far, Factory White Noise, Farmland Cows Birds, Stream Flowing Slow, and Waterfall Birds). The latter can be placed to emit noises from specific locations.	VRF-5.2
VRF-9200	Change icons in Debug Simulation Terrain dialog to better match other places in GUI	Updated icons in the Simulation Terrain Debugging Tool to match those used elsewhere in the application.	VRF-5.2
VRF-9209	Notify level widget on Object Console for remote entities should be disabled	In the Object Console of the Information dialog box, you can only set the Notify Level for objects simulated by VR-Forces.	VRF-5.2
VRF-9211	Internal State Properties	State and parameter properties are an easy way to extend the internal or external state of an entity. VR-Forces now has a concept of internal state properties, which can be added by sim components or Lua scripts. For more information, see "State and Parameter Properties" in the VR-Forces Developesr Guide.	VRF-5.2
VRF-9217	Add new version of DtTerrainInterface::trianglesInArea function that can return instanced object geometry	There are new functions that can pass back geometry using instanced objects. These are DtTriangleOutputInterface: processTerrainInstance() and enableTerrainInstanceProcessing(), and also DtTerrainInterface::trianglesForGeometry(). Refer to the VR-Forces Developers Guide for details.	VRF-5.2
VRF-9243	Ground vehicle maneuver-in-formation controller	Refactored leadFormation and followInFormation controllers into unified DtGroundManeuverInFormationController.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-9245	Ground unit "move-to-destination" redirect to "maneuver-in-formation"	Ground vehicle units now default to using the new Maneuver To task when they are assigned the Move To task. They use Move To only if they are not configured with Maneuver To. For more information, see the information on this task in the VR-Forces help or VR-Forces User Guide.	VRF-5.2
VRF-9250	Change sensor default tick-overflow-strategy to "Delay next detection cycle"	Change the default to prefer better performance by default.	VRF-5.2
VRF-9278	Improvements to DMS coordinate entry	In DMS mode, allow for entry of partial values and fill in the rest with 0's. For example, the user can enter 21 N and the application will populate the field as 21:00:00.00 N. The value populates after accepting the value. Please note that this is supported for only left-to-right languages. Right-to-left languages do not have this functionality.	VRF-5.2
VRF-9284	For Aggregate Tactical Level SMS, propagate ground-echelon-group-tactics-enabler.sysdef to pseudoaggregate units.	Ground echelon groups in the aggregate model set are now equipped with a system definition that enables tactical tasks such as group attack to objective. The name of the system definition is ground-echelon-group-tactics-enabler.sysdef. The system definition uses the script-enable-controller to add group tasks to the list of available tasks for echelon groups.	VRF-5.2
VRF-9309	Ground move-to backwards compatability	Ensured that scenarios created before 5.2 that include entities performing one of the old move to tasks will continue to work even though those tasks are no longer in the GUI.	VRF-5.2
VRF-9312	Debug Simulation Terrain tool should use better default height for features	The tool now queries elevation for each point of features when displaying them in the Debug Simulation Terrain tool.	VRF-5.2
VRF-9328	Update effects, documentation, and GUI names for movement preference Sets	Due to the changes to the ground movement behavior, some set data requests have been changed: - The road passing options for entities and units, set-road-driving-options and unit-set-road-driving-options, are now set-road-passing-options and unit-set-road-passing-options. These control whether entities or units use the breakdown lane or an opposing traffic lane to move around an obstacle. - Navigation Enabled now applies only to lifeforms. - The Collision Avoidance Types set data request (set-collision-avoidance-types and unit-set-collision-avoidance-types) has been deprecated.	VRF-5.2
VRF-9336	Limit the number of maximum asynchronous terrain interface threads	There is a new parameter in the vrfSim.mtl file, maxAsynchronousTerrainThreads, which allows you to set the maximum number of threads that will spawn when asynchronous terrain processing jobs are required.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-9369	Subordinate functions for aggregate-level SMSs	Subordinate functions were assigned to echelon groups in the aggregate model set.	VRF-5.2
VRF-9433	Add small UAV/drone that delivers explosive on impact	Some of the new models included in this release are the DJI Mavic 3 Small Munition and DJI Mavic 3 Small Munition Fiber Optic. The new Drone Attack scenario included with VR-Forces demonstrates the fiber optic model, showing five drones striking various targets.	VRF-5.2
VRF-9543	Rename AI Enabled to Autonomous Actions Enabled	The set data request was renamed to more accurately reflect its functionality. Additionally, the AIEnabled state property has been renamed AutonomousActionsEnabled. Update any Lua scripts that reference this property to use the new property name.	VRF-5.2
VRF-9627	Check WMM (magnetic model) to make sure it stays valid for 2025 and beyond	Updated the World Magnetic Model.	VRF-5.2
VRF-9635	Allow behavior tree scripts to restart if they fail to load	If a scenario is saved when a behavior tree script is running and that behavior tree is later modified, VR-Forces would previously be unable to run the behavior because the saved state did not match the new behavior. To resolve this, the behavior engine now restarts the behavior.	VRF-5.2
VRF-9643	Doc: more info on sql logging	The VR-Forces Developers Guide now has more information on saving data to a database. The topic is "Database Logger", found under "2. Simulation Services" in the "Miscellaneous" section.	VRF-5.2
VRF-9646	Lua Doc: better sql database logging information	Added more information to the development documentation on SQL Database Logging.	VRF-5.2
VRF-9673	Package all MAK Radio code	The ./appsrc directory now includes a makRadioUser folder, which enables you to customize the makRadio application.	VRF-5.2
VRF-9737	SIM: Make an aggregate-level background script that suspends resupply while engaged.	When a simulation object is engaged in combat, resupply is now paused for a time.	VRF-5.2
VRF-9772	Remove Create Multiple Simulation Objects capability	This feature has been replaced by better methods for creating multiple simulation objects, such as crowds and clutter areas.	VRF-5.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRF-9807	Add "No Altitude" mode to Location Reference GUI widget	VR-Forces now supports task parameters that can represent either a location or a simulation object, such as a waypoint: Location Reference, with or without altitude. This has allowed for the consolidation of many VR-Forces tasks. For more information on task consolidation in the 5.2 release, please refer to the VR-Forces Migration Guide.	VRF-5.2
VRF-9816	Add GlobalId option to RC API create entity/aggregate arguments	For remote control create calls you can now specify the specific HLA global ID (or, if DIS, the entity ID).	VRF-5.2
VRF-9961	Launcher should have preconfigured options to launch the Logger and VRL test apps	In addition to being configured to launch the VR-Forces GUI and sim engine, you can also use the new VRF Launcher to run other MAK ONE products--the MAK Data Logger, VR-Link f18, VR-Link Netfump--and also tools--MAK Radio, the SOE, DIS Spy, MAK Remote Debugger, Tracy, and VR-Forces Message Dump. The Launcher checks for installed product paths. If they do not exist, you can install the products or edit the configuration to point to the location of the installed product. You can also add other applications to the Launcher. For more information, refer to the VR-Forces User Guide or help.	VRF-5.2
VRF-10002	Add new ground vehicle actuator for reacting to DtCollisionEvents	The DtReactToCollisionEventActuator enables ground vehicle entities to react to collisions with vehicles that use the Vortex mechanism. This was added to support VR-Engage.	VRF-5.2
VRF-10062	Set fuel levels to max when loading a pre-5.2 scenario	When you load scenarios in VR-Forces 5.2 that were created in previous releases that include entities with fuel resources, the application sets the fuel amounts to full. For more information, refer to the VR-Forces User Migration Guide.	VRF-5.2
VRF-10172	Refactor Legion::Configuration to use DtAppPathResolver instead of assuming vrfLegion.lua is in the current directory	In running a VR-Forces based executable outside of the VR-Forces bin64 directory you will use default Legion configuration for data double buffering. If you wish to use the same configuration used by VR-Forces copy the vrfLegion.lua file from the VR-Forces bin64 directory to be in the same directory as your executable	VRF-5.2
VRF-10236	Double drone speed from current speed	Drone's default speeds have been increased to more realistic values.	VRF-5.2
VRV-57	Add support for multiple WebSocket connections	You can now stream to more than one WebSocket, either the same view or different views. Add more connection ports to stream the same view, or define additional video streams to stream different views. See the help or the VR-Vantage Users Guide for instructions.	VRV-3.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRV-196	Complete extended type support for CIGI V4	Added support for extended entity types when using CIGI V4, per the CIGI standard "The content and intended usage of the extended entity type record closely parallels the Entity Type record used by [DIS]". VR-Vantage's extended type support looks up the model definition from the 3D model set for an entity type mapped to an element definition in the Visual Model Editors. Types of element definitions are mapped in the Simulation Object Type Mappings dialog box.	VRV-3.2
VRV-4164	Update GDAL version to 3.x	Updated GDAL to version 3.10.1.	VRV-3.2
VRV-4521	Add feature filtering to BuildingLayer	You can now use the FilteredFeatures layer for buildings to filter locally.	VRV-3.2
VRV-5150	Upgrade Tracy to version 0.11.1	Updated version of Tracy included with the application. This included a change to a library name; if your code referenced TracyProfiler.lib, update it to TracyClient.lib.	VRV-3.2
VRV-5156	Update Remote Graphics to use new decal projected rendering where appropriate	There is now support for projected line and area decals.	VRV-3.2
VRV-5187	Add light group support for dynamic light/emissive textures	Added support for entity light source and emissive textures controlled by light groups. The entity models must use the "@dis light_group" comment above the light sources and emissive geometry to specify the correct light group. (Currently, the light group also requires an associated light point to create the light group, otherwise the emissive geometry is controlled by the default group as if there were no comments.)	VRV-3.2
VRV-5270	Improvement to data entry for latitude and longitude	Updated to allow users to enter lowercase letters for north, south, east, and west when entering latitude and longitude. The application no longer requires users to enter uppercase letters.	VRV-3.2
VRV-5489	Update exampleGimbalDriver to render the sensor view overlay	Updated the exampleGimbalDriver example to render the sensor view overlay to a channel. More information is available in example's documentation.	VRV-3.2
VRV-5690	Remove use of std::auto_ptr and boost::shared_ptr	To support C++20 and the new version of Boost, replaced std::auto_ptr with std::weak_ptr throughout the codebase. (This may require changes to any surrounding code, such as adding std::move.) Additionally, switched Boost shared/weak pointers to the std versions instead. (This should simply be a find/replace unless there are cases that depend on an external library.)	VRV-3.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRV-5703	Remove ambush visualizer pathway in favor of geometry generation	Removed the Ambush visualizer class in favor of the generic DtTacticalGraphicModelVisualizer class, which makes use of new vertices generation pathways. Currently, this supports only linear models.	VRV-3.2
VRV-5718	Aerodromes - improve the appearance of tarmac lines	You can now customize the appearance of tarmac lines by editing the <linear_features> block in the aerodrome_catalog.xml file.	VRV-3.2
VRV-5726	Add a Parameter to Earth file to turn off pre-calculated elevation ranges	Fictional terrains that are at Latitude 0, Longitude 0, and Altitude 0, should not use a precalculated spatial index based on real world elevation data. The new "disable_elevation_ranges" earth file parameter allows you to disable the spatial index for those kinds of terrains.	VRV-3.2
VRV-5728	Extend the ability to visualize scene graph node properties for debugging	The Terrain Information Panel has two new check boxes in the Scene Graph tab to help terrain artists and developers with debugging: Visualize Node Bounds and Visualize LODs. These enable visualizations of the selected node as you browse through a scene graph.	VRV-3.2
VRV-5763	Upgrade to Boost 1.84.0	Upgraded the Boost version for compatibility with C++20.	VRV-3.2
VRV-5766	Grid Lines should use separate parameters for number of lines and number of line *segments*	The new parameter maxGridLineSegments is configurable through the GridLines model definition. It controls the number of line segments in a 'curved' grid line (instead of being based on the maxGridLines parameter). This reduces the maxGridLines default value.	VRV-3.2
VRV-5797	CDB: reinterpret raster heights as geoid-relative upon load	The application can now process CDB geodetic (ellipsoidal, or HAE) elevation data and interpret those values as inverted MSL values. For details, see "Referencing an Earth Gravitational Model (EGM)" in the the help or the Adding Content to MAK ONE Applications Reference Manual.	VRV-3.2
VRV-5831	Upgrade Windows to CUDA 11.8	Updated to CUDA 11.8, which supports VS2022 and is also compatible with CUDA 11.7.	VRV-3.2
VRV-5873	Update an example to use OpenGL to render 3D geometry	The exampleGLDrawingPlugin example has been expanded to include using OpenGL to render 3D geometry into the 3D scene with correct depth testing.	VRV-3.2
VRV-5882	Expand exampleViewControl to demonstrate how to attach observers to sensors	The exampleViewControl now demonstrates how to attach observers to sensors. See the information on the attach observer commands in that example for details.	VRV-3.2
VRV-5884	Support Azure Maps API (to replace Bing API)	Microsoft is deprecating Bing Maps in favor of Azure Maps, therefore osgEarth and MAK ONE now support Azure Maps. See the VR-Vantage help or the Adding Content to MAK ONE Applications Reference Manual for details.	VRV-3.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRV-5885	Add ability to set video quality on the GPU to low / medium / high via our API	There is now API support for NV_ENC_TUNING_INFO and NV_ENC_PRESET when video streaming. This is only available for developing and using plug-ins.	VRV-3.2
VRV-5903	Sensor Overlay API needs to be opened up	Added more support for customizing the sensor overlay section drawers. See the exampleGimbalDriver to learn more.	VRV-3.2
VRV-5960	Upgrade TBB	Upgraded TBB version to OneTBB 2021.12 for C++20 compatibility.	VRV-3.2
VRV-5989	Add ability to add multiple FOM modules at the same time	When you add FOM modules using the HLA 1516 Evolved Connections page of the Simulation Connections dialog box, you can now select multiple files at the same time in the Browse for FOM Files to Add dialog box.	VRV-3.2
VRV-6006	Improve CDB sigsize support	Added logic to prevent that collapsing of LODs, improving the results.	VRV-3.2
VRV-6028	Load highest LOD GS Models for CDB terrains first	The application now starts with the high LODs and then works its way down to the lower LODs. This improves loading speed.	VRV-3.2, VRV-3.1.1b
VRV-6075	Update exampleSymbolFacade to exhibit new altitude-based icon scaling	The exampleSymbolFacade example now includes the application's support for scaling icons by altitude. Refer to the Developer's Guide to learn more about using this example.	VRV-3.2
VRV-6082	Investigate High Number of Elevation Requests at the Schwyz viewpoint	Improved the osgEarth Network Monitor by adding more filters (type and status) and showing the number of requests that pass the filter in a status bar at the bottom of the window.	VRV-3.2
VRV-6083	Document the terrain options file (inline), esp. the page-out expiry options.	Added more information, such as recommended defaults and any other options that are not listed, to ./TerrainData/TerrainConfiguration/options.terrain-rex-default.xml.	VRV-3.2
VRV-6085	Create an example which exemplifies how to create a custom element attribute	Created a new example, exampleCustomElementAttributePlugin, which reports an entity's label as a custom element attribute. Refer to the class doc for more information. Also updated exampleElementAttributesPlugin to visualize the custom element attribute to the console.	VRV-3.2, VRV-3.1.1d
VRV-6090	Change how OsgEarth network monitor gets updated so functionality stays in sync with the OsgEarth master	Improved the F2 statistics to update after users make improvements to the version in the osgEarth master.	VRV-3.2
VRV-6103	Show entity marking text in the sensor gimbal overlay	The overlay for sensor view windows now displays the entity's marking text instead of "Ownship" at the upper right-hand corner of the sensor view.	VRV-3.2

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRV-6111	Upgrade GEOS to C++20 compatible version	Updated GEOS to version 3.13.0.	VRV-3.2
VRV-6117	Update 3rd Party Software to latest version of SQLite	Updated third-party libraries and dependencies to use version SQLite 3.47.2.	VRV-3.2
VRV-6122	IndirectLog.log file doesn't need to be generated	Previously, a file <code>nnn##_IndirectLog_##_##_nnn-##_##_log</code> was generated, but it contained the same information that is included in the product's standard log file and therefore was disabled. It is no longer generated (unless you define the <code>VRV_ENABLE_INDIRECT_LOG</code> environment variable).	VRV-3.2, VRV-3.1.1d
VRV-6126	Improve CDB frame time smoothing	This feature contains code improvements to reduce frame time spikes with CDB terrains.	VRV-3.2, VRV-3.1.1d
VRV-6137	Pre-process CDB models for improved load times	The <code>cdbTool</code> utility has been updated to improve runtime performance by combining feature models into groups and simplifying the node hierarchy. Note that the CDB terrain database is not modified in any way; the utility uses the information in the database to generate files that it saves in a cache directory, and then VR-Vantage loads those optimized files instead. (The previous functionality of the <code>cdbTool</code> still works, which is to write out <code>medfs</code> and <code>meifs</code> for GS buildings.) Read the "Caching CDB Data (<code>cdbTool</code>)" section of the help or the Adding Content to MAK ONE Applications Reference Manual for details.	VRV-3.2, VRV-3.1.1e
VRV-6141	Add per frame time budgets for indirect operations to have either faster load times, or smoother scenes	- The Per Frame Time Budgets slider allows you to adjust the indirect time budgets per frame. Reducing the time budget can help prevent stalls in the application. Note that this does increase loading time: setting a higher budget reduces loading times. You can adjust the per-frame budgets for the GPU arena's one-time indirect operations and for models. - The CDB Loader slider allows you to control the number of threads that the CDB model loader can use when loading models in parallel. (This applies only to geospecific models.)	VRV-3.2, VRV-3.1.1b
VRV-6144	Add ability to control render order of styles in a FeatureImage or RoadSurface layer in <code>makOsgEarth</code>	Updated the rendering order so that styles either render in their order of appearance or in order of the render-order symbol, if present. Refer to the OSG Earth documentation for more information.	VRV-3.2
VRV-6146	Add a centralized location for environment variables	The <code>DtDe</code> now holds a repository of cached environment variables that can be checked during runtime without the penalty of a system call. Developers can update their code to take advantage of this if desired, but it is not required.	VRV-3.2, VRV-3.1.1d

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRV-6149	Allow the controlling of an 'LOD Scale' that apply to entities only	In the Observer Control Panel, the LOD Distance Scale is now separated into two different sliders: one for entities and one for terrain. The gives you greater control over what displays in the window. For example, you can choose to see entities that are farther away from the observer without showing a higher level of detail for distant terrain.	VRV-3.2, VRV-3.1.1d
VRV-6164	Add CDB texture management for 301 textures	Improved processing of geospecific textures to ensure that MEIF files are not generated for duplicate textures. (Some CDB database designs use the 301 dataset inefficiently.)	VRV-3.2
VRV-6168	Make the new CDB pre cache data portable between machines	You can run the cdbTool once to generate cache files for a CDB terrain and then copy the files from the cache directory on that machine to any other machine that will load the same CDB terrain. This is because the cdbTool uses relative paths.	VRV-3.2, VRV-3.1.1e
VRV-6180	osgEarth should output name of missing biome assets to the console	osgEarth now prints warnings when either a biome parent ID is not found while parsing the biome definitions or a model asset is not found in the asset catalog while parsing the biome catalog.	VRV-3.2
VRV-6183	Add ability to query out all network driver configuration options	The new ./bin64/MAK-ONE-2025-Config.xml file defines default exercise connection settings. You can use the --exConnConfigFile command-line option to load your own configuration file or files. Refer to the MAK ONE Interoperability Guide for more information.	VRV-3.2
VRV-6254	Support for HLA 4	VR-Vantage applications support the HLA 4 (IEEE 1516_2025) protocol.	VRV-3.2
VRV-6283	Changing the Field of View should make automatic adjusts to LOD scale	When calculating the final view magnification for a channel, VR-Vantage can now consider the current frustum in relation to the default frustum to compute a field of view (FOV) difference ratio, which can be 1 or greater. The FOV difference ratio represents the zoom that a user employs by using a smaller FOV, and this ratio contributes to the final view magnification that is applied to the LOD scale factor and determines whether the LOD center approach is employed or not. Use the Enable Frustum-based View Magnification option in the Observer Control Panel to specify whether to use this when narrowing the FOV.	VRV-3.2, VRV-3.1.1h
VRV-6292	Add a dialog for LOD Center Settings	The new LOD Center Settings button in the Observer Settings page of the Display Settings allows you to fine-tune the observer settings when the magnification is greater than one.	VRV-3.2, VRV-3.1.1i

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix versions
VRV-6355	Add capability to edit vertices in the OSM feature data and apply these edits in a client-side patch	You can use the new Feature Patches to locally override features. For more information, refer to the help or the Adding Content to MAK ONE Applications Reference Manual.	VRV-3.2
VRV-6419	Move up on newer version of Rapid JSON	Updated to the revision of the Rapid JSON library that is used by cesium-native v0.37.0.	VRV-3.2
VRV-6483	Add --hasNTPSync support for Light point animations	The --hasNTPSync command-line option now enables you to synchronize time-based light point and continuous flipbook animations between different VR-Vantage applications, such as other instances of VR-Vantage or the VR-Forces GUI.	VRV-3.2, VRV-3.1.1l
VRV-6601	Add support for CIGI IG Mode in SOF and IG control packets	IG Mode supports only 0 (Reset/Standby) and 1 (Operate). This applies to the IG control host-to-IG packets and the Start of Frame (SOF) IG-to-host packets.	VRV-3.2, VRV-3.1.1m

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, please contact your MAK distributor or use the [Support Portal](#) at <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 User Guide*.