CustusX Feature overview

This is a list of the features implemented in CustusX from the user perspective.
Refer to doxygen for an architectural description.
Also fefer to the tutorial (in the release).

ID	Name	Description
1	**Services**	
1.1	**Patient**	
1.1.1	**Data Representation**	Representation of different kinds of patient data
	3D volumetric unsigned data	vtkImageData
	3D volumetric signed data	vtkImageData
	Mesh data	vtkPolyData
	Data orientation	Transform matrix
	Registration history	History of transforms
	Modality	MR,SC,CT,US
	Timestamp	
1.1.2	**Data Import**	
	Import Metaheader	Import .mhd format files.
	Import STL	Import .stl format files.
	Import VTK	Import .vtk format files. Also those with ITKSnap/Nifti axis definition
	Import DICOM	Import DICOM files. Linux only
1.1.3	**Data Export**	
	Export metaheader	
	Export VTK	
1.1.4	**Volume manipulation**	Change/merge with representation?
	2D TF	
	3D TF	
	Shading	
	TF Presets	
	Crop box	
	Clip Planes	
1.2	**Tracking**	
1.2.1	**Tool representation**	Navigation pointers, US probes, surgical instruments are represented as tools.
	Active tool	One tool is denoted as active. The rest of the system can use this to react to a single tool.

1.2.2	**Hardware support**	Aurora, Polaris tracking systems are supported.
1.2.3	**Manual tool**	Virtual tool controlled by mouse, direct matrix manipulation.
1.2.4	**History**	Entire tracking history is stored to disk.
1.2.5	**Specification**	All tools are stored in separate xml files. Configurations of several tools + tracking systems also stored as xml. User interface to create configurations.
1.2.6	**Tool Offset**	Add a virtual offset to the tool tip, giving a new point that can be used for navigation.
1.2.7	**US Probes**	If the tool is an US probe, it contains a definition of the probe sector and the probe video stream.
1.3	**Video**	Framework for streaming realtime video in 2D
	Video framework	
	OpenIGTLink Interface	Connect to an IGTLink server and stream images from it. GUI for setup. Auto init of Video servers (4.1)
1.4	**Visualization**	Display selected volumes, tools and metadata in 2D and 3D views.
	View framework	Display visualization data in 2D and 3D views. Organize in groups and display in a specified layout on the screen. This layout is user customizable.
	Selective visualization	Provide controls for showing/hiding visualization objects. Select which patient data are displayed in each view group.
	3D Camera Control	Control the camera view direction in the 3D scene
	View mode	Select Object View (camera locked to data), Tool View (camera locked to tool tip), Angled view (camera locked a point above the tool). Select distance from scene to enable zoom
	Camera angle	Set the camera in a specified direction (anterior, posterior, superior, inferior, left, right, oblique).
	2D Slice definitions	Define slice planes based on the tool tip, a focus point and a size.
	Orthogonal slices	This is the Axial, Sagittal, Coronal slices.
	Oblique slices	This is the AnyPlane, DualAnyPlane, Radial slices.
	3D View	
	Texture volume rendering	Display a volume using texure rendering. Multivolume working partially
	GPU Volume rendering	Display a volume using a gpu-based ray-cast technique. Multivolume not working properly. NA on Mac
	2D slices in 3D	Display the 2D views as rectangles in 3D space.
	Polydata representation	mesh, point cloud, lines etc (vtkPolyData)
	Tool representation	Display a 3D representation of the visible tools.
	Tool path	Display a path showing the tool trajectory.
	US Probe sector	Display us probe sector outline
	US Probe video	Display us probe video inside the probe sector
	Orientation Annotation	Display a schematic humanoid indicating orientation.

	Annotation	Display name of volumes and meshes in the view.
	Interactive slice plane	A slice plane cutting a 3D volume using one 2D slice definition. This is visualized as a modification to the volume rendering.
	2D View	A view displaying data using a specific slice definition.
	Volume slicing	Display a slice of one volume.
	Multivolume slicing	Display slices of several volumes on top of each other. Use alpha transfer function and ordering to render.
	Polydata representation	mesh, point cloud, lines etc (vtkPolyData)
	Tool representation	Display a 2D representation of the visible tools.
	US Probe sector	Display us probe sector outline
	Orientation Annotation	Display letters (APSILR) indicating main directions for each corner.
	Annotation	Display name of volumes and meshes in the view. Also display the name of the slice definition.
	Video View	A view displaying a video stream.
	Video	Display a 2D video stream
	Annotation	Display video name and frame rate
1.5	**State**	
1.5.1	**Desktop customization**	Enable interactive customization of the application layout, store to disk. Application layout is defined as positioning of widgets + view layout.
1.5.2	**Surgical workflow steps**	Define steps Data Acquisition, Preoperative, Registration, Navigation, Acquisition, Postoperative. Enable customization of the application for each step
	Customize desktop for each step	
1.5.3	**Clinical Area customization**	Define clinical areas. Store desktop and workflow customizations for each area. Enable customization for each area.
2	**Miscellaneous**	
2.1	**Logging**	
	Status logging	Framework for logging system messages in various levels: Debug, Status, Warning, Error. Console widget for displaying messages, Write to disk.
	Screen snapshot	Button/shortcut for saving screenshot to disk.
	History	Store tracking data, registrations, all major events. Use this to enable playback. (partially implemented)
	Sounds	Play sounds when status messages appear, and for some other events. Start, Stop, Error, Success.
2.2	**Measurement**	Framework for adding metrics to the scene. Visualization and user interface.

	Point	Define a point in 3D space in a given coordinate space.
	Plane	Define a plane with a normal vector and surface point.
	Line	Define a line connecting two points/planes.
	Angle	Define an angle between three points/planes.
2.3	**Coordinate systems**	Use DICOM coordinate definitions throughout the system. All coordinate systems s are characterized by a transform matrix sMr and a reference space r. sMr transforms a point in r to the equivalent point in s.
	Coordinate system viewer	A table describing all coordinate systems and their relations.
2.4	**Supported operating systems**	CustusX runs on Windows, Mac, Linux. Some features may be available only on certain OS.
3	**Plugins**	
3.1	**Registration**	
	Registration framework	Moving+fixed data, space tree, autoupdate of related data when registering.
	Registration history	All previous registrations available, rewind/forward functionality.
	Image-Patient Registration: Landmark	
	Image-Patient Registration: Fast	
	Image-Image Registration: Landmark	
	Image-Image Registration: Vessel-Vessel	
3.2	**Acquisition**	
	US Acquisition framework	User interface for recording of US data (images and tracking positions, both with timestamps), store data to disk.
3.3	**US Reconstruction**	
	Reconstruction framework	A framework and user interface for reading us recordings from disk and convert them to a 3D volume using a reconstruction algorithm of choice. The finished volume is available in the Patient Service.
	Thunder VNN	OpenCL/GPU-based algorithm, VNN.
	PNN	Simple PNN implementation.
3.4	**Calibration**	
	Temporal Calibration	
	Tool Manual Calibration	
	ToolTip Calibration	

3.5	**Algorithm**	
	Volume Segmentation	
	Volume Contouring	
	Centerline extraction	
4	**Auxiliary Applications**	
4.1	**Video servers**	Applications that connect to US scanners, or other video sources, and emits their video using OpenIGTLink.
	Quicktime server	
	OpenCV server	
	Ultrasonix server	
4.2	**Probe Calibration**	Matlab script/procedure for determinging probe characteristics.

Added in version
3.0
3.0
3.2
3.0
3.0
3.0
3.2
3.0
3.0
3.0
3.1
3.3
3.1
3.1
3.0
3.0
3.0
3.0
3.0
3.0
3.0
3.0

3.0
3.0
3.1
3.0

3.0

3.1

3.1
3.1

3.0

3.0

3.0
3.0

3.0

3.0

3.0
3.0

3.0
3.0

3.2

3.1
3.0
3.0
3.1
3.1
3.1
3.2

3.0
3.0

3.0

3.2

3.0
3.0
3.1
3.0

3.0

3.1
3.1
3.1

3.0

3.0

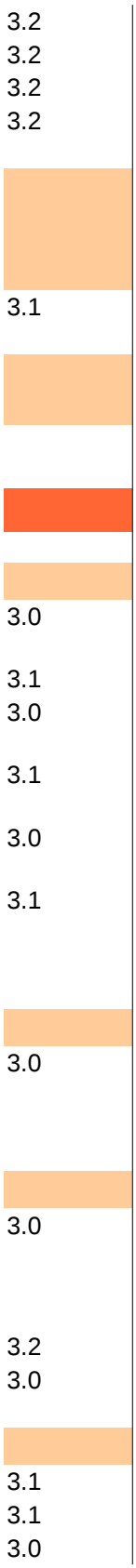
3.0

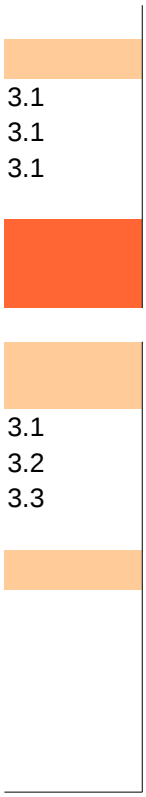
3.0

3.0

3.0

3.0


3.2
3.2
3.2
3.2
3.1
3.0
3.1
3.0
3.1
3.0
3.1
3.0
3.0
3.2
3.0
3.1
3.1
3.0


3.1
3.1
3.1
3.1
3.2
3.3