Malmö stad

WISDOME MALMÖ

Technical Specification & Delivery Guide

Version 2 - 2025

Malmö
museum

Wisdome Malmö
Technical Specification

PUBLIC SPACE

58 seats, 2 spaces för wheelchair users

DOME
Ulteria Seam dome with diameter: 11.5m, aperture: 165 grader, tilt: 26 degrees, gain: 0.45 tbd

PROJECTORS
5x Christie Gryffin 4K 32 RGB with 0.9 :1 lenses, 120Hz 3D stereo, resolutions up to 4096 x 2160@60Hz 4:4:4 8Bit

LIGHTING
LED Cove Lighting (DMX) 16 Bit control, stepless fading
4x LED spotlight

INTERACTIVE SYSTEM
Digital Sky Interactive Responder built in to every chair, programmable via Dark Matter

PODIUM
Height-adjustable podium with HDMI and power outlet

IPAD
With the apps VNC and WING Copilot, Dark Matter and the Behringer Wing mixer can be remote controlled.

AUDIO INDUCTION LOOP
For visitors with hearing aids, there is an induction loop.

CONTROL ROOM

SERVER SETUP
Definiti Master Control with RTXA4000
SkyVision GPU Server with five stereo clusters with RTXA4000
10 PCs in total for running 2D or 3D film and space visualisations.
1 PC för lighting control.
1 PC for sound control.

LABSERVER
Labserver with RTXA6000, 5x 4K output configuration that can be used for cooperations, testbeds, research, experiments, game content etc.

SOFTWARE

VISUALISATION SOFTWARE
Digital Sky Dark Matter for space visualisation, show control, lght control, sound control, film screenings, presentations, capture system, interactive system. Installed on DS Master Control.

OpenSpace for space visualisation, installed on the main system and on production laptops.

SLICING
Skyvision Slicer 3 for slicing a series of frames in order to render a dome film. Installed on DS Master Control.

CAPTURE
DS Superstreamer Client. Installed on DS Master Control to stream HDMI signals from the stage, control room and labserver to the dome.
Blackmagic Media Express för HDMI-inputs.

LIGHTING DESIGN
ChromaCove Designer for lighting design, programming of light scenes, live control, cue editor for LED cove lighting and LED spotlights.

SOUND

DANTE NETWORK
with Dante Controller and Dante Virtual Soundcard, ASIO Bridge, Black Magic Media Express.

PA SYSTEM
5.1 Surround Cinema Series

AUDIO INDUCTION LOOP
Ampetronic C-serie

SOUNDMIXER
Behringer Wing with 32 input channels, local i/o 16/8

STAGEBOX
Behringer S16, i/o 16/8

EXTERNAL SOUNDCARD
Focusrite Scarlett 18i20

SOUND LAPTOP
MacBook Pro 14" with Logic Pro & Final Cut

MICROPHONES & DI
AKG WMS470 wireless, 3x handheld HT 470 & 5x lavalier PT 470
Shure Beta 52 A
Shure SM 57
Shure SM 58 LC
Palmer Pan 04
Palmer Pan 02

MONITORING
4x active monitor wedges dB Technologies FMX10

BACKLINE
Music stands
Microphone stands

3D TECHNOLOGY

3D GLASSES
SkyVision Active 3D with XPAND Active 3D stereo glasses (XPAND X106), 140 pcs and
120 pcs child size glasses

3D DESINFECTION
XPAND UV station, desinfection system for 3D glasses

FOYER

SCREEN
Philips 65BDL3511Q with Pixilab Blocks player, Intel Nuc

MEETING ROOM

SCREENS
2x Clevertouch UX Pro 75 inch

CONFERENCE CAMERA
Logitech Rally Bar

SPEAKERS
2x Fifty4 active speakers

MEDIAPLAYER AV-SYSTEM
Pixilab Blocks player on an Intel Nuc

DIGITAL LABS

VR TECHNOLOGY
Meta Quest 2 x3
Valve Index
Festoon installed on preproduction laptop

360 TECHNOLOGY
Insta 360 Pro
VR Dolly, stand & boom
Zoom H3VR Spatial Audio Recorder

3D VISUALISATION
Einscan Pro HD 3D scanner
Einscan Pro 2X Plus Industrial Pack
Einscan Color Pack Pro HD
Flashforge Guider IIS / S2 v2 3D printer x2
Sunlu FilaDryer S2 x2

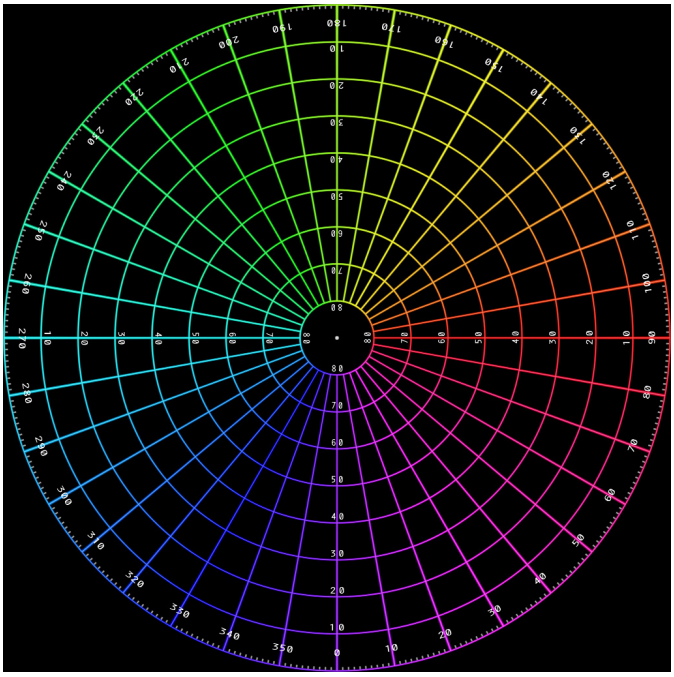
PRODUCTION IN OPENSPACE
Windows 11 laptops with OpenSpace x6

Delivery Guide

When media files are to be shown in the dome theatre, many questions can arise. The following guide on different media formats for dome projection strives to answer the most common.

FULLDOME MASTER 4K FISHEYE VIDEO (4096x4096 PIXLAR) OR 8K FISHEYE VIDEO (8192x8192 PIXLAR)

The video file needs to be designed as 180 degree fisheye with square pixels: 2048x2048 pixels (2K), 4096x4096 pixels (4K) or 8192x8192 pixels (8K). The active image are needs to be circular in order to fill the whole dome area and the remaining image area should be black and may include the file name, logo, frame number, timecode, title, copyright, and similar text. 0 degrees in the image below resembles the southern part of the dome, i.e. the direction the audience looks at when seated. The middle of the circle resembles the top of the dome and at 180 degrees, the visual content is behind the audience. The sweet spot for the audience is located at around 30 degrees up from the front of the dome.



VIDEOFORMAT MPEG-4 med h.265 codec or h.264

FRAMERATE 30 eller 60 fps

VIDEOFORMAT MPEG-4 med h.265 codec or h.264

VIDEO BITRATE h.265 (for content higher than 4K resolution): 60Mbit/s for 30fps content or 120Mbit/s for 60fps content or h.264 (for content up to 4K resolution): 100 Mbit/s for 30fps or 200Mbit/s for 60fps.

LJUD 2-channel (stereo) embedded in the MPEG-4 file or 5.1 delivered as single mono files, uncompressed WAV or AIFF files.

ENCODING SETTINGS

Square Pixels
Main Profile, Level 6.2
CBR (constant bitrate)
Highest Quality

AUDIO SETTINGS

STEREO (EMBEDDED IN THE MPEG-4 FILE)
Audio codec: AAC
Sample Rate: 48 kHz
Audio Bitrate: 320 kbit/s.

5.1 SURROUND
Clear labelling of channels L, R, C, LFE, Ls, Rs.
The channels need to be delivered as mono files in wavex format and are combined to one surround file by us.

Alternatively, a film can be delivered as a series of frames which are sliced on site. This needs to be announced early in the process as preparation and slicing time needs to be determined and scheduled. A 4K film with a duration of 30 minutes in 2D can have an estimated slicing time of one week.

SLICING

Slicing is the term that describes the process of converting a series of frames in png or jpg format into moving picture in mkv format. Dome productions are often delivered as a series of single continuous frames so that they can be adapted to the unique dome theatre profile. Wisdome Malmös dome profile includes 5 projectors and becomes unique through their placement, distance to the dome, angle as well as blending and masking of projection areas.
In order to convert 150 frames to a film file with 5 different image angles, all of our PCs need to work on the slicing for about 30 minutes. Depending on the image frequency or framerate - e.g. 30 or 60 fps (frames per second), which are the standards for dome productions - one 60 second film sequence is made up of 1800 frames or 3600 frames respectively. During slicing, all of our PCs are utilised (DS Master, DS 01-10, DS Sound, DS streaming) for the conversion of frames. DS Master coordinates the process and the remaining PCs take 150 frames each at a time and convert them to short film sequences. A dome production with a duration of 30 minutes is most often made up of 60 000 - 120 000 frames, with 30 or 60 fps. The slicing process can take up to a week during our ordinary working periods as we do the slicing during night time only. If the film is produced for 3D, the slicing process needs to be performed for the left and right eye separately. In that case, the whole process may take up to 14 days. Finally, the sliced film sequences are encoded into a complete and continuous film that is perfectly adapted to Wisdome Malmös dome profile.

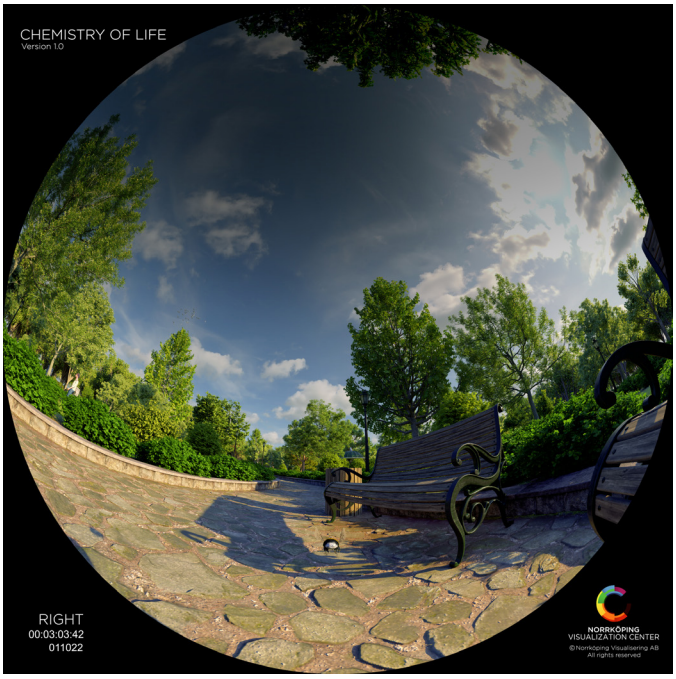
360-VIDEO

360 video kan be imported into the visualisation software Dark Matter in various ways. Either as 16:9 format that is projected digitally onto a sphere so that the result becomes immersive in the dome or it is exported as 180 degree fishey with square pixels. Format: MP4 video with 30 or 60 fps, with embedded audio (stereo or spacial sound in 5.1 surround with 48kHz and 16 or 24bit). The Field of View settings may need to be adjusted in the dome. Therefore, it is highly recommended to deliver a test file early on in the process.

STILL IMAGES

Image files can be delivered in various formats, as a domemaster frame (fisheye 1:1) or equirectangular panorama image (2:1) if they are to be shown immersively on the dome. Aternatively, 16:9 or 16:10 image files can be shown as a presentation slide as a rectanglar image on the front part of the dome.

DOMEMASTER FRAME (FISHEYE)



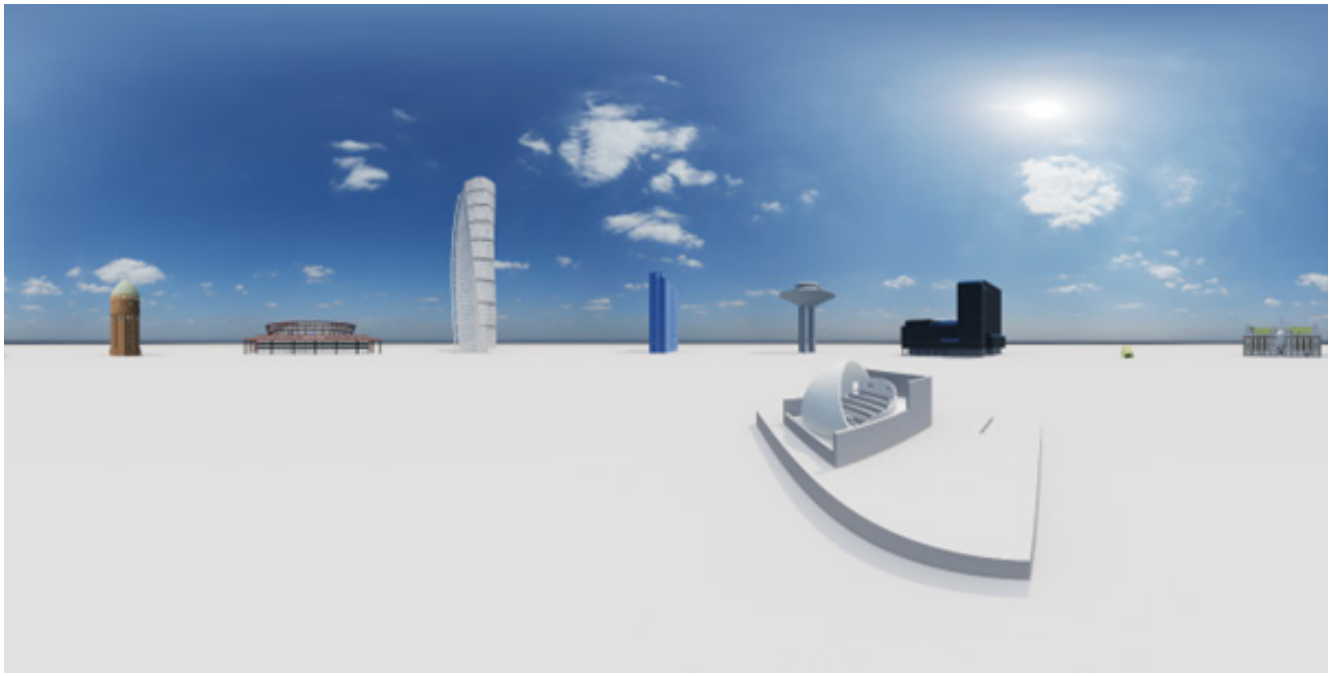
The image file should have square pixels, and one of the following resolutions:
2048x2048 pixlar (2K)
3200x3200 pixlar
3600x3600 pixlar
4096x4096 pixlar (4K)
8192x8192 pixlar (8K)

The higher the resolution, the sharper the visualisation on the dome. The projection system consists of 5 projectors with 4K resolution each, creating a compund resolution of 6K. Resolutions higher than 4K will create a sharper image on the dome.

The active image area of a domemaster frame should be the same as a Fulldome Master fisheye film file: it should be circular in order to fill the whole dome area and the remaining image area should be black and may include the file name, logo, frame number, timecode, title, copyright, and similar text. The image file could be produced in the following formats: .png, .jpg, .tiff, .dds.
The geometry of the image needs to be an equidistant azimuthal fisheye render that represents a hemisphere.

PANORAMA IMAGES

In contrast to a domemaster frame, our software can convert a panorama image so that the sides of the image meet and form a panoramic view. This may result in visible borders and needs to be considered when designing panorama images.
Measurements of a panorama image: 4096x2048 pixlar (2:1)
Format: png or jpg
Beware – image bordes will meet when converting a panorama image to fisheye so visible borders should be avoided.



SOUND

Sound files may be delivered as wavex formatted files, mp3 or ac3. For a dome production that requires slicing, sound files are delivered separately in stereo or 5.1 surround format. Surround files need to be delivered as separate mono files for each channel and require clear labelling (L, R, C, LFE, Ls, Rs) so that we can create a correct sound file on site. For concert preproduction, we need to know exactly which instruments or sound devices will be used in order to accurately preproduce the concert. In order to do so, we require a technical rider including a stage plot and detailed channel list.

EXECUTABLE GAME FILES & 2D OR 3D ENVIRONMENT

Executable game files can be exported in .exe format from game engines such as Unity or Unreal Engine. These can be installed on our lab server in the dome and shown on the dome via the capture system. Game controllers can be connected for navigation, or the game could utilise our interactive system which is addressed via UDP communication. The executables need to be rendered as equirectangular fisheye in order to visually work on the dome.

3D OBJECTS

It is even possible to import and show 3D objects that we can visualise in Dark Matter. Single objects or whole 3D environments can be imported as .obj files with .mtl materal files and texture maps. Working with 3D objects in Dark Matter generally resembles working with most other 3D software that consists of components such as environment, camera, scene, lighting etc. It is possible to navigate these objects using orbit, roll/pitch/yaw and similar parameters.

LAPTOPS

External laptops can be connected via HDMI on stage or in the control room in order to show content on the dome. When e.g. doing a PowerPoint presentation, a laptop may be connected on stage. The presentation is shown as a 16:9 or 16:10 presentation slide. For this to work, the laptop screen needs to be duplicated and not extended-
PowerPoint-presentations may even be sent to us early on in the booking process in which case we can prepare a laptop with the presentation.
Laptops should have a high output resolution so that the projected image is sharp. They can even be integrated with our DANTE network to play high resolution sound in stereo or 5.1 surround.

INTERACTIVE SYSTEM

Each chair contains a DigitalSky interactive responder with 5 built in buttons. These are addressed via UDP protocol and there are two modes of utilisation - a voting mode where all 58 chairs can vote simultaneously in real time and a live control mode where 3 chairs can be used simultaneously to e.g. navigate through a game on our lab server or space travel in our planetarium system. In the case of a game interaction, the ports for the interactive system need to be included in the game engine and UDP messages need to be programmed according to the button mapping of the interactive system.

CONTACT IN CASE OF QUESTIONS

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Example specifications for media files

EXAMPLE SPECIFICATIONS

ADOBE PREMIERE PRO VIDEO

Format :	AVC (Advanced Video Codec)
Format Setting, CABAC:	Yes
Codec ID:	avc1
Codec ID/Info:	Advanced Video Coding
Bit rate mode:	Variable
Bit rate:	8151 kb/s
Maximum bit rate:	187 Mb/s
Width:	4096 pixels
Height:	4096 pixels
Display aspect ratio:	1.000
Frame rate mode:	Constant
Frame rate:	30.000 FPS
Color space:	YUV
Chroma subsampling:	4:2:0
Bit depth:	8 bits
Scan type:	Progressive
Bits/(Pixel*Frame):	0.016
Stream size:	146 MiB (98%)

EXAMPLE SPECIFICATIONS FOR IMAGES AND LOGOS

Format :	PNG
Format/Info :	Portable Network Graphic
Compression :	Deflate
Width :	20 000 pixels
Height :	10 000 pixels
Color space :	RGBA
Bit depth :	8 bits
Compression mode :	Lossless
Stream size :	1.04 MiB (100%)

EXAMPLE SPECIFICATIONS FOR EXECUTABLE FILES

UNREAL ENGINE

File description :	BootstrapPackagedGame
Type :	Application (.exe)
File Version :	5.1.1.0
Width :	20 000 pixels
Height :	10 000 pixels
Color space :	RGBA
Bit depth :	8 bits
Compression mode :	Lossless
Stream size :	1.04 MiB (100%)

EXAMPLE SPECIFICATIONS FOR SOUND FILES

5.1 SURROUND

Format :	AC-3
Format/Info :	Audio Coding 3
Commercial name :	Dolby Digital
Bit rate mode :	Constant
Bit rate :	448 kb/s
Channel(s) :	6 channels
Channel layout :	L R C LFE Ls Rs
Sampling rate :	48.0 kHz
Stream size :	79.2 MiB (100%)

ELLER

Format :	PCM / Wav (WaveFormatExtensible)
Format settings :	Little/Signed
Bit rate mode :	Constant
Bit rate :	6912 kb/s
Channel(s) :	6 channels
Channel layout :	L R C LFE Ls Rs
Sampling rate :	48.0 kHz
Bit depth:	24 bits
Stream size :	1.65 GiB (100%)

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