



1.4.6

US 593 Changed `ScalarSettings::legendVisible(bool)` to `ScalarSettings::legendVisibilityMode()`.

Added support for setting the color legend to auto (show the legend if used by any item in the 3d view, default), always (show the legend independent of use) or never (always hide). To port old code, modify `setLegendVisible(true)` to `setLegendVisibilityMode(ScalarSettings::AUTO)` and `setLegendVisible(false)` to `setLegendVisibilityMode(ScalarSettings::NEVER)`.

US 592 Added option for always using polygon offset for parts in `UnstructGrid` model.

This might be useful if you have parts with primitives in the same plane and are using eye-lift (`setEyeLiftFactor`) in order to control the visibility of the part. Added `cee::ug::PartSettings::setAlwaysUsePolygonOffset()`

US 591 Increased the number of clipping planes in one View from 6 to 12.

This applies both to cutting plane clipping (`cee::ug::CuttingPlane::setClipping()`) and to View clipping (`cee::vis::Clipping`).

US 587 Improved accuracy of filled contours scalar mapping when having (very) uneven levels (`cee::ug::ColorMapper::type() == FILLED_CONTOURS`).

US 585 Added new `wheelEvent()` for `CameraInputHandler` for enabling zoom to cursor functionality

US 581 Add reader for MSC/Marc `.t16` and `.t19` files in the `ImportCae` component.

US 574 Added support for undefined, above and below range colors to the scalar mappers deriving from `ScalarMapperContinuousDomain`.

Added `EffectTexture::createResultMapping()` to help setup a texture effect suited for results mapping. More accurate results mapping in the `ScalarMapperFilledContours` when the levels differ vastly in size.

US 572 Removed `ScalarSettings::enableFringesElementFiltering()`.

Filtering is enabled when calling `setFringesElementFilteringVisibleRange()` and disabled by calling `disableFringesElementFiltering()`.

US 564 Added `cee::ug::DataElementSetGenerator::createAllElementsPart()`

1.4.5

US 562 `GeometryModel::setModelTransformation` and `modelTransformation` renamed to `setTransformation()` and `transformation()`. Signature also changed to return a const ref (in c++).

US 561 Extension and refactor of scalar mappers and color legend and in `cee::Visualization`.

Added 4 new scalar mappers: `ScalarMapperFilledContoursUniform`, `ScalarMapperFilledContours`, `ScalarMapperContinuous` and `ScalarMapperContinuousPiecewise`. Added `OverlayColorLegendContinuousDomain` which supports all four mappers.

Changes: `ScalarMapperUniformLevels` is replaced by `ScalarMapperFilledContoursUniform`. `OverlayColorLegend` is replaced by `OverlayColorLegendContinuousDomain`.

See documentation of `cee::vis::OverlayColorLegendContinuousDomain` for more information and examples.

US 552 Added `cee::ug::ColorMapper::setTextureSize()` to control the size of the texture used in the `UnstructGridModel` to show scalars.

US 458 Added support for drawing cutting planes with the color of the source part (if not mapping results onto the plane).

Added `CuttingPlane::setUseSourcePartColor()`.

1.4.4

US 507 Updated `ImportCAE` file readers with support for Abaqus 2016 model files

US 506 Updated `ImportCAE` file readers with bug fixes

US 504 Added readers for LS-DYNA files in the `ImportCAE` component.

One reader handles input (keyword, *.k) files and an another one handles results (state database, *.d3plot; *.ptf) files.

US 481 Added support for node sets in the `UnstructGrid` component.

Added the `DataNodeSet` and `DataNodeSetItem` classes to store a node set. Added `DataNodeSetGenerator` class for generating node sets based on a region of the screen (rectangle or polygon), a plane or all the nodes in a given frame.

US 478 Added methods to access the underlying raw data pointer in part result classes (`DataPartScalar`, `Vector`, `SymmetricTensor`, `Displacement`, `Visibility`). This allows an optimized parsing of the values. It is the user's responsibility to ensure that parsing is within bounds.



- US 477 Reduced VTFx export time when writing cases that use the same database
- US 474 Added method for querying outline edges (based on the current crease angle setting) of an unstruct grid part.
See `VisualizationPartQuery::outlineEdges()` for more info.
- US 473 Added method for querying edges of an element in an unstruct grid part.
See `ElementsQuery::elementEdges()` for more info.
- US 472 Added multiple section definition support to Vdm-based readers. Certain Cae databases contain results that are based on more than one section definition. For example, stress and strain may on one and temperature on another.
- US 468 Added a `PartSetting` for controlling the line width of the mesh and outline mesh lines.
See `PartSettings::setMeshLineWidth()` for more info.
- US 467 Added option to always show the labels on the axis cross (to disable the depth test vs the axis arrows).
See `OverlayAxisCross::setAlwaysShowLabels()` for more info.
- US 460 Added an STL reader to the `ImportCAE` component.
Both ascii and binary files are supported. The reader produces a single-state, single-geometry, single-part model.
- US 456 Added support for transformation matrices for all `MarkupPart*` classes.
- US 427 Added `frameIndex()` to `HitItem` and `PartHitItems` in the `UnstructGrid` component.

1.4.3

- US 464 Added text alignment to `OverlayTextBox`.
Text alignment is set using `cee::vis::OverlayTextBox::setTextContentAlignment()`. Options are LEFT, CENTER or RIGHT.
- US 463 Updated `ImportCAE` file readers with new features and bug fixes
- US 461 Added helper method to `ug::DataElements` that returns an element's index given its id using a simple linear search. The method will assert if no element ids are defined.
- US 457 Added `DataElementSet::addItems(...)`. This is a much faster way to add multiple elements for a given part to a `DataElementSet`.
- US 450 Added helper method to `ug::DataNodes` that returns a node's index given its id using a simple linear search. The method will assert if no node ids are defined.
- US 447 Added a query to `ElementsQuery` to gather all elements that contain a given node
- US 445 Added a query to `ElementsQuery` to gather all elements that contain an edge given by its two nodes
- US 438 Added label size query (in pixels) to `MarkupPartLabels`. `MarkupPartLabels::width()` `MarkupPartLabels::height()` for more info.
- US 437 Reduced vertex count in display model by 33% (QUAD/HEX) to 56% (QUAD8/HEX20) for models with per element and per element results.
- US 436 Added `View::regionClosestVertex()`.
This will find the vertex (in world coordinates) closest to the front clipping plane within the given screen based region.

1.4.2

- US 425 Added support for cutting plane animation. Use the class `cee::ug::CuttingPlaneAnimation` to setup the animation.
- US 423 Added support for uniform spacing of tickmarks on custom continuous color legends.
`ScalarSettings::setForceUniformLevelSpacing()` have been renamed to `setForceUniformTickMarkSpacing()` and this now controls the color legend in both `FILLED_CONTOURS` mode and with custom continuous tick marks.
- US 421 Added support for controlling scalar filtering of elements with undefined scalar results. Default is now that elements with a undefined scalar result is visible even when the scalar filtering is enabled.
To hide elements with undefined scalar results, use the method `ScalarSettings::setFilterUndefinedElements(true)`.



- US 419 Improved performance for creating parts with OUTLINE and SURFACE_OUTLINE_MESH draw styles in the UnstructGridModel.
Computation of outline and outline mesh lines is now 5-10 times faster. Switching the model from SURFACE to OUTLINE draw style is now 3-4 times faster.
- US 418 Improved performance for generation and rendering of element mesh lines (SURFACE_MESH) in the UnstructGridModel.
Computation of element mesh lines are now 5-10 times faster. Switching the model from e.g. SURFACE to SURFACE_MESH draw style is now 2-3 times faster.
- US 400 Scalar Color mapper: Added support for setting opacity for values above and below the current range of the color legend.
Added `cee::ug::ColorMapper::setAboveRangeOpacity()` and `cee::ug::ColorMapper::setBelowRangeOpacity()`

1.4.1

- US 413 Improved drawing performance for the SURFACE_MESH draw style in the unstructured grid component
- US 412 Added `size_t View::modelIndex(Model* model) const`
- US 399 `ug::ElementHighlighter`: Added support for highlighting hititems on cutting planes, isosurfaces and isovolumes.
Added `partId()` to `ug::HitItem` which contains the id of the DataPart even for hititems on cutting planes, isosurfaces and isovolumes.

1.4.0

- US 369 Added a Python interface to Ceetron 3D Components. The interface is produced using SWIG and distributed in the form of a Python 3.4 or higher module named `cee`, with submodules `core`, `ug`, `vis`, `geo`, `imp`, `exp`, `plt`, and `rep` giving access to the functionality of each component of the C++ distribution : `Core`, `UnstructGrid`, `Visualization`, `Geometry`, `ImportCAE`, `Export`, `Plot2d` and `Report`.

The Python interface is available for Windows only in this release. It has been compiled for 64-bit platforms and runs with Python 3.4 (64bit) or higher. Platform integration classes are provide for PyQt5, as illustrated in the demo application of the distribution.

Please consult the online documentation for further details, in section `Topics/Python users`.
- US 368 Added `cee::Vec2d` class.
- US 367 Remove "Ceetron" folder from start menu path for setup. Windows 8 and 10 do only support two levels in the star menu hierarchy.
- US 366 Added a new component, `Plot2d`, for 2D plotting. Please see the online documentation for more information and example code
- US 357 Added support for vector results in local (default) or world coordinates in the UnstructGridModel. If set to world coordinates, the vector directions are not transformed by the part transform matrix.

The base position of the vector arrows will of course follow the transformed part. See `VectorSettings::setResultInLocalCoordinates()` for more info.

1.3.1

- US 347 Added support for shader computed flat normals: `cee::ug::ModelSettings::setUseShaderComputedFlatNormals()`.

This settings reduces vertex count 3-6 times (depending on model) compared to the 1.3.0 version. Still a reduction of 50-70% with the new (US345) flat shading optimizations.

Note: This technique has some artifacts when combined with ZOOM navigation. When you zoom in with a very large factor the model will start to show a pattern and not smooth colors anymore. This artifact can be avoided by using WALK navigation.
- US 346 Added setting of label border width to MarkupPartLabels.

Added `cee::vis::MarkupPartLabels::borderWidth()/cee::vis::MarkupPartLabels::setBorderWidth()`.
- US 345 Optimized memory usage (CPU and GPU) and rendering speed for part with flat shading (`cee::ug::PartSettings::setSmoothShading(false)`).
Reduced GPU memory usage with around 40%.
- US 340 Optimized and added improved support mode-shape animations.

Added `ModeShapeAnimation` class (accessible from the `ModelSpec`) with settings related to mode-shape animation. See documentation for more info.



- US 339 Select parts in the GeometryModel by a polygon in screen coordinates.
Added `cee::geo::GeometryModel::polygonIntersect()`. Extends the `regionIntersect()` method from a rectangular region to an arbitrary polygon in screen coordinates. See documentation for more information.
- US 338 Added support for rendering unlit triangles in the MarkupModel. Added lighting setting to `cee::vis::MarkupPartTriangles`.
- US 337 Select parts in the UnstructGridModel by a polygon in screen coordinates.
Added `UnstructGridModel::polygonIntersect()`. Extends the `regionIntersect()` method from a rectangular region to an arbitrary polygon in screen coordinates. See documentation for more information.
- US 331 Added support for 2D drawing.
Added `cee::vis::Model::setUse2dPixelProjection()`. This makes it possible to render in a pixel exact 2D projection from all models, including both MarkupModel and GeometryModel (and even UnstructGridModel, although that might be a bit far-fetched). Models with this setting enabled will use the x,y part of the `cee::Vec3d` as (OpenGL based) screen coordinates. The z value of the coordinates will be used to order the items. The one with the largest z coordinate will be visible.
- US 325 Report images supports hyperlinks to the full model on Ceetron Cloud
- US 318 Create set in the UnstructGridModel by a polygon in screen coordinates.
Added `DataElementSetGenerator::createFromPolygon()`. Extends the `createFromRegion()` method from a rectangular region to an arbitrary polygon in screen coordinates. See documentation for more information.

1.3.0

- US 322 Added a new component for creating reports with interactive 3D models directly from the user application. Please see the online documentation for more information and example code.
Please note that the Report component requires a license with this feature enabled. All evaluation licenses have this feature enabled.
- US 321 Large performance increase when working with DataElementSet's. The DataElementSetGenerator has been optimized and performs much better, especially on large models/sets.
The `updateVisualization()` method has also been updated when using set filtering (`ModelSpec::setVisibleSetIds()`).
- US 320 Deleting unused data from DataSourceInterface based DataSources in `updateVisualization()`. This will reduce the memory usage when using file readers and switching between results, states, etc.
- US 319 Added setting of the width of the overlay color legend bar (the filled boxes) in the UnstructGrid component: `ScalarSettings::setLegendBarWidth()`

1.2.1

- US 317 Added DataElementSetGenerator class to create DataElementSets based on spacial positioning of the elements in the UnstructGridModel. You have methods to extract sets based on position to a plane and within a region of the screen.
Also added `Camera::planeFromWindowCoordinates()` to create a Plane from a line in screen coordinates.
- US 316 Added a flag to `DataSourceReader::reload()` in order to allow developers to control when the database should be reloaded.
- US 315 ImportCAE: Added support for reading 1D elements (`cee::ug::Element::POINTS`). This applies to all file formats supported by the ImportCAE component.
- US 75 Added support for element sets in the UnstructGrid component. Element sets can be used to filter the model by only showing the elements that are in the visible set(s). You can also show the complement of the visible set(s).
Added DataElementSet and DataElementSetItem classes. DataElementSets are managed by the DataSource. You specify which sets that should be used for filtering in the ModelSpec with the `ModelSpec::setVisibleSetIds()` method.

1.2.0

- US 313 Updated ImportCAE file readers with new features and bug fixes, which includes:
- Support for ANSYS 17
- US 312 Added support for user text files in the VTFx file. Any number of text files can be added by specifying a file name and the file content. Use `ExportVTFx::addUserTextFile()` to write to the VTFx and `FileBrowserVTFx::userTextFileCount()/userTextFileName()/userTextFileContent()` to access text files in the VTFx.

- US 311 Extended the capabilities of SurfacePathQuery to allow computing paths on cutplanes, isosurfaces and isovolumes. Also, querying for element surface result is now supported.
Removed path point structure PathPoint in class SurfacePathQuery. Points are now specified using `cee::ug::HitItem`
- US 310 Added `triangleIndex()` to `HitItem`. This index corresponds to the index of the triangle delivered by `VisualizationPartQuery` (normal parts) or `CuttingPlaneData`, `IsosurfaceData` or `IsovolumeData` for cut/iso/isovol.
Added `triangleIndex` as an optional parameter to `sampleScalar()` and `sampleVector()` in `CuttingPlane`, `Isosurface` and `Isovolume` to speed up the lookup if you know the triangle index (e.g. after picking).
- US 308 Visual Studio 2015 version. From this release we will support and deliver Ceetron 3D Components for VS2015 (32 and 64 bit).
- US 307 Extended and replaced `ScalarSettings::setAutoFullRange()` to `ScalarSettings::setAutoRangeMode()`. Supported modes are : OFF, ALL_ITEMS, VISIBLE_ITEMS
- US 303 Allowed for enabling/disabling surface path sampling. Disabled sampling ensures the path has points on each surface element
Added `SurfacePathQuery::enableSampling(bool enable)`
Renamed `SurfacePathQuery::sampleScalarResultValues` to `SurfacePathQuery::getScalarResultValues`
- US 302 Unstructured grid models support specifying a highlight color. Highlight color is overridden when halo is activated.
Added `ModelSettings::highlightColor()` / `ModelSettings::setHighlightColor()`
- US 301 Ceetron Cloud!
It is now possible to upload VTFx files generated by the Export component directly to Ceetron cloud, allowing you to add a Send-To-Cloud button in your app to provide a One-Click-Sharing experience to your users. A topic describing Ceetron Cloud integration has been added to the documentation.
Ceetron Cloud integration has been added to the Qt and .NET DemoApp. A `SendToCloud` button has been added on the toolbar to upload a model to Ceetron Cloud with the click of a button. The source code can be used as a template to integrate `OneClickSharing` into your application. A standalone command line uploader (`sendToCloud`) has also been added as a Qt example.
- US 299 Introduced a reader for sequential Vtk unstructured grid files (.vtu) and Paraview data files (.pvd).
New `DataReaderVtu` class in `CeelImportCae`
- US 298 Added atomic reference count in `cee::RefCountedObject`. Added class `cee::AtomicCounter` and using this in `cee::RefCountedObjects`. All `addRef/release` calls (and thus usage of smart pointers) are now thread safe.
- US 296 Added setting of eye lift factor to `cee::vis::MarkupPartLabels` and `cee::vis::MarkupPartText3d`. Previous versions used a hard coded value of 2.0, which did not give the desired result. The default is now 0.0 (no eye lift), and to get the old behavior you have to set the eye lift to 2.0 on the `MarkupParts`.
- US 294 Added `cee::Vec3f` class. `cee::Vec3f` is mainly by for the VTFx component.
- US 293 Added `cee::ug::VTFxFileBrowser::readTextFile()` to support reading of (custom) text/xml files from a VTFx file.
- US 292 Added setting to disable forcing of uniform level heights on the color legend. Useful if using uneven spaced levels and would like the legend to reflect this visually. Added `cee::ug::ScalarSettings::forceUniformLevelSpacing`.
- US 282 Added multi core optimization for several operations, especially in the `UnstructGrid` component.
`UpdateVisualization()` is now faster, and all the feature extraction (cutting planes, isosurfaces, isovolumes and particle traces) run in parallel using all available cores. Sorting of the rendering queue is also done in parallel, improving the the visualization speed with many parts.
- US 269 "Selectability" flag for parts in the `GeometryModel`. Parts can now be set to not be included in the `GeometryModel::rayIntersect()` and `regionIntersect()` methods. This is useful for limiting the parts that can be selected by the user. See `PartSettings::setIntersectable()`.

1.1.1

- US 280 Added point size and line width VTFx properties to `UnstructGrid` component.
- US 279 Added controls for ambient and specular intensity in `EffectColor`, `EffectFrontAndBackColor` and `EffectTexture` in the `Geometry` Component. This allows the user to control the light settings. Reducing the specular intensity and increasing the ambient intensity would lead to less dramatic lighting of the part.

US 276 Added new MarkupModel part: MarkupPartText3d. This part makes it possible to render text that is positioned, oriented and scaled in world coordinates.

This allows you to create text that is "glued" onto the model and follow the model when the user performs pan/rotate/zoom. The text 3d layout is described with a position, direction vector, up vector and a text height (all in world coordinates). See `cee::vis::MarkupPartText3d` in the documentation for more information.

US 275 Added support for showing a special text on the tick marks of the color legend in the UnstructGridModel if all results on the model are out of range of the color legend. See `cee::ug::ModelSettings::setColorLegendNoResultOverrideTickMarksText()` in the documentation for more information.

US 274 Added option to draw tick mark lines over the legend bar for continuous color legends. See `cee::ug::ScalarSettings::setForceTickMarkLinesToCoverLegend()` in the documentation for more information.

1.1.0

US 272 Added a new component for reading commercial FEA and CFD files. The Import CAE component provides a DataSource for the UnstructGrid Component that is capable of reading most commercial FEA and CFD files. Please see the online documentation for more information on how to use it and which file formats that are supported.

Please note that the ImportCae component requires a license with this feature enabled. All evaluation licenses have this feature enabled.

US 271 Added option to disable use of Vertex Buffer Objects (VBOs) in the UnstructGridModel. This is useful for large animations with changing nodes (displacements or remeshing) and many time steps.

See documentation of `cee::ug::ModelSettings::setUseVertexBufferObjects()` for more information.

US 270 Added support for setting a legend title font in UnstructGridModel. Color legends can now be rendered with a different font for the title and the tick-mark values.

Changes to `cee::ug::ModelSettings`:
- Removed `colorLegendFont()`.
- Added `colorLegendTitleFont()` and `colorLegendDetailsFont()`.

1.0.3

US 267 Added new optimized update action (`cee::ug::UnstructGridModel::NODE_POSITIONS`) for the UnstructGridModel to use when only the node coordinates have changed (not the number of nodes or the element topology). This will significantly reduce the update time when only modifying the node positions.

US 266 Added support for specifying a font for the OverlayAxisCross and the OverlayNavigationCube classes. The constructors now take a font in addition to a camera. To get the old behavior, modify the constructor to:
`new cee::vis::OverlayAxisCross(camera, cee::vis::Font::createNormalFont().get());`

Added method to set the axis labels for OverlayAxisCross as well as a better layout scheme for the axis labels. The default color of the labels is now white to match other overlay items (e.g. color legend). The default labels are now 'X', 'Y' and 'Z' (capital letters).

US 262 Added UpdateAction `UnstructGridModel::COLOR_LEGEND` for use when only the appearance of the color legend has changed (visible on/off, text color, etc). This update is much faster than e.g. `UnstructGridModel::SCALAR_SETTINGS`.

US 260 Added support for per-frame animation setup in the UnstructGrid component to allow the view to show the frames as they are complete. This is really useful for large models with many time steps that takes some time to setup. The user will see the frames as soon as they are ready and not have to wait until the complete animation sequence is ready.

Added the `cee::ug::UnstructGridModel::startUpdateVisualizationPerFrame()` and `cee::ug::UnstructGridModel::updateVisualizationForFrame()` methods. See `startUpdateVisualizationPerFrame()` for more information and an example of how to use this feature. Also added `cee::vis::View::requestImmediateRedraw()` which redraws the view immediately and does not wait for the normal app message queue processing.

1.0.2

US 258 Unified naming scheme for loggers used by Ceetron 3D Components. See "Topis: Logging" in the documentation for more information.

US 257 Extended clipping support in View to allow multiple UnstructGridModels to use different clipping planes that only affect the model they are defined in. This makes it possible to split a model and show the two parts with different settings (e.g. solid vs. transparent). This is done with two UnstructGridModels sharing the same data source.

US 256 Changed type of fillChar in `Str::arg()` functions from `wchar_t` to `char`

US 255 Added support for custom tick mark values on the color legend when using a CONTINUOUS color mapper. Added `ColorMapper::setCustomContinuousTickMarks()`. This allows the user to define the tick marks independently of the colors scheme or custom colors.



- US 254 Added per frame and per part bounding box query to `cee::ug::UnstructGridModel`.
- US 252 Moved `VTFxMemoryFile` from `CeeExport` to `CeeUnstructGrid` and added `cee::ug::VTFxFileBrowser::initialize(ug::VTFxMemoryFile* vtfxMemFile)`
- US 192 Added support for bounded clipping planes which makes it possible to cut holes in the model with multiple clipping planes and only cut out what is behind a specified number of clipping planes. By setting this number to the number of clipping planes you can e.g. create a box that cuts only what is inside the box and shows everything else. See the documentation of `cee::vis::Clipping` for illustrations and more information.

Also added support for bounded clipping planes for cutting planes in the `UnstructGrid` model that works the same way as in the `cee::vis::Clipping` class. See the documentation of `cee::ug::CuttingPlane` and `cee::ug::ModelSettings` for more information.