



VR-Vantage 3.1 Release Notes

This release note contains the following release-specific information for VR-Vantage 3.1.

Systems Supported and System Requirements	2
Compiler Compatibility on Windows	2
Disk Space Requirements	2
The makData Package	2
License Manager	2
New Features and Major Changes	3
Visuals	3
Virtual Reality	3
Modeling	4
Coordinate Systems	5
Terrains	5
Weather	8
User Interface	8
Tactical Graphics	9
Performance	11
SensorFX	11
CIGI Support	12
API Changes	12
Documentation	13
Fixed Bugs	14

Copyright © 2024 MAK Technologies 10 Fawcett Street, Suite 204, Cambridge, MA 02138 USA. All rights reserved. VR-Exchange™, VR-TheWorld™, VR-Vantage™, DI-Guy™, and DI-Guy Scenario™ are trademarks of MAK Technologies. MAK Technologies®, VR-Forces®, RTIsPy®, B-HAVE®, and VR-Link® are registered trademarks of MAK Technologies.

Document ID: VRV-3.1-3-240329

Feature List	40
Known Problems	57

Systems Supported and System Requirements

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

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

Compiler Compatibility on Windows

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

Disk Space Requirements

A full installation of VR-Vantage requires approximately 6.6 GB of disk space and an additional 69.8 GB for the complete makData 18 package, including the supplemental data package.

The makData Package

VR-Vantage 3.1 is compatible with the makData 18 package. MAK applications can share the same data package. For instructions on installing the data, see "[The makData Package](#)" in the *VR-Vantage Users Guide*.

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

License Manager

VR-Vantage 3.1 uses FLEXlm 11.17.1. You must install the license management software to run VR-Vantage.

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

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

New Features and Major Changes

VR-Vantage 3.1 has the following new features and updates.

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

Visuals

- You can now apply shadows to ambient lighting, in addition to diffuse and specular shadows, by selecting the Apply Shadow to Ambient Lighting check box in Shadow Settings. This makes shadows significantly darker. By default, it is disabled to ensure that shadows display realistically.
- The Particle System Editor has a new option in the Advanced Debugging Settings. When it is enabled, the Play/Pause button in the Preview Settings apply to all particle systems in the scene, not only any systems you are actively previewing.
- You can now specify more text box properties using element or visual definitions: Origin Placement Policy, Text Horizontal Alignment Policy, and Background Color. Text Horizontal Alignment Policy requires that Default Width and Default Height are defined.
- In the Visual Model Editors, you can now configure the 2D and 3D Laser Designators visualizer definitions for entities to display a line, and you configure the appearance of the line. Define the `islaserlinevisualized`, `lasercode lodoutaltitude`, `laserlinestipplepattern`, and `laserlinecolor` visual definition attributes.

Virtual Reality

- Added support to render all UI into only a single eye of the VR overlay. This allows for use of binoculars and other simulated devices that have reticles to display the reticle in only one eye, allowing the user to focus the reticle where they are looking.

- Added an option to disable multisampling. This improves performance, although it also disables alpha to coverage and so there will be issues with transparency.

Modeling

- Some users do not need all of the model sets, and those users might want to disable the sets they are not using. For example, some users only need the 2D model set and never looks at the 3D models. The new `--disableModelSets "#"` command-line option allows you to specify the sets you want to disable: 3D model set (0), colorized models (1), minimap (4), or 2D icons model set (5). You can also specify multiple model sets by separating them with commas. For example, `--disableModelSets "0, 1"` disables the 3D and XR (colorized) model sets.
- Because most renderers do not support vertex or alpha color, you should ignore it when it is in the model file. There are two ways to do this. For FBX model files, use the new command-line option for the medfTool, `-c` or `--disableVertexColor`. For MFT files, add `<myDiscardVertexColor>1</myDiscardVertexColor>` under `<myTerrainPatchDefinitionRecord>`.
- There is a new conditional particle system visualizer that can be used for trail effects, flames, smoke plumes, and other visualizers.

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

Also added visual support for light types that allow for control of the lights' intensity: flight deck lights, horizon bar lights, glide path indicator lights, and so on.

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

The exhaust plume can be enabled or disabled based on the state of the powerplant bit. Particles are realistically affected by windspeed and direction as well as the movement of the ship.

Coordinate Systems

- You can now see Global Area Reference System (GARS) grid lines in the Plan View. GARS is a standardized geospatial reference system developed by the National Geospatial-Intelligence Agency (NGA) for use across the U.S. DOD.
- When you want to work with multiple coordinate systems in the Plan View, the new Grid Line Selector toolbar allows you to rapidly toggle between grid line overlays. By default, it is set up to show DDM, GARS, or MGRS. You can customize the available coordinate systems in the Grid Lines Settings page of Display Settings.
- To declutter the window, geodetic and MGRS coordinates now default to displaying at the left and top edges of the window, no longer cluttering the terrain in the center of the window. (At a configurable altitude, the coordinates display as they did in previous releases. That altitude is very high.)
- Latitude and longitude now correctly display a leading 0 for the minutes if the value is less than 0. For example, 21° 05' 07".

Terrains

- Airports in terrains now support a number of aerodrome and runway lights. These lights can use different models. In procedural airports, the runway numbers display in the manner expected for the countries where they are located. When runways are active, text and an arrow indicate this.
- The new Procedural Engine 2.0 is a vast improvement over what existed before for procedural terrains used in earth files. The new framework, configuration, and data are used to generate procedural imagery, ground cover, and the soil type information. Procedural Engine 2.0 is comprised of three parts:
 - Assets. There are two kinds of assets: models and imposters (billboards). These represent specific types of vegetation.
 - LifeMap. Raster (gridded) dataset that contains Lush, Rugged, and Dense values for a location. VR-Vantage uses the values to choose procedural imagery and vegetation assets. Lush indicates how moist the vegetation is. Rugged defines the roughness of the terrain. Dense specifies how thick the vegetation is at a location.
 - Biome. Area that has a subset of ground cover assets. You can have a specific biome for an area that limits your full set to the models appropriate to the region. Biomes are pageable, which greatly improves performance when moving from one area to another.

Figure 1. Tropical - old and new



Figure 2. Mountainous - old and new



- You can have biome-specific vegetation assets, such as crops, that render only when a trait is specified.
- Procedural buildings previously used OSM data intersected with a feature to mask areas where it should not render buildings because of an inset area. Now, you can use a feature reference, which allows you to define a mask feature outside of the buildings block. That enables you to have different mask areas without multiple versions of the XML file.
- Improved support of CDB terrains:

- There are many improvements to the performance of CDB terrains to support larger terrains. See the fixed bugs list for details.
- In CDB terrains, intersections can be slow, so you might want to disable intersections for certain model layers. This addresses a problem where it can take a long time for simulation objects to appear after they are placed. If you do not need to intersect with certain layers, enter `<enable_intersections>false</enable_intersections>` in the `<model>` block for that layer.
- Added support for CDB terrains published using the CAE Lithos tool. Added parameters to scale GT models, such as trees. Other issues are in the fixed bugs list.
- Added support for the T2D dataset, which is tiled but contains only 1 LOD.
- The underwater IG is now more realistic, allowing factors such as depth and underwater fog to affect visibility. The overall ambient light also affects the scene, for example, it is harder to see underwater at night than in daylight. The Underwater Visibility setting in the Advanced Marine Settings has been adjusted to support these improvements.
- There are significant performance improvements for loading source-based terrains or terrains from the VR-TheWorld server:
 - Fixed some unnecessary mutex contention on all layer types to allow you to use all of your cores more effectively.
 - Extruded geometry layers are also faster. Tiles that previously took 10 seconds to load now take about 1 second.
 - Mipmap generation and texture compression for image layers are faster. Each image layer that you add to your earth file now requests an image for each tile that must be loaded, and each one of those images needs to be mipmapped and maybe compressed based on your layer settings.
 - Each loaded tile creates an elevation layer, which also requires the generation of a normal map. Previously it took 30 ms per tile, and now it's about 10 ms.
 - Aerodromes now load much more quickly, taking approximately a tenth of the time that they did previously.
- There is a new optional check box in the Add Terrain Patch dialog box: Is Pageable. When you select this check box, the patch will page in only when it is part of the observer view. This can improve performance when loading large terrains. If the patch is not pageable, it fully loads when you load the terrain, regardless of the view.
- There are new command-line options that you can use to limit the size of the textures that VR-Vantage loads from an *.earth* file:
`--limitEarthSplattingTextures`, `--limitEarthTerrainTextures`, and `--limitEarthVegetationTextures`. These allow you to constrain the amount of GPU (video) memory used for *.earth* files. For each, you specify the width and height of the texture limit as a power of 2, for example, `--limitEarthTerrainTextures "16"`. If you do not enter a power of 2, VR-Vantage rounds it up to the next highest

power of 2.

- In osgEarth files, you can now specify a layer to not draw to the heightmap using `<draw_in_heightmap>false</draw_in_heightmap>`.
- VR-Vantage can visualize dynamic ditches, berms, and tank scrapes created in VR-Forces.
- VR-Vantage now looks in the correct data location for terrains or scene files specified on the command line, working as it did in the releases before shared data. It looks in either the default location (C:\MAK\SharedData) or the one specified by the environment variables (MAK_SHARED_DATA_ROOT and MAK_SHARED_DATA_STEM).
- You can now get your own key to use Microsoft Bing imagery services and then configure it in the `./SharedData/18/latest/TerrainData/TerrainConfiguration/imagery.worldwide.BingMaps.online.xml` file. That file also includes information on how to get a key.

Weather

- VR-Vantage now uses the METOC FOM for simulating weather.

User Interface

- You can now specify whether you want to see the speed for aircraft as the ground speed (GS), indicated airspeed (IAS), true airspeed (TAS), and Mach number (MACH).
- You can now display a velocity indicator for air entities. When displayed, the line shows the relative speed of air entities, allowing you to rapidly assess the velocity of entities relative to each other. The faster the entities are moving, the longer the line. At this time, the indicator points in the same direction as the entity's heading.
- Rotating 2D icons to the simulation object's heading now works only for aircraft and munition entities by default. Other platforms do not rotate when you enable the Rotate Entity Military Standard Symbols to Heading setting.

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

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

Continue cycling the label until it displays as desired.

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

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

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

- You can now choose whether to display the labels for embarked entities. Select Embarked Entity Labels from the Settings menu, click the  icon on the Display Settings toolbar, or press **Ctrl+L**.
- There are new color controls for 2D map views (Plan View), which helps you see tactical graphics and other overlay information more clearly. The color controls include adjustments for grayscale invert, contrast, brightness, and color mix. You can enable and disable color controls using the icon located on the Display Settings toolbar () or through the Display Settings.
- You are now able to measure bearing and range by drawing a range line. This ability was previously available in VR-Forces and has now been added to VR-Vantage. See "[Range Lines](#)" in the *Intervisibility Objects* chapter of the *VR-Vantage Users Guide* (or the help).
- The organization of pages in Display Settings that are in both VR-Vantage and VR-Forces are now consistent across both applications.
- There is a visualization for lethal IFF interrogation reply interactions. If the target of the interrogation has Mode 5 available but has not enabled it, the interrogated entity briefly displays a **V** in the Plan View.
- There are now height lines that display below route tactical graphics and entity track histories. These lines display in regular intervals along the routes and tracks, pointing towards the earth to help you see where they are positioned relative to the terrain. You can configure the height lines using the Visual Model Editors dialog box.

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

Tactical Graphics

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

- Most tactical graphics now default to be the color of the force with which they are associated. For friendly forces, you have the option to display them as either black or white. Other forces' tactical graphics display as their defined color.

- Text on linear tactical graphics is now aligned with the segment it is adjacent to. Text for areas is now in the center. Some areal tactical graphics show more information than they did in previous releases, such as altitude and the time during which the graphic is active. In addition, areal tactical graphics are now projected onto the terrain, including any fill patterns. This last helps users spatially identify the areas in 3D.
- Text on tactical graphics is now hidden when the observer is at an altitude such that the text is longer than the adjacent line segment or shape. The text on larger tactical graphics is visible at higher altitudes than the text on smaller ones.
- You can now set VR-Vantage to display tactical graphics only when they are active. This option is in the Tactical Graphics Display Settings, found in the Display Settings, and also on the Display Settings toolbar.
- If you experience performance issues when hiding and showing tactical graphics in scenes with a large number of them, you can choose to make them invisible when hiding them. (The default behavior is to destroy and recreate them.) To configure tactical graphics to be invisible when hidden instead of destroyed, clear the new Delete Tactical Graphics on Hide check box in Tactical Graphics Display Settings.
- The new tactical graphics for minefields—antitank, antitank with antihandling device, antitank wide area, antipersonnel, decoy, decoy fenced, and unspecified—use standard fill patterns to differentiate the type of mines in the minefield. They also display appropriate text on the outlines of the areas.
- The new tactical graphics for Ditch and Fortified Ditch conform to MIL STD 2525D.
- There is also support for other 2525D tactical graphics, which include:
 - Airspace control. Air Control Point, Air-to-Air Restricted Operations Zone, Base Defense Zone, Fighter Engagement Zone, High-Density Airspace Control Zone, Identification Friend-or-Foe (IFF) Off Line, Identification Friend-or-Foe (IFF) On Line, Low-level Transit Route, Minimum-risk Route, High (Altitude) Missile Engagement Zone, Low (Altitude) Missile Engagement Zone, Restricted Operations Zone, Safe Lane, Short-Range Air Defense Engagement Zone, Special Corridor, Standard Use Army Aircraft Flight Route, Transit Corridor, Unmanned Aircraft (UA) Corridor, Unmanned Aircraft Restricted Operations Zone, Weapon Engagement Zone, Weapons Free Zone. In addition, the Joint Engagement Zone and Missile Engagement Zone tactical graphics have been updated.
 - Areal. Area of Operations, Assault Position, Assembly Area, Attack Position, Base Camp, Brigade Support Area, Corps Support Area, Detainee Holding Area, Division Support Area, Engagement Area, Forward Arming and Refueling Point, Guerrilla Base, Named Area of Interest, Objective Area, Refugee Holding Area, Target Areas (area, area of interest, rectangular, circular, smoke, and bomb).
 - Linear. Airborne Or Aviation Axis Of Advance, Bridgehead Line, Battlefield Handover Line, Bridgehead Line, Common Sensor Boundary, Coordinated Fire Line, Counterattack, Delay Line, Final Coordination Line, Fire Support Coordination Line, Forward Edge Of The Battle Area, Intelligence

Coordination Line, Limit Of Advance, Line Of Departure, Line Of Departure Or Line Of Contact, Probable Line Of Deployment, Release Line, Restrictive Fire Line, One-way Traffic, Alternating Traffic.

- Maneuver control and points: Ambush, Attack by Fire Position, CBRN Observation Outpost, Combat Outpost, Cover, Forward Observer Outpost, Guard, Outpost Unspecified, Reconnaissance Outpost, Screen, Sensor Outpost, Support by Fire Position.
 - Obstacle control measures: Block, Disrupt, Fix, Obstacle Belt, Obstacle Free Area, Obstacle Line, Obstacle Restricted Area, Obstacle Zone, Turn.
 - Other tactical graphics include: Planned Explosive State Of Readiness, Explosives, Explosives, State Of Readiness 2 (Armed But Passable), Roadblock complete (executed).
- Phase lines now conform to MIL STD 2525D.
 - Use the new Dome, Sphere, and Spherical Sector tactical graphics to define 3D areas in space: a full sphere, hemisphere, and a dome.
 - Sectors can now be drawn up to 360 degrees.

Performance

- The splash screen now remains visible until the main window is available. Additionally, simple messages display on the splash screen to report what is happening while you wait. This makes it clear that the application is launching.
- Entities (in indirect) are divided into a grid of cells. The cells have the same size. This is a regular (sparse) grid that allows for efficient, higher-level culling. Setting it to one cell (infinite cell size) allows you to look at parts other than moving entities. You can use the new `--entityGridCellSize` command-line option to set the cell size for culling entities. This is useful when you need to debug for bottlenecks in the code.
- The application now checks whether your graphics card driver version changes—either to an older or newer driver—and automatically removes cached shaders and so on from the directory. This prevents an error about binary compatibility that users previously experienced, where the cached data became invalid due to the changed driver.
- DMP files now save automatically, even if you are unable to respond to the error message prompting you whether to save one.

SensorFX

- Made significant performance improvements to the SenSim processor.
- Improved how many features are handled, including: special effects (obscurants and combustion), temperatures (thermal inertia and angle-dependence), skyglow around the sun and moon, fog conditions.
- Made improvements to:

- Thermal inertia and angle-dependence of temperature solution.
- Fidelity for the material system boundary conditions.
- Atmospheric modeling.
- Atmospheric / multi-scat irradiance algorithms for fog conditions.
- Man-made-light-source modeling.
- Handling of skyglow around sun and moon.
- Handling of special effects (obscurants & combustion).
- Automatic Gain Control (AGC). Added Histogram Equalization and Projection techniques.
- Non-uniformity (integration of both low and high spatial frequency non-uniformity).
- Angular distribution of upwelling/downwelling radiance combination.
- Added airglow downwelling irradiance contribution.
- Added support for:
 - Pupil plane sizing (for variable aperture type sensor systems).
 - Optical lens transmission effects.
 - Platform jitter (both low and high-frequency effects dependent on sensor framerate).
 - Detector well capacity and quantum efficiency.
- SensorFX information is now cached in its own directory.

CIGI Support

- Mirror mode is now supported in CIGI. You would enable the mirror mode for a channel to view it as a horizontal mirror of a scene, which is useful when you want to include a view such as a rearview mirror.

API Changes

This is a summary of significant changes to the API. Please refer to the class documentation for more information.

- Decoupled DtWorldMagneticModel from the DtCoordinate system. Moved it to vrvCore and made it instance-able on DtDe and DtBaseConnection. Created a DtWorldMagneticModel in DtDeSharedState and registered it with DtDe.
- Updated the OpenFlight API to 22.0, removing MSVC2005 distributable dependencies. Removed the NVTT (NVIDIA Texture Tools) libraries.
- You can debug specific entities in indirect by specifying this function in DtOsgArticulatedModel::
`static void trackEntity(const std::string& entityDisplayName, int modelSet, bool track);`

- Added a simple static method to `DtSceneObject`, `modelCoordToSceneObjectCoord`, to convert a point from model coordinates to scene object coordinates.
- You can get a list of entity names or pointers that are visible within the camera frustum. In the `DtOsgChannel`, use `vector<Entity*> getEntitiesInFrustum()`.
- Made more improvements with refactors:
 - More protocol-dependent visualizers have been removed. Most have moved to `vrvcCore`, but some were removed because they were no longer required.
 - Added a new element manager to assist with the removal of protocol-dependent visualizers.
 - Added a creator-creatable signaler to listeners so that you do not need to override protocol-dependent listeners. The `exampleFomMapper` has been updated to demonstrate the new functionality.
 - You can now use a signal in the `DtEntityStateListener` to enable or disable track histories for an entity in all model sets.
 - Refactored elements to use one kinematic state object for all model sets. There is now one kinematic state object per element, rather than one per model set. This means there is one updater chain per element; all scene objects for active model sets of an element are updated by this chain.
 - There are now three embarkation states: `unembarked`, `embarkationRequested` (or `Pending`); and `fullyEmbarked`.
- Moved the relevant code into a new DI-Guy motion controller object, which the DI-Guy character model creates/owns. Removed all previous references to the motion model and the add/remove model methods that were required by the previous implementation.
- If you want to enable DI-Guy logging in VR-Vantage, create the environment variable `VRV_DIG_LOGGING_ENABLE`.

Documentation

- Due to the limitations on installer size, the VR-Vantage documentation is now included in a separate installer. Run the `doc.exe` installer after installing the runtime to get the developer guide and class doc, user help, users guide, and more. (These release notes are included in the runtime installer.)
- After you install the documentation, you can now access the locally installed VR-Vantage HTML5 help using the VR-Vantage Help shortcut in the Documentation folder of the installation.
- The HTML5 help is now available on the mak.com website as well.
- The VR-Vantage Quick Reference Card has been removed from the end of the *VR-Vantage Users Guide*. It is now a separate, easy-to-reference PDF included in the installation and available online on the [Product Specifications & Dependencies](#) page for VR-Vantage.

Fixed Bugs

Table 1. Fixed Bugs

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

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
DIG-683	Unable to clear geometry nodes selected through Geometry Viewer.	Fixed selection logic to allow users to clear selections regardless of whether they selected them through the 3D View or the Geometry Viewer.	DIG-IPB18, DIG-13.7
DIG-688	Crash if skeleton initialization is delayed a frame.	Fixed issue where skeleton could remain uninitialized for a frame.	DIG-IPB18, DIG-13.7
DIG-698	DI-Guy log level setting doesn't adjust file logging.	Fixed issue preventing log level changes in the Character Viewer from applying to the log output written to the log file on disk.	DIG-IPB18, DIG-13.7
DIG-712	Fix scrubber in playback controls.	Added basic playback controls widget to Character Viewer.	DIG-IPB18, DIG-13.7
DIG-794	Logs from Character Viewer run from other MAK ONE products should go to MAK Shared Logs directory.	When you run the Character Viewer from a MAK ONE application (VR-Vantage, VR-Forces, VR-Engage), any LOG and DMP files are now saved in a central location. The default is C:/MAK/logs, which you can change by using the MAK_LOG_DIR environment variable to specify a different path.	DIG-IPB19, DIG-13.7
VRV-1008	Ocean performance	Improved performance when dynamic ocean is enabled by lowering the grid resolution.	VRV-3.1, VRV-IPB18
VRV-1048	long makeCurrent with multiple windows causes optional jobs to never run	Fixed code to correctly support multithreading.	VRV-3.1, VRV-IPB18
VRV-1830	exampleElementAttributesPlugin, examplePostProcessor, exampleProjectile, exampleSymbolDecoration, exampleSymbolFacade, exampleToolbar, exampleTacticalGraphics missing documentation	These examples are now documented in the class documentation.	VRV-3.1, VRV-IPB18
VRV-1972	Crash adjusting shadow map resolution with certain settings	Addressed issues that could cause a crash on Linux when users adjusted shadows.	VRV-3.1
VRV-2029	Vehicle headlights performance loss	This is fixed by the optimizations to indirect, including those for indirect light points. Enabling vehicle headlights no longer drastically reduces the frame rate.	VRV-3.1
VRV-2188	Varjo Overlay not rendering correctly	Virtual reality providers can now optionally request a stereo overlay. This takes the overlay texture and renders it on a floating quad in front of the user. The renders from the floating quad are then submitted as the overlay textures to the headset. This is only available on Varjo.	VRV-IPB9, VRV-3.1

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-2213	Sun rays are displayed in main window based off of the position of the sun in a second camera	This is fixed. In the main window and additional stealth windows, the crepuscular rays are shown emitting from the sun's location in that window.	VRV-3.1
VRV-2362	Overlay icons, widgets incorrectly positioned in VR	Virtual Reality Channels are now added to a HMD window rather than the main window. This ensures that the overlays, widgets, and so on display correctly.	VRV-IPB9, VRV-3.1
VRV-2416	Wind must be non 0 before grass is affected by it	A fix in osgEarth now allows grass to blow in rotor wash even when the global wind is set to 0.	VRV-3.1, VRV-IPB16
VRV-2506	Waypoints cast shadows	Waypoints no longer cast shadows.	VRV-3.1, VRV-IPB16
VRV-2819	::dataPath(), ::appPath(), etc. do not return correct values if defined by environment variable	These have been removed, since they did not work and the command-line options for setting these values work well.	VRV-3.1, VRV-IPB18
VRV-3012	Render settings shouldn't modify shadows	The Boolean property for Enable Shadows was duplicated in the shared render settings record. This caused the Enable Shadows option in Shadow Settings to be cleared when users chose to reset their Render Settings to factory.	VRV-3.1, VRV-IPB18
VRV-3058	Floating taxiway signs & runways on flattened airports	Fixed the issues on procedural terrains that caused taxiway signs to appear above the runways.	VRV-3.1
VRV-3159	SensorFX sends excessive spam to console.	The read particle input file output now displays only when the SIGSIM_DEBUG environment variable is set to 1.	VRV-3.1, VRV-IPB16
VRV-3369	Layers for Dynamic Craters get cached	This is fixed. Those layers no longer appear in the cache.	VRV-3.1
VRV-3390	Changing cloud type and sky cover can cause clouds to disappear from scene	This fix prevents clouds from disappearing when clouds are set to a low base altitude and the observer is below the configured fog height.	VRV-3.1, VRV-IPB18
VRV-3514	Remove VR-Vantage IG from start menu; rename VR-Vantage Stealth to just VR-Vantage	The VR-Vantage IG product no longer ships as a separate product.	VRV-3.1
VRV-3611	Update GStreamer to 1.20.2	Updated the GStreamer to a more recent release to improve support for video streams.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-3739	DtOsgWidgetLabel's ConstrainToText Size Constraint Policy does not work as documented	Fixed the code to work as intended and described.	VRV-3.1, VRV-IPB16
VRV-3763	DtCigiViewManager does not support removing a view ID from a group	Removed CIGI views from group when group ID is set to "None".	VRV-3.1, VRV-IPB18
VRV-3791	Seems that turning on track histories cause the PVD entity to blip back to the start of the track history	Fixed to ensure that entities do not return to their previous position if track histories are enabled after they start moving.	VRV-3.1, VRV-IPB18
VRV-3876	The sensor controller should call saveDefaults instead of the GUI	Sensor settings are now saved on exit. This fixes a bug where the settings were not saved when modified by the remote control.	VRV-3.1
VRV-3904	Dead reckoning regression slowing down DI-Guy performance at high entity counts.	Ensured that dead reckoning for DI-Guy entities are multithreaded.	VRV-3.1, VRV-IPB16
VRV-3909	Children particle systems are not affected by play/pause network messages	This is fixed. Child particle systems stop moving when paused and resume when played.	VRV-3.1, VRV-IPB16
VRV-3931	CIGI setWeaponDeployed to false does not seem to work	Added the ability to set DI-Guy item and head appearance correctly in CIGI python packets. This is the way to stow a weapon: set the item appearance to "no_weapon" (this is what DIS does).	VRV-3.1, VRV-IPB18
VRV-3998	Inconsistent line thickness between VR-Vantage and VR-Forces GUI	The application now checks whether values have been set on the listener before using them. It also now accesses and sets the values after the visualizer definition values have been loaded. This ensures the consistent display of lines in both VR-Vantage and the VR-Forces GUI. (The listener values take priority over visualizer definition values.)	VRV-3.1, VRV-IPB18
VRV-4036	SilverLining should cache shader binaries	SilverLining now allows for the caching of shader binaries to disk and use them on the next load. To use this optional functionality, set the option in the SilverLining.config file: shader-cache-path=../appData/cache/silverlining/. Without setting this option, it does not cache shader binaries.	VRV-3.1, VRV-IPB18
VRV-4078	Some attribute group widgets do not support altitude-based scaling or an LOD out altitude	Added the ability for DtValueBarAttribute, DtImageAttribute, DtQuadAttribute, and DtOutlineAttribute to LOD-out based on altitude. Made a change to DtFlatPrimitiveStyle and DtStippledPrimitiveStyle handling of sorted data to pick up needed data changes (and performance).	VRV-3.1, VRV-IPB16

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4103	CIGI Rotorwash at wrong height on Ala Moana	Fixed the CIGI rotor wash on geocentric terrains. It now displays correctly on the terrain and below the entity, rather than above the terrain just below the entity.	VRV-3.1, VRV-IPB18
VRV-4129	Cannot change altitude of intervisibility lines	In the class DtMapMouseCursorFromBullseyeOnMouseCursorUpdater, removed unused DtBasicEditingEventProcessor from input driver event chain that was suppressing mouse events. DtMapMouseCursorFromBullseyeOnMouseCursorUpdater requires last known mouse coordinates, but these are provided by the input driver itself.	VRV-3.1, VRV-IPB16
VRV-4132	--autoReconnectPeriod crashes every single time on Linux	Fixed the issue that prevented Linux users from running VR-Vantage with this command-line option.	VRV-3.1, VRV-IPB16
VRV-4141	exampleEffectPlugin ground clamping doesn't work	Corrected an issue that affected the example in Linux. Added the ability to set the ground clamping cull cylinder radius scale for the facade ground clamping updater. Changed the radius in the example to 1000m; previously it was 10.	VRV-3.1, VRV-IPB16
VRV-4143	examplePostProcessor is broken on Windows	Removed --disableReverseZBuffer in examplePostProcessor startup scripts because the example shader is intended to work with a reverse Z Buffer visually.	VRV-3.1
VRV-4148	Heading values constrained to 360 when using NATO MILS	When the application's Display Units Settings for Orientation was set to NATO-MIL, users were constrained to a value of 360. This is fixed.	VRV-3.1, VRV-IPB16
VRV-4150	Improve VR preview	Made improvements to the display of the VR preview.	VRV-3.1, VRV-IPB16
VRV-4152	Investigate and change rgba16/rgba to rgb16/rgb rtts in HDR chain that don't need the alpha channel	Work group size can now scale, depending on whether hardware supports larger sizes. Previously it was hardcoded to 32x32.	VRV-3.1, VRV-IPB18
VRV-4155	Power lines cause "trenches" in dynamic ocean	You can now specify a layer to not draw to the heightmap using <draw_in_heightmap>false</draw_in_heightmap>.	VRV-3.1, VRV-IPB16
VRV-4157	Rewinding a logger tape can cause aggregate icons to appear if entities in tape are part of an aggregate	This is fixed. Extraneous icons no longer display when you rewind a Logger tape.	VRV-3.1, VRV-IPB18
VRV-4159	HDR does not cache shader binaries	Fixed the code to allow for caching of shader binaries.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4172	Parallelize text glyph processing and speed up text rendering	Significantly improved the frame rate by reducing the data sent for the text.	VRV-3.1, VRV-IPB18
VRV-4183	Alpha not used in ocean reflected lights	The point state is now set to smooth for reflected light points. Also modified DtPlanarReflection for height and width consistency with reflection size settings.	VRV-3.1, VRV-IPB16
VRV-4191	No 3D emitter visualizer definition	Made updates to use the new emitter visualizers.	VRV-3.1, VRV-IPB18
VRV-4196	The attachment drop down resets when switching between entities	If you have attachments on multiple entities and switch between them, the Attachments panel now correctly preserves the settings you specified instead of resetting to the default.	VRV-3.1, VRV-IPB18
VRV-4197	Update CUDA to 11.7	Updated CUDA for Windows and Linux to 11.7.	VRV-3.1, VRV-IPB18
VRV-4203	exampleSensorSettings documentation needs to be fixed	Updated the documentation in the Developer's Guide/class doc for the example.	VRV-3.1
VRV-4210	Visualizers, when created, do not add the VisualizerShowHideContext::ElementHidden context	Sometimes an entity that was set to be invisible when embarking was not being set to be visible on disembark. Now we make sure that all relevant visibility flags are set correctly when an entity is first discovered.	VRV-3.1, VRV-IPB16
VRV-4223	Channel addition, initialization takes a long time (SilverLining)	Corrected an issue with cloud visualization that slowed down creation of new channels.	VRV-3.1, VRV-IPB16
VRV-4228	Startup dialog doesn't have focus on startup	The Load Terrain dialog box now has focus when you start VR-Vantage, allowing you to open the recently loaded terrain by simply pressing Enter.	VRV-3.1, VRV-IPB16
VRV-4231	VRV Feature Layer props can have the same name	Fixed to ensure that, even if a configuration file has props with the same name, VR-Vantage will not use the same name. This prevents crashes that duplicate names can cause.	VRV-3.1, VRV-IPB18
VRV-4232	LOD Center can cause osgEarth paging cycles	When determining the level of detail for magnified views, the terrain skin and insets are now checked together to address the paging cycle issues in terrains with insets.	VRV-3.1, VRV-IPB16
VRV-4244	GPU memory leaks when a new Stealth window is opened and then closed (VRV/indirect buffers)	Fixed an issue with flush camera logic. Also removed the concept of bindless buffers tracking.	VRV-3.1, VRV-IPB16

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4261	Update makTriton CUDA version to 11.7 (Windows)	The version of Triton used by VR-Vantage now uses CUDA 11.7.	VRV-3.1, VRV-IPB16
VRV-4262	Simplify indirect texture processor(s) and residency management	Refactored multiple context handling to prevent crashes when using multiple windows.	VRV-3.1, VRV-IPB16
VRV-4272	Crash can occur when closing sensor gimbal window	Fixed a crash that could occur when opening and closing multiple gimbal sensor windows,	VRV-3.1, VRV-IPB16
VRV-4276	Emitter Volume rendering is incorrect for wide azimuth and non-0 elevation beams	Fixed a rendering bug to ensure that emitters' vertices are correctly calculated using wide azimuth and non-0 elevation beams, rather than orientating the model based on those values. Emitters will render correctly, and now the application can accurately render higher angles of azimuth and elevation.	VRV-3.1, VRV-IPB18
VRV-4280	Crash when playing MAK Data Logger tape after opening then closing a new plan view	Fixed multiple context handling refactor.	VRV-3.1, VRV-IPB16
VRV-4293	getDistanceToViewpoint function returns the wrong value for height map cameras in 2D	The heightmap, which is used for ocean masking and several weather effects, is no longer computed when using the PVD. The heightmap is not needed in PVD, and was significantly increasing terrain paging when it was computed.	VRV-3.1
VRV-4302	DI-Guy isn't garbage collecting unused textures.	Fixed DI-Guy memory leak.	VRV-3.1, VRV-IPB16
VRV-4305	VR-Village doesn't turn dark and dynamic lights don't work when you set the time of day to night time	Fixed the dynamic lights in the VR-Village terrain.	VRV-3.1, VRV-IPB16
VRV-4309	Triton is leaking resources as new windows are made and destroyed	Made improvements to better handle the deletion of cameras and also to track textures, buffers, shaders, programs, and so on.	VRV-3.1, VRV-IPB18
VRV-4324	The Terrain Information Scene Graph node mask is misleading	Fixed the information to include leading zeroes, ensuring that all 32 bits of scene graph node mask text display.	VRV-3.1, VRV-IPB16
VRV-4349	Add geocentric tests to CIGI python scripts	Move the CIGI intersection tests to a geocentric terrain to properly test coordinate conversions.	VRV-3.1, VRV-IPB18
VRV-4352	VRV doesn't remember Object List state when brought in front of the Observer Views pane.	Fixed a bug that prevented the UI from displaying the selected tab on top.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4354	Virtual program is caching programs 1 more time than necessary with toggling shadows	Made a fix to ensure that the application did not generate duplicate programs. Shaders hit the cache, even if they appear in a different order when collected from the state stack.	VRV-3.1, VRV-IPB16
VRV-4359	CIGI updaters are deleted and recreated incorrectly	The application now recreates clamping updaters after CIGI entities disembark.	VRV-3.1, VRV-IPB18
VRV-4361	HBAO not working correctly when model Alpha to Coverage is off	To improve horizon-based ambient occlusion, added new shaders and modified some existing shaders and also values in the occlusion buffer texture.	VRV-3.1, VRV-IPB16
VRV-4366	Customer CDB loading hang with 1 model in indirect rendering	Fixed a bug in the CDB loader that caused the application to hang if there is a feature in the top-level node/shape file.	VRV-3.1, VRV-IPB16
VRV-4370	HBAO causing artifacts on procedural earth trees	To improve horizon-based ambient occlusion, added new shaders and modified some existing shaders and also values in the occlusion buffer texture.	VRV-3.1, VRV-IPB16
VRV-4377	Communication lines disappearing if we zoom in too closely	Changed the communication lines to ensure that they display correctly.	VRV-3.1, VRV-IPB16
VRV-4379	Channels that use sensor modes and do not use the entire viewport of its parent window render incorrectly	Updated the code for the settings display offset and display size in CameraFX.	VRV-3.1, VRV-IPB17
VRV-4387	Remove Zed lib which isn't used.	Removed the Zeb library because it was causing issues with CUDA.	VRV-3.1, VRV-IPB16
VRV-4391	Corridor TGs on reloading scenario do not retain color info	Corridor tactical graphics now correctly preserve custom colors set by the user.	VRV-3.1, VRV-IPB16
VRV-4393	Need a way to set cell size for entities' culling	Entities (in indirect) are divided into a grid of cells. The cells have the same size. This is a regular (sparse) grid that allows for efficient, higher-level culling. Setting it to one cell (infinite cell size) allows you to look at parts other than moving entities. You can use the new --entityGridCellSize command-line option to set the cell size for culling entities. This is useful when you need to debug for bottlenecks in the code.	VRV-3.1, VRV-IPB16
VRV-4404	Video streaming is not working	Fixes to CUDA to restore video streaming.	VRV-3.1, VRV-IPB16

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4411	Change Entity Type Mapping to <New...> doesn't seem to do anything	Removed the non-functional New option from the list of choices in the Simulation Object Type Mappings dialog box.	VRV-3.1
VRV-4425	CDB clamping code is much slower than it be	Fixed the code to improve performance when loading CDB terrains.	VRV-3.1, VRV-IPB16
VRV-4426	ExampleEmbedded does not properly set up the DtDeInitializer	Corrected to put the display configuration into the DtDeInitializer.	VRV-3.1, VRV-IPB16
VRV-4434	Example Gimbal view has a roll component	Changed the way the orientation was calculated by starting with a level topo orientation instead of the orientation of the UAV it's attached to.	VRV-3.1, VRV-IPB16
VRV-4443	HDR + reverse z disable washing out roads textures	Added the shader definition "OE_LIGHTING" to lighting and fog shaders. "OE_LIGHTING" is not defined when lighting and fog should be disabled. "OE_LIGHTING" is normally defined for each top-level VR-Vantage camera. osgEarth does not define "OE_LIGHTING" when using rendering techniques that require lighting and fogging to be disabled.	VRV-3.1, VRV-IPB16
VRV-4458	Always install shadow vp & use early out for shadows	When shadows are enabled, the stateset is now always active and a uniform is used to toggle them when the view is in outer space. There is also support for having shadows permanently active and using a uniform to toggle them. When shadows are disabled, the shadow camera traversal is skipped but the shaders remain the same preventing additional shader sets in SpeedTree and instant switching. This is off by default and can be enabled using the --enablePersistentShadowTechnique command-line option.	VRV-3.1, VRV-IPB16
VRV-4473	LOD update logic for DI-Guys doesn't account for multiple observers.	Fixed an issue where DI-Guys viewed by different observers would not display correctly or consistently.	VRV-IPB17
VRV-4476	When a prop version of a sim object is placed, any further instances of that sim object are invisible	Fixed an issue where, if a simulation object was placed using the Props Palette, adding the same object from the Simulation Objects Palette resulted in an invisible entity.	VRV-3.1
VRV-4482	Symbol Decoration LOD Out Altitude lets you specify negative values	The LOD Out Altitude slider in the Symbol Decoration Settings page no longer allows users to enter negative values.	VRV-3.1, VRV-IPB16
VRV-4485	Show Labels for Ghosted Objects (2D Only) does not work	Fixed to ensure that labels display correctly when the Show Labels for Ghosted Objects (2D Only) option in Unit Display Settings is selected.	VRV-3.1, VRV-IPB16
VRV-4486	Ghosted To Echelon Level does not work right	Fixed for ghosted level 1 aggregates.	VRV-3.1, VRV-IPB16

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4492	Example in Signaler Pattern Documentation has errors	Improved the example by removing the unneeded first argument to the signal and making myDisplayEngine a reference.	VRV-3.1, VRV-IPB16
VRV-4501	Multiple tactical graphics line thickness for 3D/XR needs updated in their visualizer definitions	For 3D and XR views, fixed tactical graphics line thickness in the visualizer definitions.	VRV-3.1, VRV-IPB16
VRV-4502	VR-Vantage texture memory profiler apparently not considering the new splatting, veg memory	Added osgEarth NVGL memory stats to F2 imGui.	VRV-3.1, VRV-IPB16
VRV-4516	Shadows not able to get dark enough	You can now apply shadows to ambient lighting, in addition to diffuse and specular shadows, by selecting the Apply Shadow to Ambient Lighting check box in Shadow Settings. This makes shadows significantly darker. By default, it is disabled to ensure that shadows display realistically.	VRV-3.1, VRV-IPB18
VRV-4520	VRV crashes when CIGI attempts to initiate a track mode that we do not support	Instituted an early out when the track acquirer does not exist for CIGI sensor tracking.	VRV-3.1, VRV-IPB18
VRV-4532	3D Tactical Graphic lines are not created correctly on network connection	Fixed the 3D lines to ensure that they are now created with the correct height and can be scribed on initial creation.	VRV-3.1, VRV-IPB18
VRV-4546	Hardcode Areal Informational Labels to use Feet for altitude and the Zulu time zone for (de)activation times	Areal tactical graphics now always measure the altitude in feet. If the tactical graphic is set to be active for only a specified period of time, the activation and deactivation times are shown in Zulu time.	VRV-3.1, VRV-IPB18
VRV-4555	Duplicate persistent track type model definition	Changed the level of the message from warning to info. In the application, persistent tracks will use only the first texture of each key (trackType / trackDepth).	VRV-3.1, VRV-IPB18
VRV-4559	CIGI Height Of Terrain requests in Geodetic do not ignore altitude	For HOT requests in geodetic, ignore altitude and use 100000.0 instead as the start point for the intersector.	VRV-3.1, VRV-IPB16
VRV-4566	MIL STD Icons can be rotated incorrectly when 'Rotate Entity Military Standard Symbols to Heading' is enabled	Fixed to ensure that, when Rotate Entity Military Standard Symbols to Heading is enabled, the heading of the icon and the heading indicator are pointed in the correct direction, regardless of the observer's orientation.	VRV-3.1, VRV-IPB16
VRV-4568	Separate the 'Range/Bearing Lines' Display Unit Setting into two different display unit settings	The measurements for Bearing and Range are now separated in the Display Units Settings. Previously, you could only specify whether the bearing was measured in degrees or NATO-MIL. Now you can also specify the distance used to measure the range.	VRV-3.1, VRV-IPB16

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4572	VRV HLA1516 connection information in the simulations connection tab is not populated	HLA 1516 is no longer supported out of the box.	VRV-3.1, VRV-IPB18
VRV-4577	Cleanup Intervisibility Settings and Remove Range Line Settings	You can now edit range line settings in the Model Definition Editor in Visual Model Editors, as covered in "Configuring Range Lines" in the VR-Vantage Users Guide. You can no longer display labels for the ends of Intervisibility Lines.	VRV-3.1, VRV-IPB16
VRV-4579	Connecting a RDE to a master with rain enabled causes rain visual problems on master	This is fixed. Added logic to not capture the environment map until cloud layer completely fades in.	VRV-3.1, VRV-IPB18
VRV-4580	DI-Guy does not aim at location after show/hide of DI-Guy	Added logic to ensure aim state is restored with the rest of the character state.	VRV-3.1
VRV-4581	Display symbolDecorations doesn't save out foreground text color	Corrected the built-in schema for entity symbol decorations by removing the "textColor" attribute. The text color is a global setting, not set for each entity.	VRV-3.1, VRV-IPB18
VRV-4586	Wake/Spray should orient orientation rather than velocity and have a low-velocity cutoff.	Added the ability to cut off wake rendering under a specified speed; it can be set in the visualizer definition. The default is 0.0. Also limited rendering the angle between boat's heading and velocity direction is greater than 45 degrees; it can be set in the visualizer definition. The default is 45 degrees.	VRV-3.1, VRV-IPB17
VRV-4588	Car embarkation doesn't correctly re-initialize coordinate system.	Fixed to ensure that DI-Guy entities embark correctly when taking a seat in a vehicle with embarkation slots.	VRV-3.1, VRV-IPB16
VRV-4593	Allow sectors to be created up to 360 degrees	You can now draw sectors up to 360 degrees. The arc goes counterclockwise; if you draw counterclockwise, the arc comes around to the cursor position.	VRV-3.1, VRV-IPB18
VRV-4594	Re-organize context menus for intervisibility and range lines	With the new ability to create range lines from the context menu, that menu has been changed. The top level now reads "Create" and has separate options for intervisibility lines and fans, range lines, and deleting any of those.	VRV-3.1, VRV-IPB16
VRV-4595	Remove "Cull Instanced Objects in Range" option	The Cull Instanced Objects In Range settings have been removed from the Experimental Features dialog box. They no longer apply to the application since the instancing pathway was removed.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4599	VR-Vantage has 3 separate flags for triggering topo. updates for DI-Guy	Cleaned up initialization logic and removed redundant/unused flags.	VRV-3.1
VRV-4605	CDB loading logic has buggy duplicate handoff of already registered models to indirect	Made code improvements to pass the model directly. The different model LODs were being passed as the same model ID, which caused duplicate registration and also was incorrect in that it used the first registered model LOD and ignored the others.	VRV-3.1, VRV-IPB18
VRV-4606	DtCreateInstrumentPanelMenu and a few other should reuse member variables	Modified DtCreateInstrumentPanelMenu to use the same signal mapping pattern as DtCreateSensorViewMenu. Modified DtCreateInsetViewItem to reuse the myAction so there is only 1 shared action.	VRV-3.1, VRV-IPB18
VRV-4609	Make Axis Tactical Graphics Render with a Width in World Space (not Screen Space)	Corrected the display of Air Axis, Axis, and Main Axis tactical graphics to correctly represent the world space covered by the tactical graphic.	VRV-3.1, VRV-IPB18
VRV-4612	Make extruded areas have no fill	Extruded area tactical graphics no longer have fill in either Plan View (2D) or Stealth (3D).	VRV-3.1, VRV-IPB18
VRV-4613	Cannot add .earth file as terrain patch	VR-Vantage now uses the absolute file path for the Add Terrain Patch feature even when the terrain patch being added could be relative to the executable folder.	VRV-3.1, VRV-IPB18
VRV-4616	Check myConnections in classes derived from DtTickable and DtOsgModelInstance	Removed redundant declarations of myConnections in child classes of DtTickable and derived classes.	VRV-3.1, VRV-IPB18
VRV-4635	Preload OSG drivers for VRV common formats to speed up load	Improved load speed for medf/meif files.	VRV-3.1, VRV-IPB18
VRV-4641	VR-Vantage crashes if given a font file that does not exist	VR-Vantage no longer crashes when it cannot find a specified font file. Instead, it tries to use a default font file and logs an error. If it cannot find the default font file, it logs a warning.	VRV-3.1, VRV-IPB18
VRV-4648	Air Axis Twist is applied on wrong line segment	To represent the 2525D standard, the air axis tactical graphic now has the twist applied to last segment rather than the first segment.	VRV-3.1, VRV-IPB18
VRV-4649	MCOD roads do not have the correct road width	Corrected the math used for estimating MCODE angular feature road width to ensure that the width is correct.	VRV-3.1, VRV-IPB18, VRV-3.0.3h

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4650	The recently loaded terrains list isn't updated until exit or close	The list of recently loaded terrains now updates when the user loads a terrain. This ensures that the most recent terrain displays at the top of the list even in the case of a crash.	VRV-3.1, VRV-IPB17
VRV-4654	Screen numbers do not work right when using fullscreen windows	Modified the code to move the window to the appropriate screen first, then apply fullscreen.	VRV-3.1
VRV-4656	Changing observer mode for one observer/channel makes previous observers/channels within the same window flicker	Updated the logic used when initializing a channel sensor. This prevents flickering in other channels when changing the observer settings for one channel.	VRV-3.1, VRV-IPB17
VRV-4658	Coordinate displays are forced to claim flat earth grid line support even when they don't	Instead of defaulting to the Flat Earth coordinate system when no terrain is loaded, the Grid Lines Settings are now blank until you load a database.	VRV-3.1, VRV-IPB18
VRV-4661	Never use 'smoothed velocity' from the dead reckoner	All places outside of the smoother class shouldn't use "smoothed velocity". Developers using the API should use DtDeadReckonUpdater::approxUnsmoothedVelocity. They are now prevented using DtDeadReckonUpdater::approxVelocity because it can return smoothed/erratic values.	VRV-3.1, VRV-IPB18
VRV-4662	Image data can sometimes be null/garbage and cause crash	Fixed an issue that could cause issues when loading models, frequently this manifested itself loading OpenFlight models referenced by CDB terrains.	VRV-3.1, VRV-IPB18
VRV-4663	Jobs code for MetaFlight and CDB may be unnecessarily blocking paging threads	Improved performance to ensure that MetaFlight and CDB render once they are ready.	VRV-3.1
VRV-4679	Ability to set up 2-sidedness and alpha in FBX	Added the ability to specify alphaCutOff in model definitions.	VRV-3.1, VRV-IPB18
VRV-4685	HLA1.3 connection option and its tab need to be removed from the dialog	HLA 1.3 is no longer supported out of the box.	VRV-3.1, VRV-IPB17
VRV-4690	Recent Terrains are saved with a full path name, even if they are from \$(MAK_SHARED_DATA)	File names are prepended with \$(MAK_SHARED_DATA) before they are written to the Recent Terrains list.	VRV-3.1, VRV-IPB17
VRV-4691	VR-Vantage's DtModelSet clashes with existing class in VR-Forces	Renamed to DtModelSetId.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4697	Lat/Lon Grid lines don't draw at certain latitudes/altitude	Fixed to ensure that the latitude and longitude lines display correctly to the observer when grid lines are enabled.	VRV-3.1, VRV-IPB17
VRV-4698	Remove occlusion query code	Removed the path for infrequently used occlusion query usage.	VRV-3.1, VRV-IPB18
VRV-4701	Post processors cannot be used with plan view	You can now use post processors with the Plan (2D) view.	VRV-3.1, VRV-IPB18
VRV-4707	Cultural features have no heading lines	Added heading indicator to cultural features. This allows users to know that they have successfully rotated an object when placing it in Plan View (2D).	VRV-3.1, VRV-IPB17
VRV-4724	Alphabetize the menu for toolbars	Toolbar names in the View menu are now sorted alphanumerically.	VRV-3.1, VRV-IPB17
VRV-4749	Disembarking an AggLevel object leaves the icon hidden	Corrected to set the embarked flag to disembarked before the signal that the parent is set to be consistent with the behavior of entity state embarkation.	VRV-3.1, VRV-IPB17
VRV-4751	Goto panel cannot handle negative minutes and seconds when no degrees have been set.	Updated the Go To Location panel to allow users to enter negative values when using the Lat, Lon (DMS) coordinate system.	VRV-3.1, VRV-IPB17
VRV-4758	Track history color doesn't take	If you change the color for an entity's track history before enabling Show Track Histories, the entity displayed the default color. This is fixed, and the color setting is now respected regardless of when you set it.	VRV-3.1, VRV-IPB17
VRV-4765	Using the same model definition for Stealth and XR breaks node switches	Fixed to ensure that the correct node is passed to the model container. Refactored to put the mappings in a separate mappings class, which also maintains the model node master.	VRV-3.1, VRV-IPB18
VRV-4768	DtTacticalGraphicNameVisualizer missing name position policy for 2525D	Added new name label position options to the DtTacticalGraphicNameVisualizer to display trailing and upwards text.	VRV-3.1, VRV-IPB17
VRV-4789	Indirect geometry with >3 texture coordinates causes shaders to fail compiling	Fixed an issue in the shader that caused indirect shaders to fail to compile when a model used three or more texture coordinates.	VRV-3.1, VRV-IPB17
VRV-4795	Actions coming in with "default" speed value shouldn't autogenerate speed.	For DI-Guys, the action speed autochoosing logic was being triggered instead of using the speed off of the network.	VRV-IPB17, VRV-2.8j
VRV-4799	With multiple channels in a Window, changing CameraFX Sensor causes trees to render differently	Updated the code for the new functionality of uniform maps.	VRV-3.1, VRV-IPB17

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4805	DtWindowEntityAttachedSurface has a jitter	Fixed the jitter in DtWindowEntityAttachedSurface. This issue primarily affected API and CIGI users.	VRV-3.1, VRV-IPB17
VRV-4806	Buoyancy does not work if DtTritonWaterClampingUpdater does clamping	Fixed the Triton water clamping updater to ensure that it applies buoyancy to scene objects when it should. The buoyancy now works even when the updater clamps the scene object to a different position.	VRV-3.1, VRV-IPB17
VRV-4813	Cloud shadows setting needs to be removed	Removed the Clouds option from the Cast Shadows From settings. It did not work correctly.	VRV-3.1, VRV-IPB18
VRV-4815	Use of EpFomMapper in HLA for VR-Link connections blocks usage of new NETN FOM mapper	Removed all references in code (and the code) of the outdated EpFomMapper workaround.	VRV-3.1, VRV-IPB17
VRV-4820	There is no DtWindowArcAgent	Various DtWindow graphics have an agent, such as DtWindowEllipseAgent. It was missing for DtWindowArc. Added DtWindowArcAgent and DtOsgWindowArcAgent to address this oversight.	VRV-3.1, VRV-IPB18
VRV-4829	DtWindowArc/DtOsgWindowArc do not work	Removed the arc window classes because they do not work and the window ellipse covers all functionality with start/end angles and number of vertices.	VRV-3.1
VRV-4834	Terrain formats in VR-Forces (TerraPage v.2.2 LOD)	Added improved support for TerraPage databases that are modeled using a geocentric coordinate system.	VRV-3.1, VRV-IPB18
VRV-4835	Terrain formats in VR-Forces (TerraPage v.2.3 Crash)	Added support for TerraPage databases that contain Transform and SmartMesh Seam nodes.	VRV-3.1, VRV-IPB18
VRV-4839	Remove batch scripts that use the old debug executables	There were some older batch scripts in the bin64 directory that still used the debug versions of our executables. They have been removed because they no longer work: stealthScalableDisplayd.bat, vantageIGScalableDisplayd.bat, stealthVirtualRealityd.bat, and vantageIGVirtualRealityd.bat.	VRV-3.1, VRV-IPB18
VRV-4852	Ocean around Ala Moana inset is very bright in NVG (SensorFX)	Fixed by refactoring the sensor object registration. Terrain node registration was inconsistent in some cases.	VRV-3.1
VRV-4853	Range Line Distance/Bearing text disappears at long distances	Due to the curvature of the Earth, range lines did not show the distance when they were longer than about 1300 km. Range lines have been adjusted to show the distance and bearing information at distances up to the diameter of the Earth.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4871	VR-Vantage crashes when opening/closing/using multiple windows (related to multiple contexts and driver version > 527.56)	Fixed a crash caused by a driver bug released for NVIDIA drivers after November 2022. The crash was related to the use of multiple graphics contexts and showed up when using multiple windows in VR-Vantage-based applications. NVIDIA plans to fix the driver but has not yet released a fix, therefore we developed a workaround for the problem in our own code.	VRV-3.1, VRV-IPB18
VRV-4872	Error checking with visual definitions with multiple model definitions not working	Improved the error messages that the Visual Model Editors display. Also fixed an issue where Visual Model Editors would claim there was an error when none were present.	VRV-3.1, VRV-IPB18
VRV-4881	Low FPS when using Nimbostratus clouds	Made changes to reduce the number of indices that result when adding nimbostratus clouds to the scene, which improves the frames per second.	VRV-3.1, VRV-IPB18
VRV-4884	Platform-specific display unit settings do not correlate between master and slaves	Display unit information is passed along differently so that the application no longer checks for it every tick. Slave machines also use the same settings as the master machine.	VRV-3.1, VRV-IPB18
VRV-4886	The labels on the Spider Web tactical graphic don't scale	This is fixed. The labels now display like those in other tactical graphics, where they become smaller and are eventually hidden from the window when the observer moves farther away from Spider Web.	VRV-3.1, VRV-IPB18
VRV-4889	Map overlay should not change when mouse is hidden	Ensured that the map overlay doesn't change when the cursor is not displayed.	VRV-3.1, VRV-IPB18
VRV-4895	Ship kinematic chains are always single threaded	Improved performance. Watercraft kinematic chains are always single-threaded, and Triton water clamping is not thread-safe. Now the chain is set to thread-safe when water clamping is off. (Note that the surface clamber for amphibious vehicles is never thread-safe.)	VRV-3.1, VRV-IPB18
VRV-4896	Larger icon due to selection does not change the overall selectable area	When simulation objects icons are larger, such as when you have selected them and then zoomed out, you can now click any part of the entire, larger icon. Previously, only the area of the original-sized icon was clickable.	VRV-3.1, VRV-IPB18
VRV-4911	SilverLining atmospheric halo doesn't display around the earth when it's enabled in the config file	Fixed an issue with SilverLining that was preventing the display of the atmosphere around the Earth. The display of the atmosphere is controlled by the enable-atmosphere-from-space setting in the ./data/Environment/Sky/SilverLining.config file.	VRV-3.1, VRV-IPB18
VRV-4915	rain effects appear while in space	Fixed an issue where rain splash effects would display in space after moving from a terrain where rain was in the scene.	VRV-3.1, VRV-IPB18

Table 1. Fixed Bugs (continued)

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

Table 1. Fixed Bugs (continued)

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

Table 1. Fixed Bugs (continued)

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

Table 1. Fixed Bugs (continued)

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

Table 1. Fixed Bugs (continued)

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

Table 1. Fixed Bugs (continued)

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

Table 1. Fixed Bugs (continued)

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

Table 1. Fixed Bugs (continued)

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

Table 1. Fixed Bugs (continued)

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

Table 1. Fixed Bugs (continued)

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

Feature List

Table 2. Feature List

Key	Summary	Release Notes	Fix Version/s
DIG-28	Clean up old FED Files & FOM Modules from packaging script.	Removed legacy FED/FOM files from package in favor of the latest versions.	DIG-IPB18, DIG-13.7
DIG-570	Attach camera to link/bone when clicking to select.	Fixed broken link attachment logic for camera when shift-clicking to select.	DIG-IPB19, DIG-13.7
DIG-651	Add remove button for material states.	You can use the new Remove State button in the Geometry Viewer to remove old material states.	DIG-IPB17, DIG-13.7
VRV-202	Replace billboard trees with 3D model trees at close range	The application now replaces the GroundCover GPU trees with 3D models when the observer is close to the trees.	VRV-3.1, VRV-IPB17
VRV-2160	Unify 2D and 3D symbol decorations	The Symbol Decoration Settings page in Display Settings now allows you to control what labels display for 2D and 3D model sets. Previously, it applied only to the 2D model set; the labels in the 3D model set were not configurable.	VRV-3.1, VRV-IPB18
VRV-2299	Texture Replace for Models, for Variations as well as Camo type	Added the ability to swap out the texture on a model in the configuration. This allows for a single model to have different appearances, which helps to manage runtime performance and data by sharing content.	VRV-3.1, VRV-IPB18
VRV-2467	Make terrain patches pageable	There is a new optional check box in the Add Terrain Patch dialog box: Is Pageable. When you select this check box, the patch will page in only when it is part of the observer view. This can improve performance when loading large terrains. If the patch is not pageable, it fully loads when you load the terrain, regardless of the view.	VRV-3.1, VRV-IPB17
VRV-2509	Making a change to the element definition hierarchy requires saving the leaf children / Some parts of the hierarchy need to be in in the leaf file	In addition to the --entityDefsDir command-line option, which existed previously, the new --unitDefsDir and --tacticalGraphicsDefsDir options allow you to specify the directory where the application should load the .hier and .leaf files to the entity, tactical graphics, or unit element definition managers, respectively.	VRV-3.1, VRV-IPB19
VRV-2813	Replace and retire Makland from the VRV examples	Replaced the Makland terrain in examples because the terrain was deprecated and removed from the data package.	VRV-3.1, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-2923	Visualize Ditches and Berms in VRV	VR-Vantage can visualize ditches and berms created in VR-Forces.	VRV-3.1, VRV-IPB18
VRV-3019	Add support for Attack By Fire (ABF) position graphic	There is a new tactical graphic available, Attack By Fire Position.	VRV-3.1, VRV-IPB18
VRV-3021	Add support for Support By Fire Position Graphic (SBF)	There is a new tactical graphic available, Support By Fire Position.	VRV-3.1, VRV-IPB18
VRV-3367	Upgrade SenSim and SigSim for SensorFX	Upgraded SenSim to 4.0.0.19238 and SigSim 4.0.0.19238. These libraries from JRM Technologies power sensor modes.	VRV-3.1, VRV-IPB18
VRV-3386	Add new MACH/GS/IAS/TAS speed symbol decorations	In the Plan View, you can now specify whether you want to see the speed for aircraft as the ground speed (GS), indicated airspeed (IAS), true airspeed (TAS), and Mach number (MACH). Surface watercraft can also display ground speed. These settings are separate from the Show Speed setting previously available for display in symbol decorations. (Ground vehicles do not show these speeds, even when they are enabled.)	VRV-3.1, VRV-IPB17
VRV-3393	Add logic for using rsync to VRV_CopyFiles so we can avoid copying headers if they haven't changed.	For the MAK internal build system, updated VRV_CopyFiles to use rsync, which allows it to update only files that are different, regardless of whether the files are newer or not. This is now the default behavior, but the previous behavior--using the `cp` command to copy all the 3rdParty dependencies header files--can be enabled if necessary.	VRV-3.1, VRV-IPB18
VRV-3608	Velocity Indicator Symbol Decoration	You can now display a velocity indicator for air entities that displays the heading and an indication of the velocity. When displayed, the line is bright green and shows the relative speed of entities, allowing you to rapidly assess the velocity of air entities relative to each other. The faster the entities are moving, the longer the line. At this time, the indicator points in the same direction as the entity's heading.	VRV-3.1, VRV-IPB16
VRV-3634	Optimize Performance of MAK Earth with Procedural Terrain 2.0	Improved terrain performance with Procedural Earth 2.0 improvements.	VRV-3.1, VRV-IPB17
VRV-3659	Finish refactoring the remaining the VRL visualizers	Removed more protocol-dependent visualizers. Most have moved to vrvCore, but some were removed because they were no longer required.	VRV-3.1, VRV-IPB16
VRV-3661	Remove DtSceneObjectVisualizer	As part of the Element & Visualizer Refactor, removed DtSceneObjectVisualizer because it is no longer required. Elements now create a scene object for each model set.	VRV-3.1, VRV-IPB16

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-3666	Refactor remaining element types to new design	Refactored Smoke, Remote Graphic, and Laser Designator Elements as part of the Element & Visualizer Refactor.	VRV-3.1, VRV-IPB16
VRV-3676	Update embarkation to three states	There are now three embarkation states: unembarked, embarkationRequested (or Pending); and fullyEmbarked.	VRV-3.1, VRV-IPB18
VRV-3747	Refactor elements to use one kinematic state object for ALL model sets	Refactored elements to use one kinematic state object for all model sets. There is now one kinematic state object per element, rather than one per model set. This means there is one updater chain per element; all scene objects for active model sets of an element are updated by this chain.	VRV-3.1, VRV-IPB18
VRV-3843	Splash screen should stay visible until the main window is shown and be more informative	The splash screen now remains visible until the main window is available. Additionally, simple messages display on the splash screen to report what is happening while you wait. This makes it clear that the application is launching.	VRV-3.1, VRV-IPB16
VRV-3861	Ability to disable a dataset from being used by the intersector	You can disable a dataset/feature_geom layer from being used by the intersector. See "Disabling Intersections for a Feature Geometry Layer" in the Adding Content to MAK Applications Reference Manual.	VRV-3.1, VRV-IPB16
VRV-3910	Add support to particle system editor for time-controlling all particle systems (not just preview systems)	The Particle System Editor has a new option in the Advanced Debugging Settings. When it is enabled, the Play/Pause button in the Preview Settings apply to all particle systems in the scene, not only any systems you are actively previewing.	VRV-3.1, VRV-IPB16
VRV-4021	Underwater Visibility controlled by Depth	The underwater IG is now more realistic, allowing factors such as depth and underwater fog to affect visibility. The overall ambient light also affects the scene, for example, it is harder to see underwater at night than in daylight. The Underwater Visibility setting in the Advanced Marine Settings has been adjusted to support these improvements.	VRV-3.1, VRV-IPB18
VRV-4022	Ship Smokestack smoke control and environmental effects	The smoke can be enabled or disabled based on the state of the powerplant bit. Particles are realistically affected by windspeed and direction as well as the movement of the ship.	VRV-3.1, VRV-IPB19
VRV-4034	Add creator-creatable signaler for listeners	Added a creator-creatable signaler to listeners so that you do not need to override protocol-dependent listeners. The exampleFomMapper has been updated to demonstrate the new functionality.	VRV-3.1, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4039	Performance Improvements to OSGEarth	There are significant performance improvements in osgEarth: - Fixed some unnecessary mutex contention on all layer types to allow you to use all of your cores more effectively. - Extruded geometry layers are also faster. Tiles that previously took 10 seconds to load now take about 1 second. - Mipmap generation and texture compression for image layers are faster. Each image layer that you add to your earth file now requests an image for each tile that must be loaded, and each one of those images needs to be mipmapped and maybe compressed based on your layer settings. - Each loaded tile creates an elevation layer, which also requires the generation of a normal map. Previously it took 30 ms per tile, and now it's about 10 ms. - Aerodromes now load much more quickly, taking approximately a tenth of the time that they did previously.	VRV-3.1, VRV-IPB18
VRV-4123	Add an ability to output a list of visible entity names or pointers from the camera.	You can get a list of entity names or pointers that are visible within the camera frustum. In the DtOsgChannel, use <code>vector<Entity*> getEntitiesInFrustum()</code> .	VRV-3.1, VRV-IPB18
VRV-4171	API needs a model to scene object coordinate conversion method	Added a simple static method to DtSceneObject, <code>modelCoordToSceneObjectCoord</code> , to convert from model coordinates to scene object coordinates.	VRV-3.1, VRV-IPB16
VRV-4174	Command Line to suppress Vertex/Alpha color in FBX	Because most renderers do not support vertex or alpha color, you should ignore it when it is in the file. There are two ways to do this. For FBX model files, use the new command-line option for the medfTool, <code>-c</code> or <code>--disableVertexColor</code> . For MFT files, add <code><myDiscardVertexColor>1</myDiscardVertexColor></code> under <code><myTerrainPatchDefinitionRecord></code> .	VRV-3.1, VRV-IPB16
VRV-4195	Rework text rendering for areal tactical graphic names	Text for areas is now in the center. Some areal tactical graphics show more information than they did in previous releases, such as altitude and the time during which the graphic is active.	VRV-3.1, VRV-IPB16
VRV-4235	Ability to debug specific entity/entities in indirect	To make use of this functionality, specify via this function in DtOsgArticulatedModel:: <code>static void trackEntity(const std::string& entityDisplayName, int modelSet, bool track);</code>	VRV-3.1, VRV-IPB18
VRV-4243	Add support for mirror mode to CIGI	CIGI supports mirror mode.	VRV-3.1, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4245	PVD Improvements for Aggregates	The new Aggregate Display Toolbar allows you to collapse or expand all units in the scene, or display ghosted icons to a specified echelon level. (The Collapse All and Expand All buttons apply only to units that are known at the time you click the button. Any units added to the scene after you click the button display in their default state.)	VRV-3.1, VRV-IPB16
VRV-4247	Add new Detector Sensor Settings for SensorFX: Horizontal/Vertical Jitter Amplitude, Horizontal/Vertical Jitter Frequency, Charge Well Capacity	The new settings are available in the Sensor Settings page of Display Settings for VR-Vantage with SensorFX.	VRV-3.1
VRV-4277	Rework text rendering for line tactical graphic labels	Text on linear tactical graphics is now aligned with the segment it is adjacent to.	VRV-3.1, VRV-IPB16
VRV-4288	Make the width of Line Indicator Symbol Decoration customizable via visual attribute	You can adjust the thickness of the new velocity indicator line by editing the entity's Entity Symbol Decorations visual definition for the 2D Icons model set.	VRV-3.1, VRV-IPB18
VRV-4372	It should be possible to find the terrain specified on the command line if other prerequisites are met.	VR-Vantage now looks in the correct data location for terrains or scene files specified on the command line, working as it did in the releases before shared data. It looks in either the default location (C:\MAK\SharedData) or the one specified by the environment variables (MAK_SHARED_DATA_ROOT and MAK_SHARED_DATA_STEM).	VRV-3.1, VRV-IPB17
VRV-4397	Create Ambush Line Tactical Graphic	Added support for the Ambush Line tactical graphic (MIL STD 2525D).	VRV-3.1, VRV-IPB16
VRV-4412	Create a Support By Fire Tactical Graphic	Added support for the Support by Fire tactical graphic (MIL STD 2525D).	VRV-3.1, VRV-IPB18
VRV-4446	Add a signal to the entity state listener to turn track histories on/off at a per element basis	You can now use a signal in the DtEntityStateListener to enable or disable track histories for an entity in all model sets.	VRV-3.1, VRV-IPB18
VRV-4466	Add text decoration support to the Area model	The tactical graphics for minefields now display appropriate text on the outlines of the areas.	VRV-3.1, VRV-IPB16

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4467	Add more fill pattern textures for areas	The tactical graphics for minefields now use different fill patterns to represent the type of mines in the minefield: antitank, antitank with antihandling device, antitank wide area, antipersonnel, decoy, and decoy fenced.	VRV-3.1, VRV-IPB16
VRV-4468	Minefields (Element Definitions)	The new tactical graphics for minefields--antitank, antitank with antihandling device, antitank wide area, antipersonnel, decoy, decoy fenced, and unspecified--use standard fill patterns to differentiate the type of mines in the minefield. They also display appropriate text on the outlines of the areas.	VRV-3.1, VRV-IPB16
VRV-4470	Some Area TGs should have more informational text at the center of the area	Some areal tactical graphics show more information than they did in previous releases, such as altitude and the time during which the graphic is active.	VRV-3.1, VRV-IPB16
VRV-4474	Display appropriate visuals for an empty scene	Channels now display an overlay containing the MAK One logo when no terrain is loaded. A new ImGui check box in the F4 debug options allows you to enable or disable this feature as desired.	VRV-3.1, VRV-IPB16
VRV-4478	Hide/Show tactical graphics based on its Activation State	You can now set VR-Vantage to display tactical graphics only when they are active. This option is in the Tactical Graphics Display Settings, found in the Display Settings.	VRV-3.1, VRV-IPB16
VRV-4491	Tactical Graphics should be colored by force type by default	Most tactical graphics now default to be the color of the force with which they are associated.	VRV-3.1, VRV-IPB16
VRV-4495	Improve performance in osgEarth and also frames per second.	Made various fixes and optimizations to increase both frames per second and loading time in osgEarth.	VRV-3.1
VRV-4505	Implement GAR Grid Lines	You can now see Global Area Reference System (GARS) grid lines in the Plan View. GARS is a standardized geospatial reference system developed by the National Geospatial-Intelligence Agency (NGA) for use across the U.S. DOD. When you want to work with multiple coordinate systems in the Plan View, the new Grid Line Selector toolbar allows you to rapidly toggle between grid line overlays. By default, it is set up to show DDM, GARS, or MGRS. You can customize the available coordinate systems in the Grid Lines Settings page of Display Settings.	VRV-3.1, VRV-IPB17
VRV-4507	Remove DiGuy Motion Model	Moved the relevant code into a new DI-Guy motion controller object, which the DI-Guy character model creates/owns. Removed all previous references to the motion model and the add/remove model methods that its use caused us to add.	VRV-3.1, VRV-IPB17

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4513	Allow more Text Box Visualizer properties to be user-settable via configuration	You can now specify more text box properties using element or visual definitions: Origin Placement Policy, Text Horizontal Alignment Policy, and Background Color. Text Horizontal Alignment Policy requires that Default Width and Default Height are defined.	VRV-3.1, VRV-IPB16
VRV-4517	Add command line argument to disable model sets	Some users do not need all of the model sets, and those users might want to disable the sets they are not using. The new --disableModelSets "#" command-line option allows you to specify the sets you want to disable: 3D model set (0), colorized models (1), minimap (4), or 2D icons model set (5). You can also specify multiple model sets by separating them with commas. For example, --disableModelSets "0, 1" disables the 3D and XR (colorized) model sets.	VRV-3.1, VRV-IPB16
VRV-4538	Allow Outline Textures to be larger than 16x16	Allowed for more configuration of the outline textures of tactical graphics so that they display as desired.	VRV-3.1, VRV-IPB16
VRV-4541	Make Antivehicle Ditch/Wall Tactical Graphics conform to MIL STD 2525D	The tactical graphics for Ditch and Fortified Ditch now conform to MIL STD 2525D.	VRV-3.1, VRV-IPB16
VRV-4551	Move Range/Bearing Line Support for Plan View (2D) from VR-Forces to VR-Vantage	You can now measure bearing and range by drawing a range line. See "Range Lines" in the Intervisibility Objects chapter of the VR-Vantage Users Guide (or the help).	VRV-3.1, VRV-IPB16
VRV-4554	Add Boundary Line Tactical Graphic	VR-Vantage can visualize the new Boundary Line tactical graphic.	VRV-3.1, VRV-IPB18
VRV-4560	Add support for text rotation in world space	Text on linear tactical graphics is now aligned with the segment it is adjacent to. Text for areas is now in the center.	VRV-3.1, VRV-IPB16
VRV-4562	Add Screen-Interval Text Rendering support to Overlay Line Models	Added the capability to render text at intervals along the lines for tactical graphics to support more complicated models such as Boundary Line, which renders informational text along the line. The text renders at specific intervals depending on the size of the tactical graphic and the position of the observer view.	VRV-3.1, VRV-IPB18
VRV-4565	Add functionality to tactical graphic models to enable them to be hidden rather than destroying them	If you experience performance issues when hiding and showing tactical graphics in scenes with a large number of them, you can choose to make them invisible when hiding them. (The default behavior is to destroy and recreate them.) To configure tactical graphics to be invisible when hidden instead of destroyed, clear the new Delete Tactical Graphics on Hide check box in Tactical Graphics Display Settings.	VRV-3.1, VRV-3.2, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4569	Add support for a maximum text bounds in world space	Text on tactical graphics is now hidden when the observer is at an altitude such that the text is longer than the adjacent line segment or shape. The text on larger tactical graphics is visible at higher altitudes than the text on smaller ones.	VRV-3.1, VRV-IPB16
VRV-4611	Add Airspace Control Zone Tactical Graphics	Added support for Air-to-Air Restricted Operations Zone, Base Defense Zone, Fighter Engagement Zone, High (Altitude) Missile Engagement Zone, High-Density Airspace Control Zone, Low (Altitude) Missile Engagement Zone, Restricted Operations Zone, Short Range Air Defense Engagement Zone, Unmanned Aircraft Restricted Operations Zone, Weapon Engagement Zone, Weapons Free Zone.	VRV-3.1, VRV-IPB18
VRV-4614	Improve Polygon Fill	Modified the polygon stipple fill to be texture-based. The stipple texture pattern is now projected onto the polygon and UV coordinates are scaled based on discrete camera altitudes.	VRV-3.1, VRV-IPB17
VRV-4623	Add texture limiting code to osgEarth	There are new command-line options that you can use to limit the size of the textures that: --limitEarthSplatingTextures, --limitEarthTerrainTextures, and --limitEarthVegetationTextures. These allow you to constrain the amount of GPU (video) memory used for .earth files. For each, you specify the width and height of the texture limit as a power of 2, for example, --limitEarthTerrainTextures "16". If you do not enter a power of 2, VR-Vantage rounds it up to the next highest power of 2.	VRV-3.1, VRV-IPB18
VRV-4624	Show Only Active Tactical Graphics Needs a Toolbar Button	You can control whether active tactical graphics are the only ones displayed using the new Show Only Active Tactical Graphics button on the Display Settings toolbar.	VRV-3.1, VRV-IPB18
VRV-4629	Automatic save of DMP files	DMP files now save automatically, even if you are unable to respond to the error message prompting you whether to save one.	VRV-3.1, VRV-IPB18
VRV-4664	Add Airspace Control Line Tactical Graphics	There is support for many 2525D tactical graphics, which include Identification, Friend-or-Foe (IFF) Off Line and Identification, Friend-or-Foe (IFF) On Line for Airspace Control.	VRV-3.1, VRV-IPB19
VRV-4668	Put Geodetic Grid Labels at the top and side of the display when zoomed in.	Geodetic coordinates now display at the left and top edges of the window, no longer cluttering the view in the center of the window.	VRV-3.1, VRV-IPB17
VRV-4669	Put MGRS grid line labels at the top instead of at the bottom of the display	The MGRS coordinates now display at the top of the relevant lines, rather than the bottom.	VRV-3.1, VRV-IPB17

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4677	Add Link to HTML docs in the doc folder under the start menu	You can now access the VR-Vantage HTML5 help using the shortcut in the Documentation folder of the installation.	VRV-3.1, VRV-IPB17
VRV-4687	Make Phase Lines conform to MIL STD 2525D	Phase lines now conform to MIL STD 2525D.	VRV-3.1, VRV-IPB18
VRV-4703	Add color control adjustment for plan view	There are new color controls for 2D map views (Plan View) which helps you see tactical graphics and other overlay information more clearly. The color controls include adjustments for grayscale invert, contrast, brightness, and color mix. You can enable and disable color controls using the icon located on the Display Settings toolbar or through the Display Settings.	VRV-3.1, VRV-IPB18
VRV-4706	Add element definition/type mapping configuration for Dynamic Terrain Tank Scrape	VR-Vantage applications can visualize tank scrapes created in VR-Forces.	VRV-3.1, VRV-IPB17
VRV-4709	Add option to set friendly force tactical graphics color from blue to black or white	For friendly forces, you have the option to display tactical graphics as either black or white. Other forces' tactical graphics display as their defined color.	VRV-3.1
VRV-4716	VR-Vantage to use VR-Link weather classes for all weather state	VR-Vantage now uses the METOC FOM for simulating weather.	VRV-3.1, VRV-IPB19
VRV-4722	Add visual support for more Maritime light types (e.g. warning, distress, anchor, RAM, fishing, mine hunting)	Added visual support for more maritime light types including warning and safety lights, distress beacons and strobes, upper deck flood lights, anchor lights, wave off lights, not under command lights, restricted ability to maneuver (RAM) lights, fishing with nets lights, fishing with lines lights, and mine hunting lights.	VRV-3.1, VRV-IPB19
VRV-4729	Add support for 2525D Area of operations	Added support for Area of Operations tactical graphic.	VRV-3.1, VRV-IPB17
VRV-4730	Add support for 2525D Assembly Area	Added support for Assembly Area tactical graphic.	VRV-3.1, VRV-IPB18
VRV-4731	Add support for 2525D Engagement Area	Added support for Engagement Area tactical graphic.	VRV-3.1, VRV-IPB18
VRV-4732	Add support for 2525D Objective Area	Added support for Objective Area tactical graphic.	VRV-3.1, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4733	Add support for 2525D Named area of interest	Added support for Named Area of Interest tactical graphic.	VRV-3.1, VRV-IPB18
VRV-4735	Add support for 2525D Target Areas	Added support for Target Area tactical graphics: Area, Rectangular, Circular, Smoke, and Bomb.	VRV-3.1, VRV-IPB17
VRV-4738	Add environment variable for overriding DI-Guy log hiding	If you want to enable DI-Guy logging in VR-Vantage, create the environment variable VRV_DIG_LOGGING_ENABLE.	VRV-IPB17
VRV-4747	Add support for more 2525D area graphics	Added support for Base Camp, Guerrilla Base, Target Area of Interest, Assault Position, Attack Position, Detainee Holding Area, Refugee Holding Area, Forward Arming and Refueling Point, Brigade Support Area, Division Support Area, and Corps Support Area.	VRV-3.1, VRV-IPB18
VRV-4752	Remove use of boost::bind in vrvCigi	The CIGI code makes heavy use of signals and so moved to std::bind instead of boost::bind.	VRV-3.1, VRV-IPB19
VRV-4755	Support symbol decorations that are only shown on mouse over.	You can specify whether labels display all of the time or only when you mouse over simulation objects.	VRV-3.1, VRV-IPB18
VRV-4756	Support multiple positions for PVD Entity Labels	When simulation objects are close together, their labels can sometimes overlap in the Plan View. You can now select an entity and then press Ctrl+Shift+S to rotate the label through four cardinal positions. Continue cycling the label until it displays as desired.	VRV-3.1, VRV-IPB17
VRV-4760	Radar arrays (rotating, stationary) automatically.	Radar arrays now automatically rotate based on the configuration in a metafile. This has been set up for the surface watercraft that are included in the MAK data package for VR-Vantage 3.1 and complementary products.	VRV-3.1, VRV-IPB17
VRV-4763	Aircraft Flaps (full, mid, up) and Slats (up, down).	Added support for articulated parts that are configured on aircraft models, allowing simulation software to control them.	VRV-3.1
VRV-4767	Add support for more 2525D lines	There is now support for other 2525D tactical graphics: Airborne Or Aviation Axis Of Advance, Bridgehead Line, BattleField Handover Line, Bridgehead Line, Common Sensor Boundary, Coordinated Fire Line, Delay Line, Final Coordination Line, Fire Support Coordination Line, Forward Edge Of The Battle Area, Intelligence Coordination Line, Limit Of Advance, Line Of Departure, Line Of Departure Or Line Of Contact, Probable Line Of Deployment, Release Line, Restrictive Fire Line.	VRV-3.1, VRV-IPB17
VRV-4780	Add support for Gladiator Airport Lighting Model	Airports in terrains can now display various aerodrome and runway lights.	VRV-3.1, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4781	Add support for more 2525D airspace control measures	VR-Vantage can display tactical graphics for these airspace control measures: Low-level Transit Route, Minimum-risk Route, Safe Lane, Special Corridor, Standard Use Army Aircraft Flight Route, Transit Corridor, Unmanned Aircraft (UA) Corridor.	VRV-3.1, VRV-IPB17
VRV-4782	Add support for 2525D Counterattack	VR-Vantage can now display the Counterattack linear tactical graphic.	VRV-3.1, VRV-IPB17
VRV-4784	Add support for 2525D Air Control Point	VR-Vantage can now display the Air Control Point circular tactical graphic.	VRV-3.1, VRV-IPB17
VRV-4787	Add support for 2525D Friend-or-foe lines	VR-Vantage can now display tactical graphics for Identification, Friend-or-foe Switch Off-line and Identification, Friend-or-foe Switch On-line.	VRV-3.1, VRV-IPB17
VRV-4788	Add support for 2525D Obstacle Control Measures	VR-Vantage can now display tactical graphics for obstacle control measures: Obstacle Belt, Obstacle Free Area, Obstacle Line, Obstacle Restricted Area, Obstacle Zone.	VRV-3.1, VRV-IPB17
VRV-4791	Add support for 2525D explosives and roadblock	VR-Vantage can now display tactical graphics for Planned Explosive State Of Readiness, Explosives, State Of Readiness 1 (Safe), Explosives, State Of Readiness 2 (Armed But Passable), Roadblock complete (executed).	VRV-3.1, VRV-IPB17
VRV-4792	Add ability to set distance between parallel line style to less than 1 km	Previously, the line style of two parallel lines was for air corridors, which was fixed at a minimum of 1 km. This line style is now used for other 2525D symbols, such as Planned Explosive State Of Readiness, and therefore can be set to be less than 1 km.	VRV-3.1, VRV-IPB19
VRV-4793	Add support for 2525D traffic routes	Added support for One-way Traffic and Alternating Traffic routes.	VRV-3.1, VRV-IPB18
VRV-4809	Add an Exhaust Plume visual type	There is now an Exhaust Plume visual type. You can use this to configure model definitions and also choose whether to display it in the Observer Settings.	VRV-3.1, VRV-IPB17
VRV-4816	Abstract osg::texture to reduce the need for more OSG classes	There are model instance classes that are in the OSG project solely to use OSG file cache to load textures. Abstracting the texture interface means, for new tactical graphic models, there is only a need for two classes: model and modelInstance. The osgModel or osgModelInstance are not required.	VRV-3.1, VRV-IPB18
VRV-4826	Delete cache directory automatically if driver changes	The application now checks whether your graphics card driver version changes--either to an older or newer driver--and automatically removes cached shaders and so on from the directory. This prevents an error about binary compatibility that users previously experienced, where the cached data became invalid due to the changed driver.	VRV-3.1, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4856	Change 3D entity label to look more like 2D symbol decoration	The Symbol Decoration Settings page in Display Settings now allows you to control what labels display for each model set. Previously, it applied only to the 2D model set; the labels in the 3D model set were not configurable.	VRV-3.1, VRV-IPB18
VRV-4857	Add lines beneath routes and track histories	There are now height lines that display below route tactical graphics and entity track histories. These lines display in regular intervals along the routes and tracks, pointing towards the earth to help you see where they are positioned relative to the terrain. You can configure the height lines using the Visual Model Editors dialog box. To enable or disable the height lines, use the Enable Height Lines Along Routes check box in the Tactical Graphic Display Settings or the Height Lines check box in the Track History Settings.	VRV-3.1, VRV-IPB18
VRV-4864	Display indicator of successful IFF Lethal Interrogation	There is a visualization for lethal IFF interrogation reply interactions. If the target of the interrogation has Mode 5 available but has not enabled it, the interrogated entity briefly displays a V in the Plan View.	VRV-3.1, VRV-IPB18
VRV-4869	Create a tool that generates a bounding boxes config file for PE2 vegetation	The new simTreesTool is a command-line tool for reading vegetation models and getting the bounding box values or the sim trunk and crown values. It generates a file that VR-Forces uses to create simplified geometry when you enable vegetation for the simulation engine.	VRV-3.1, VRV-IPB18
VRV-4873	Show Laser Designator Line in PVD/XR	In the Visual Model Editors, you can now configure the 2D and 3D Laser Designators visualizer definitions for entities to display a line, and you configure the appearance of the line. Define the islaserlinevisualized, lasercode lodoutaltitude, laserlinestipplepattern, and laserlinecolor visual definition attributes.	VRV-3.1, VRV-IPB18
VRV-4885	Add support for 2525D Screen/Cover/Guard	VR-Vantage can now display the Cover, Guard, and Screen maneuver control tactical graphics.	VRV-3.1, VRV-IPB18
VRV-4887	Update Bing Imagery configuration to enable customer to add their own key	You can now get your own key to use Microsoft Bing imagery services and then configure it in the ./SharedData/17/latest/TerrainData/TerrainConfiguration/imagery.worldwide.BingMaps.online.xml file. That file also includes information on how to get a key.	VRV-3.1, VRV-IPB18
VRV-4890	Add separate symbol decoration settings for each model set	The Symbol Decoration Settings page in Display Settings now allows you to control what labels display for each model set. You can also specify whether labels display all of the time or only when you mouse over simulation objects.	VRV-3.1, VRV-IPB18
VRV-4903	Support different cache directory for SensorFX	SensorFX information is now cached in its own directory. The default location is ./appData/cache/sensorFx. You can customize this using the JRM_CACHE_DIR environment variable.	VRV-3.1, VRV-IPB18

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-4926	Add a new way to visualize 3D entity tactical decorations	There are more options for visualizations. For example, air entities in the Stealth and XR views can now show a heading indicator, a velocity indicator, and a height line. The latter is a narrow white line that is different from the height above terrain line.	VRV-3.1
VRV-4937	New attachment modes for tactical graphics attaching to entities	Added support to allow VR-Forces users to control the orientation/heading when attaching tactical graphics to entities. See VRF-6751 in the VR-Forces Release Notes.	VRV-3.1, VRV-IPB18
VRV-4944	Add platform type to symbol decoration settings	You can specify symbol decorations by platform (fixed wing, ground, lifeform, rotary wing, space, subsurface, surface).	VRV-3.1, VRV-IPB18
VRV-4954	Add ability to project tactical graphic areas on the terrain in 3D views	Areal tactical graphics now display in the 3D view more like they do in the 2D view. They also contour to the terrain, including any fill patterns. This helps users spatially identify the areas in 3D.	VRV-3.1
VRV-4956	Annotate Aerodrome runway state	When runways are active, text and an arrow indicate this.	VRV-3.1, VRV-IPB18
VRV-4972	Enable Feature reference in procedural buildings intersect block	Procedural buildings previously used OSM data intersected with a feature to mask areas where it should not render buildings because of an inset area. Now, you can use a feature reference, which allows you to define a mask feature outside of the buildings block. That enables you to have different mask areas without multiple versions of the XML file.	VRV-3.1, VRV-IPB19
VRV-4988	Support Rabbit Runway Lights	Airports in terrains can now display various aerodrome and runway lights. (Documentation updates will be covered separately from this particular ticket.)	VRV-3.1, VRV-IPB18
VRV-4989	Runway painted numbers in UK for procedural airports	In procedural airports, the runway numbers display in the manner expected for the countries where they are located.	VRV-3.1, VRV-IPB18
VRV-5014	Make SensorFX work with pageable terrain patches	Fixed timing issue to ensure pageable terrain patches display correctly with SensorFX. Added thread safety.	VRV-3.1, VRV-IPB18
VRV-5022	Add earth file parameters to overwrite large Z values scaling on GT trees (published by CAE Lithos tool)	Added support for CDB terrains published using the CAE Lithos tool. Added parameters to scale GT models, such as trees.	VRV-3.1, VRV-IPB18, VRV-3.0.3b
VRV-5025	Add support for 2525D Observation Posts	There is support for 2525D maneuver point tactical graphics, which include: CBRN Observation Outpost, Combat Outpost, Forward Observer Outpost, Outpost Unspecified, Reconnaissance Outpost, Sensor Outpost.	VRV-3.1, VRV-IPB19

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5053	Add Sphere and Hemisphere tactical graphics	Use the new Sphere and Spherical Sector tactical graphics to define 3D areas in space: a full sphere and a hemisphere.	VRV-3.1, VRV-IPB19
VRV-5061	Add support for more 2525D Obstacle Control Measures	There is support for 2525D obstacle control measure tactical graphics, which include: Block, Disrupt, Fix, Turn.	VRV-3.1, VRV-IPB19
VRV-5062	Support CDB T2D dataset	Added support for the T2D dataset, which is tiled but contains only 1 LOD.	VRV-3.1
VRV-5086	Make osgEarth procedurally generated buildings destructible	For detonations of appropriate size near a vertex of a procedurally generated building, the buildings is replaced with a rubble model. This works for any osgEarth terrain using the osm.features.xml and the debris models provided in the MAK data package. For details about these files, see the Adding Content to MAK ONE Applications Reference Manual or the product help.	VRV-3.1
VRV-5106	Put log and dmp files into new Log directory	All MAK ONE log and dmp files are now saved in a central location. The default is C:/MAK/logs, which you can change by using the MAK_LOG_DIR environment variable to specify a different path.	VRV-3.1, VRV-IPB19
VRV-5111	Ship the VR-Vantage Quick Reference Card as a separate PDF	The VR-Vantage Quick Reference Card has been removed from the end of the VR-Vantage Users Guide. It is now a separate, easy-to-reference PDF included in the installation and available online on the VR-Vantage Products Specifications & Dependencies page.	VRV-3.1
VRV-5120	Need to template DtAerodromeStateInterceptor	This allows VR-Forces to provide the subclass of the aerodrome state repository that it needs to use.	VRV-IPB19
VRV-5122	Lat/Lon Strings should have leading 0 for <10 minutes	Latitude and longitude now correctly display a leading 0 for the minutes if the value is less than 0. For example, 21° 05' 07".	VRV-3.1, VRV-IPB19
VRV-5139	Update Start Menu Links	To account for the "flatter" menu structure of Windows 10 and Windows 11, the Start menu links to VR-Vantage and its associated applications now display the version information. The documentation and tools are in versioned subfolders, and there are also versioned shortcuts on the Start menu to access the folders.	VRV-3.1, VRV-IPB19
VRV-5143	Add support for different models for the same airport light type	Airports in terrains can use different models to display various aerodrome and runway lights.	VRV-3.1, VRV-IPB19

Table 2. Feature List (continued)

Key	Summary	Release Notes	Fix Version/s
VRV-5145	Add support for Land Platforms: Left/Right Indicator Lights and Emergency Lights	Added support for land platforms to control left and right indicator lights as well as emergency lights.	VRV-3.1, VRV-IPB19
VRV-5167	Support hiding OSM building with Indirect Rendering	Changes to support hiding instanced, non-instanced, and externally referenced buildings when rendered by indirect rendering. This is part of the work to allow for destroying buildings in terrains.	VRV-3.1
VRV-5170	Heading and Velocity indicator lines need to be force color	Heading and velocity indicators are colored for the force of the entity.	VRV-3.1, VRV-IPB19
VRV-5172	Add visual support for HDU Lights	Added visual support for air refuel platforms to turn HDU lights on and off.	VRV-3.1, VRV-IPB19
VRV-5178	Add visual support for more Maritime light types requiring controllable intensity (i.e. Flight Deck/Horizon Bar/Glide Path Indicator)	Added visual support for more maritime light types that allow for control of the lights' intensity. Some examples are flight deck lights, horizon bar lights, glide path indicator lights, and so on.	VRV-3.1, VRV-IPB19
VRV-5179	Horizon Bar Articulation	Horizon bars on surface vessels can now articulate such that they mimic the horizon of the world when the vessel rocks on the ocean surface. This articulation works only when the horizon bar lights are turned on.	VRV-3.1, VRV-IPB19
VRV-5180	Create generic particle system visualizer	There is a new conditional particle system visualizer that can be used for trail effects, flames, smoke plumes, and other visualizers.	VRV-3.1, VRV-IPB19
VRV-5183	Several Linear Objects need to use Projected 3d Graphics	These linear objects now use projected 3D tactical graphics: Phase Line, Line, and Battle Field Handover Line.	VRV-3.1, VRV-IPB19
VRV-5184	Add a 'Dome' tactical graphic	Added support for a Dome tactical graphic.	VRV-3.1, VRV-IPB19
VRV-5189	Rotate Air and Munition entity icons with the entities heading independent of other icons	Rotating 2D icons to the simulation object's heading now works only for aircraft and munition entities by default. Other platforms do not rotate when you enable the Rotate Entity Military Standard Symbols to Heading setting unless you edit the rotateiconheading definition for those entities.	VRV-3.1, VRV-IPB19

Table 2. Feature List (continued)

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

Table 2. Feature List (continued)

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

Known Problems

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

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

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

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