NATIONAL MUSEUM OF ART, ARCHITECTURE AND DESIGN

MUSEUM EXHIBITION DESIGN
IN-ROOMS MULTIMEDIA DESIGN

TECHNICAL ORIENTATIONS
AND SPECIFICATIONS

DOCUMENT FOR K912 TENDER
EDITION FOR PRE-QUALIFICATION PHASE

Update 2018-12-01

TECHNICAL ORIENTATIONS
AND SPECIFICATIONS

IN-ROOMS (FIXED) MULTIMEDIA

1. SCOPE OF THE K912 TENDER

The scope of the K912 Tender includes the following deliveries and attached or derived services:

- Finalization of technical studies contained in this tender, in order to check and validate the detailed and overall feasibility of the ambition and goals of the museum, by means of products, features and services hereby required,

- Delivery of the equipment, as well as their adapted mounting elements,

- Installation of the delivered equipment, as well as the integration of these elements into the exhibition spaces, including related and derived necessary works,

- Low-level coding and/or hardware/software settings (including Wakeup On Line processes),

- Cabling of each piece of equipment, for power supply and data, from dedicated sockets (refer to plan),

- Integration into the equipment of all digital files produced outside the scope of this tender, by the producer of contents (K932), or required for the equipment to run as expected,

- Delivery of up-to-date documentation, description of cabling, description of processes, as well as description of maintenance procedures (low level as well as global) of equipment installed,

- Training of the museum operational technical staff for the use, update and first level of maintenance of the equipment,

- Warranty for each individual piece of equipment as well as for the whole operational system,

- Any works of any kind deemed necessary as a derivation or a consequences of the deliveries and services listed above.

2. DOCUMENTS FOR THE COMPETITION SUBMISSION

Besides any other document required for the present tender, competitors should submit a technical memorandum containing detailed information on the following topics:

- General description of individual installations as well as of the overall system, as a confirmation of the full understanding of the present document, in terms of technologies and orientations involved, as well as ambition and goals to achieve,

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- Installation methodology,

- Equipment integration methodology,

- Methodology for integration of contents (produced by the producer of contents K932),

- Testing and tuning, in house and on site,

- Detailed description of the team for the installation, integration and testing-tuning phases, including academic and experience profiles,

- Detailed planning proposed, and how it is deemed realistic and/or sensitive to which factor of delay risks,

- Detailed documentation for each individual piece of equipment (and eventually associated software) proposed,

- Any other technical information or document which competitors may think valuable for the right understanding of their offer.

3. COMPOSITION OF THE MULTIMEDIA EQUIPMENT (IN EXHIBITION ROOMS)

The multimedia design is fully integrated within the exhibition design of the museum all along the visitors' path. There are four different categories of multimedia design:

- **Tablets 15**"
  Directly connected to the exhibition Webserver system
  Some of them installed with a pair of **headsets**

- **LCD screens** of various sizes (which relates to Web oriented contents)
  Connected to the exhibition Webserver system through **compact PC**

- **Specific installations** composed with different subsets of the following equipment:

  o **LED screens** of various sizes
  o **Videoprojectors** of various types (**standard, gobo-like, ultra-compact**)
  o **LCD screens** of various sizes
  o **e-Ink tablets**
  o Trough the Window **Vibrating speakers**
  o Low level near the hears **Compact Line speakers**
  o Other **Compact speakers**
  o **Ultra-directional speakers**
  o Show control system and related extensions and interfaces
    ▪ **Show controller**
    ▪ **Media server**
    ▪ **Digital processing unit**

- **Sound atmosphere** wireless speakers

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Besides the above equipment, the scope of the present tender also includes a **Webserver** to push the contents to the 15" tablets and some of the LCD/LED screens or videoprojectors.

4. TECHNICAL ORIENTATIONS: TABLETS AND CONTENT DISTRIBUTIO

4.1. Rationale for use of tablets instead of monitors

The proposition to switch from traditional screens to tablets for the display of contents within the museum, made by the Multimedia Exhibition Design team, is based on the following observations:

- The widespread use of smartphones and tablets by almost anyone today has drastically changed people's relationship to the size of screens they are looking at. Nowadays one can read at ease almost anything on screens whose size would have been rejected only a few years ago as being far too small,

- Investments and innovative digital developments are now mainly carried in the field of Web oriented tools and efficient platforms made to generate Websites and digital mobile applications. Not in the field of monitors and so called media-players, except in relation with the Web,

- Tablet sales overpassed those of PC computers back in 2013. This has lead -- and will lead again for long -- manufacturers to invest more on these products, which are now both more powerful and more reliable.

Hence the proposition to make use of 15 inches-screen tablets (the maximum size available today) for the fixed multimedia installation within the museum.

These tablets:

- Combine in a very condensed format:
    o The screen, with touch capability
    o The processing unit as well as the graphic engine
    o The cabling feature (via WiFi links)

- Run software coded the "Web way"

4.2. WEB ARCHITECTURE FOR CONTENTS DISTRIBUTION

The above proposal to switch to tablets for the display of contents within the museum modifies drastically the technical distribution architecture compared with the traditional solution.

Traditional distribution of contents ("players" type of distribution)

The traditional distribution of contents relies on media-players (audio players, video players, PC equipment) connected to their attached consultation screens. The contents are locally stored (SSD memory or HDD). Updates are "pushed" through RJ45 or WiFi networks from a central control PC device, or using local USB keys.

The contents are basically audio and/or video files, as well as computer type interactive software, generally closed and proprietary (not accessible for modification by others than the initial developers).

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Distribution of contents proposed for the museum ("Web" type)

With the Web based solution proposed, each tablet in the museum connects itself automatically to its assigned URL (i. e. the Web address of its assigned contents). In the course of the few first consultations, contents are pulled automatically in the Cache memory, so that streaming becomes soon eventually restricted to regenerations or updates that are carried forward automatically by the Web compliance of the tablets.

The proposed architecture includes a Webserver providing the various URL's which the in-room tablets connect to. This server also houses the BackOffice of the system, which the museum have a direct access to for any updates of contents.

4.3. Distinction between equipment and active elements

For the sake of separation of assignments and responsibilities, noticeably between Tender K932 (production of contents) and the present Tender K912, it is useful to define a frontier between equipment and active elements. This is rather simple in a Web type architecture:

4.3.1. Equipment

The following elements are purely "equipment" (i.e. relating to Tender K912):

- The tablets preloaded with their Operating System (OS)
- The Webserver preloaded with its OS
- The tablets Wakeup On Line system

4.3.2. Active elements (i.e. relating to Tender K932)

4.3.2.1. *For the tablets*

- The parameters settings
- The full-screen runtime browser and its related parameters settings (including the connection URL)
- …

4.3.2.2. *For the Webserver*

- The platform (run environment)
- The Web development for the distribution of contents
- Including the BackOffice, and the contents Data Base
- The contents themselves
- …

4.4. Steps and responsibilities for the development, installation and maintenance

4.4.1. Tablets

The tablets are standard products. They are delivered by the AV integrator, preloaded with their OS and the Wakeup On Line system, as part of the present K912 Tender.

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They are installed on walls, platforms, benches or tables within the museum exhibition rooms by the AV integrator (K912) in close relationship with the furniture manufacturer and integrator (Tender K943).

The parameter settings, the installation of the ad hoc browser, and the overall setting and tuning for content retrieving are performed by the AV Producer of content (Tender K932), which is also in charge of the Web type distribution system, including the Webserver Platform.

In any case, the maintenance process for the tablets within the museum is then as follows:

- Hardware failure : processed by the AV Integrator who delivered the devices (K912)
- Content delivery failure : processed by the AV Producer of contents (K932)
- Content failure : processed by the AV Producer of contents (K932)

4.4.2. <u>Webserver</u>

The Webserver is a standard product. It is delivered by the AV Integrator (as part of the present K912 Tender), preloaded with its OS.

The platform (run environment), the Web type distribution of contents, including the BackOffice and the contents Data Base, as well as the contents themselves are implemented by the AV Producer of content (K932), which is also in charge of the Web type distribution system.

The maintenance process for the Webserver for in-rooms delivery of contents is then as follows :

- Hardware failure : processed by the AV Integrator who delivered the device (K912)
- Content delivery failure : processed by the AV Producer of contents (K932)
- Content failure : processed by the AV Producer of contents (K932)

4.5. Remark: A Web architecture for the in-rooms multimedia as well as for the Mobile Multimedia Guide (outside the scope of K912 Tender)

Another advantage of the Web type architecture proposed for distribution of contents to the in-rooms fixed tablets of the museum is the immediate compatibility of this architecture with the implementation of the Mobile Multimedia Guide system.

The technical principles of content distribution are then identical whatsoever the contents are pushed towards the in-rooms fixed tablets, or towards visitor's smartphones (or mobile tablets) within the museum, or optionally anywhere else in the museum building, or even way outside.

4.6. Web platform specifications for in-rooms distribution of contents

There comes the important question of the Web platform specifications that should be inserted in the Tender for production of contents (and later on in the Tender for the Mobile Multimedia Guide).

A few years ago (and still true today) the temptation was to specify the Web Platform somewhat strictly, so that developers of contents would comply with existing or otherwise planned platforms.

Now, typical developers of contents, especially interactive ones, are likely to work on their own platforms which they have been developing and improving all along past projects. Most advanced

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developers also tend to make use of Software as a Service (SaaS) type of platforms that can literally generate interactive Web type applications a lot more efficient way (e.g. Angula or React platforms, respectively associated with Google and Facebook, with Javascript developments).

Therefore, despite the obvious preference to get all Web systems uniform within the museum organization, it may be less and less possible to do so in the near future, because then it would mean restricting the use of their most elaborate tools for developers, which in turn may be legally seen as leading to non-equitable competitions.

Notwithstanding what's above, there should be anyway some mandatory sort of uniformity between all the Web platforms installed for servicing the museum visitors (in-rooms Web type contents, Mobile Multimedia Guide, Website, etc…).

This is no longer achieved by uniformizing the various platforms, as per what's mentioned above, but by setting up the *interoperability* of data instead.

Such an interoperability of data is simply implemented by defining at the highest level which are the crucial data bases that will have to be shared by any application (e.g. so-called User's, Artworks' -- and related museum CMS and access system, events', news', and more…).

Each of these data base will then mandatorily have only one "master" occurrence in the whole Web system, with only one official "owner" in charge of its update, and a precise access protocol (preferably universal REST type) that any Web system (In-rooms Multimedia K932, Multimedia Guide, Museum Website K933) should follow to access any piece of data.

Independent Webservers for separate (but communicating) activities

The conclusion devised from what's above, which is part of the K932 Tender and will be part as well of the Multimedia Guide tender, is that each activity (In-rooms Multimedia, Multimedia Guide and museum Website) should have its own platform.

This makes sense:

- In terms of expertise, as each activity relies on different process to respond to different constraints (e.g. In-room distribution over same and fixed tablets, Multimedia Guide service to a wide variety of owner's mobile devices, Website accessible from anywhere as well as responsive)

- In terms of responsibility (any one developer-vendor controls – and is the sole responsible for – their whole system including the distribution of contents.

4.7. App versus Web App (WPA)

The proposed Web architecture for the delivery of contents within the museum, as described above, relies on tablets which connect themselves to their assigned URL (where they find their assigned contents).

This process indeed reflects another important orientation proposed by the Exhibition Multimedia Team and included in the K932 tender.

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Traditionally, it would be necessary to download the museum application in the in-rooms tablets. The proposed solution is instead to require the content delivery system be developed as a Web Progressive App, with no need for the users (the tablets) to contain any application within the device. Instead, the "client" part of the system (otherwise called FrontOffice, or App) is part of the Web Server itself, with just an URL needed to access contents.

This of course will also be the case for the Mobile Multimedia Guide (outside the scope of the present K912 Tender) so that visitors won't have to download *any* application (more and more visitors are reluctant to do so) and will instead just have to connect to an URL (equivalent to simply accessing a Website).

This WPA process organization leads to more easy maintenance, updates and evolution of the distribution of contents, as the code for the Client (FrontOffice) resides within the Webserver (and not in the tablets of the museum or visitor's devices for the Mobile Multimedia Guide) which makes a lot simpler any servicing and further development.

5. EQUIPMENT SPECIFICATIONS

5.1. Tablets

The previous chapter, focusing on the orientations for content distribution within the exhibition rooms, introduced the use of tablets.

These tablets are intended for integration within multimedia furniture elements of four types (manufactured according to K943 Tender):

- Wall mounted
- Platform attached
- Bench type
- Table type

The specifications for the tablets are the following:

- Screen size 15''
- Resolution 3240 x 2160 pixels
- 10 points multitouch
- 8th Generation Intel Core i7 Quad processor 4,2 GHz
- Graphic card Nvidia GeForce GTX 1060 or higher with minimum 6 GB memory
- Windows 10 professional OS 64 bits
- …

For example Surface Book 2 model from Microsoft, or equivalent.

Other feature required:

- A Wakeup On Line feature should be provided for these tablets
  (to be described at time of submission)

5.2. LCD screens of various sizes

Some multimedia contents are planned to fit larger LCD screens than the 15" tablets.

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This is the case for the following rooms:

- Room 18: LCD 75" (to display Web oriented content)
- Room 25: LCD 65" (part of the Specific Installation of the room)
- Room 31: LCD 98" (to display Web oriented content)
- Room 55: LCD 49" (part of the Specific Installation of the room)

Some other multimedia contents are designed to fit much smaller LCD screens:

- Room 64: LCD 5,5" (part of the Specific Installation of the room)

LCD 49", 75" and 98"

The specifications for the LCD 49", 75" and 98" screens are:

- LCD type
- IPS technology (VA or TN technologies not accepted)
- 4K resolution 3840 x 2160 pixels or higher
- Contrast ratio 5000:1 or higher
- Direct LED backlit (edge LED backlit not accepted)
- Brightness 350 cd/m² or higher
- Low haze 3% or less
- …

LCD 65"

The LCD 65" screens are planned to be installed vertically and used in an interactive way.

The specifications are:

- LCD type
- IPS technology (VA or TN technologies not accepted)
- 4K resolution 3840 x 2160 pixels or higher
- Contrast ratio 5000:1 or higher
- Direct LED backlit (edge LED backlit not accepted)
- Brightness 350 cd/m² or higher
- Low haze 3% or less
- Vertical position compliable
- Multitouch panel
  o 10 dots minimum
  o Projected capacitive technology
- …

5.3. Compact PC

As mentioned above, the distribution of contents in the exhibition rooms is based upon a Webserver system. The tablets, by means of their integrated browser, may access directly their dedicated content. A PC unit should be added when needed to other devices like LCD/LED screens or videoprojectors to do so.

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The specifications for the compact PC are:

- PC type unit
- Compact size
- Processor i7 64 bits
- 8th Generation Intel Core i7 Quad processor 4,2 GHz or higher
- Graphic card
    o similar in quality to the Nvidia GTX 1060 of the above tablets 15"
    o 4K resolution
    o with minimum 6 GB memory
- Windows 10 professional OS 64 bits
- Wakeup On Line feature provided
- …

Compact PCs may eventually be proposed embedded with LCD screens, provided that they fulfill all of the above specifications.

5.4. LED screens

Some specific installations include one LED screen or more.

This is the case for rooms 11, 16 and 22.

The specifications for these LED screens are as follows:

- Pitch 1,55 mm or lower
- Technology black SMD 3-in-1
- Black background
- Brightness 750 nits or higher
- Brightness guarantied calibrated
- Contrast 5000:1 minimum
- Refresh rate 1920 Hz – 3840 Hz or higher
- Viewing angle 140° x 140° evenly spread H x V
- Panel/framing maximum depth 13,6 cm
    o including any protruding element of the framing system
- Maintenance exclusively from front
- Front protection treatment
- …

Specifications also relate to framing requirements, for the sake of installation in the museum:

- Frame system should be separated from the LED panels
    o Allowing for frame to be installed separately in advance
    o And panels to be added at a later stage

The above requirements are for example fulfilled by the Sapphire LED screen model from ROE. Any equivalent models are however eligible.

In any case, the origin of the LED panels proposed should be mentioned, as well as those of the LED bulbs themselves, and the manufacturing process should be traceable and open to

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customer's or third party's QA (Quality Assurance) and validation at each important milestone, prior to delivery to the museum.

The dimensions of the LED screens involved are as follows:

Room 11

Room 11 contains 3 LED screens of the same size, positioned behind the 3 windows of the re-created ballroom.

- Dimensions of the glass part of the window: 96,2 W x 195,0 H (cm)
  (To be re-checked on plans)
- For example 2 W x 8 H = 16 panels of Sapphire model from ROE, or equivalent
  Leading to a total of 48 panels for the 3 windows

Room 16

Room 16 contains 2 LED screens of the same size, positioned behind the 2 windows of the re-created shop.

- Dimensions of the glass part of the window: 178,5 W x 170,0 max H (cm)
  (To be checked on plans)
- For example 4 W x 7 H = 28 panels of Sapphire model from ROE, or equivalent
  Leading to a total of 56 panels for the 2 windows

Room 22

Room 22 contains 1 LED screen, positioned in a niche by the wall.

- Dimensions of the niche: 205,0 max W x 322,0 max H (cm)
  (To be checked on plans)
- For example 4 W x 11 H = 44 panels of Sapphire model from ROE, or equivalent

5.5. Videoprojectors

Some specific installations include one or more videoprojectors. This is the case for rooms 11, 19, 20, 21 and 30. They contain videoprojectors of various types:

Room 11: Gobo-like videoprojectors
Rooms 19, 20 and 30: Standard videoprojectors for various size of display
Room 21: Ultra-compact videoprojectors

The specifications for these projectors are as follows:

Gobo-like videoprojectors (Room 11)

Because of heat restrictions for conservation of the authentic furniture within the room, as well as geometrical space constraints of the showcase of the room, the high-brightness and ultra-short-

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lens videoprojector device planned had to be replaced in the course of the study by a series of gobo-like videoprojectors, in order to achieve effects as close as possible from the one initially designed.

The specifications for these gobo-like videoprojectors are:

- Brightness 2000 Lumens or higher
- Resolution 1280 x 800 native, or higher
- LED/Laser source (no lamp)
- High contrast ratio fitting the need to create moving shadows of people dancing
- DLP Technology preferred
    - However LCD technology eligible if deemed necessary to meet the above needs
- With lighting rail mount kit

Standard videoprojectors (Rooms 19, 20 and 30)

The common specifications for the standard videoprojectors are:

- DLP technology
- LED/Laser light source (no lamp)
- 4K resolution 3840 x 2160 native
- Minimum brightness target required 500 lumen per sqm
- Reduced noise
- Compact size
- ….

Geometrical specifications:

Room 19

- Beam from top of showcase opposite to display
- Height of showcase: 380 cm
- Throw distance: 480 cm
- Width of display: 329 cm
- Height of the upper horizontal side of the display: 350 cm

Room 20

- Beam from top of telephone booth opposite to display
- Height of telephone booth: 242 cm
- Throw distance: 100 cm
- Width of display: 100 cm
- Height of the upper horizontal side of the display: 210 cm

Room 30

- Beams from the ceiling in front of the two displays
- Throw distance: shortest to comply with the width of display according to lens available
- Display area (whole portion of wall): 531 W x 300 H cm
- Height of the upper horizontal side of the display: 350 cm

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Ultra-compact videoprojectors (Room 21):

Videoprojectors in room 21 are part of the Specific Installation "Mini-Cinema" whose thin-walls design requires equipment to be rather compact.

The specifications for these compact videoprojectors are:

- Technology DLP
- Resolution 1280 x 800 native, or higher
- Brightness 2000 Lumens or higher
- LED/Laser source (no lamp)
- Contrast 1800:1 or higher
- Dimensions (critical)
    o Depth (from front to rear) shouldn't exceed 29,7 cm
    o Height (from bottom to top) shouldn't not exceed 12,0 cm
    o Width, less critical, but should be checked not exceeding the curved space available
    o Refer to plan and elevations

The display geometry is rather specific, and should be thoroughly addressed to:

- Tilted position of the videoprojectors
- Average throw distance 295,0 cm (max 333,1 cm – min 268,4 cm)
    o Depth of field should comply with the curved shape of the display area
- Size of the horizontal sides of the display:
    o Upper side: 52,5 cm
    o Lower side: 136,6 cm
- …

5.6. e-Ink tablets

Room 55 is equipped with tablets intended for use by visitors to draw by themselves.

The specifications for these drawing tablets are:

- Technology e-ink (daylight reading, not backlighted)
- Projected capacity touch feature
- Capable of pen input
- Screen size 13,3"
- Resolution 1650 x 2200 dots
- Internal memory 16 GB or more
- Connectivity LAN and WiFi
- Sync feature (critical):
  Drawings made by visitors should be transferable through network/WiFi for inclusion into a specific application for display (application in the scope of K932 production of contents)

Tablets should be delivered together with a charger rack:

- Connection to power supply by only sliding the tablets in (no wire to connect power)
- Capacity of 15 tablets
- Compact size aimed at integration in the exhibition design

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5.7. Through-the-window (vibrating) speakers

Specific installations in rooms 8, 11 and 16 include through-the-window vibrating speakers.

The specifications for these speakers are:

- 8 cm diameter transducer
- 4 ohms at 1kHz
- Input power nominal 20 W, max 40W
- Operation Wave 6,32 Volts from 200 – 20000 Hz
- It is agreed that bandwidth will depend on glass type and size.
  Hence the sound atmosphere speakers nearby to extend the apparent bandwidth

Through-the-window vibrating speakers should be delivered together with their ad hoc amplifie and wiring/interfaces.

5.8. Compact Line speakers

The Specific Installation Mini-Cinema in room 21 needs sound to be displayed for watching visitors. In order to avoid sound pollution to spread around, the volume is planned to be set at a very low level, and consequently the speakers should be positioned very close to visitors' hears, where the design involves a rather thin wall and reduce space. Hence the need for speakers in line of compact size.

The specifications for these compact line speakers are:

- Bandwidth 50 - 18000 Hz
- Low power at only few watts
- Geometry (critical):
  - Continuous line of speakers,
  - along the curved wall,
  - horizontally,
  - at visitors' hears level,
  - Refer to plan and elevation
- …

Compact line speakers should be delivered together with their ad hoc amplifier.

5.9. Other compact speakers

Specific installations in rooms 20 and 64 includes compact speakers for use in small geometrical volumes (respectively within a telephone booth for room 20 and inside a tree trunk for room 64).

The specifications for these compact speakers are:

- Bandwidth 50 - 15000 Hz
- Low power of a few watts
- Geometry:
  - Maximum size (critical for room 64)
    - 7 W x 7 H x 5 D (cm)

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- …

Compact speakers should be delivered together with their ad hoc amplifier.

5.10. Ultra-directional speakers

The specific installation in room 71 includes a series of ultra-directional speakers on walls on either side of this corridor shaped room.

The specifications for these compact speakers are:

- Hypersonic Sound (HSS) technology
- Directivity 10° angle
- Bandwidth 300 – 18000 Hz
- Dimensions (critical, as integrated in related exhibition design)
    o 92,6 W x 11,8 H x 35 D (cm)

Ultra-directional speakers should be delivered together with their ad hoc amplifier.

- Maximum dimensions for the amplifier:
    o 15,0 W x 11,8 H x 35 D (cm)

Compact speakers should be delivered together with the ad hoc amplifier.

5.11. Headsets

Some 15" tablets, as well as some other "listening stations" on bench or walls, are equipped with a pair of headsets for visitors to listen to a related audio content.

The specifications for these headsets are:

- Bandwidth 200 – 16000 Hz
- Open type (not close type) so that visitors are not isolated from each others
- Hygienic wise
- Technology preferred:
    o High/Medium frequency displayed by close micro-speakers not touching ears
    o Low frequency transmitted through bone vibrations
- …

For example the FreeSound model from RSF, or similar.

5.12. Sound Atmosphere wireless speakers

A total of 16 rooms are equipped with Sound Atmosphere speakers. They are:

- Rooms with correlated (in sync) with specific installations: 8, 11, 16, 19, 22, 25, 30, 64
- Other rooms (sound atmosphere only): 3, 4, 5, 7, 14, 31, 47

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For aesthetic reasons regarding the building, as well as for the sake of flexibility, there is no possibility to wire these speakers, and no possibility to attach them to the ceiling either, except by fixing them to the lighting rails.

The study did therefore focus on searching for components of a whole sound atmosphere system which would fulfill the wireless installation constraints, as well as typical specifications for sound atmosphere of high quality.

The sound atmosphere system and specifications described below is one particular example that fits the above requirements. Any other system fulfilling the same requirements may be proposed instead, together with a detailed description and comments.

- Audio files delivered once from a Webserver type of source

- Transmitters (TX) installed in rooms get their dedicated audio files through WiFi
  o These TX may be installed in light tracks on the ceiling, or anywhere convenient depending on configuration of each rooms

- TX pushed their dedicated contents to each wireless receiver and audio-player (RX) which they are paired with, via a Radio Frequency liaison (EU/Norwegian regulations compliant).

- RX also get specific data alike display playlists, together with the audio files

- RX are also sound amplifiers. They deliver the dedicated amplified audio signal to the sound atmosphere speakers they are paired with.

- The sound atmosphere speakers themselves are fixed to the light rail system of the rooms by means of standard sockets.

- Tuning of the atmosphere sound display in each room is performed through a related Web App that runs on smartphone or tablets, so that museum staff may walk and tune the speakers through each room.

- The above App can also be embedded inside larger systems (e.g. Specific Installations) to trigger sound playlists in relation (a few frame sync) with the related scenario.

The above descriptions-specifications are fulfilled by the New'ee products engineered and manufactured by the following company:

Life Design Sound (LDS), Paris,
www.lifeds.fr

- TX Transmitter is a "New'ee Connect RFJK" model
  o preferred with WiFi option
  o Radio Frequency liaison based on Texas Instrument protocol 2,4 GHz
  o 4 RX may be paired with one TX

- RX Receiver and audio player is a "New'ee RFRX" model.

- Sound atmosphere speaker tailored for fixing to light rails is "Trail 103" model from Ecler brand located in Spain, or similar (Product fitting light bodies are also under development by LDS).

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At this stage, it is not expected more than two tracks (e.g. L/R) displayed for sound atmosphere in each room.

5.13. Show controller

Specific installations require a show controller device to generate and master the overall scenario of each of them. The complexity, and related needs for show control features, varies depending on each case, involving different types and quantity of equipment (refer to the document "Specific Installations" for details).

5.13.1. Rooms and equipment involved

Basically, the equipment involved for each Specific Installation are as follows:

Room 8

- 3 Through-the-window vibrating speakers
- 6 Sound atmosphere speakers

Room 11

- 3 LED screens
- 10 gobo-like videoprojectors
- 4 Through-the-window vibrating speakers
- 4 Sound atmosphere speakers
- Show involve control of lights
- Show split into "moments"

Room 16

- 2 LED screens
- 4 Through-the-window vibrating speakers
- 4 Sound atmosphere speakers
- Show may split into separate moments

Room 19

- 1 Videoprojector
- 6 Sound atmosphere speakers

Room 20

- 1 Videoprojector
- 2 Compact speakers

Room 21

- 4 Ultra-compact Videoprojectors
- 4 Compact line speakers
- Video on demand type installation

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Room 22

- 1 LED screen
- 4 Sound atmosphere speakers

Room 25

- 10 LCD touch screens
- 4 Sound atmosphere speakers
- Interactive type installation (see description in the Specific Installations document)
    - Room may require a specific series of connected compact PC
    - Instead of being fed by the show controller
    - Which then only controls the equipment

Room 30

- 2 Videoprojectors, in sync
- 6 Sound atmosphere speakers
    - May be split in 4 channels
    - Originating from the L/R tracks of the 2 video files

Room 55

- 15 e-Ink tablets
- 1 LCD screen
- Syncing application to show e-Ink drawings on the LCD screen (into K932 scope)

Room 64

- 4 LCD screens
- 4 compact speakers
- 4 Sound atmosphere speakers

Room 71

- 2 x 10 Ultra-directional speakers
- 10 L/R files to be produced by K932

5.13.2. Show controller specifications-features

Following are specifications-features which are required for the show control system:

- Control all equipment listed above
    - Start / Shutdown
        - According to a preset timetable/calendar
        - On demand
            - Global as well as partial (per room)

- Connects to the building automation-alarm system
    - Following precisely predetermined protocols
    - Stop all display, noticeably sound, upon alarms from the building system

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- Manage displays:
    - For all equipment
        - Except those which are based on Web oriented contents
    - In sync (to the frame) whenever relevant and/or required by the related scenario

- Communicate with other systems
    - Light automation system (DMX or similar)
        - e.g. Rooms 11 and 30
    - All other type of communication protocols
        - IP TCP/UDP-MIDI-KNX switching-Serial RS232
    - Possibly other systems to come
        - Flexibility through add-on interfaces

- Ability to manually interact with execution of time line
    - For ease of the tuning process at time of installation or updates
    - For maintenance
        - General
        - Specific to one installation
        - Such maintenance interaction should be
            - From the central control "keyboard"
            - From a dedicated App available on a tablet to control from the room itself
    - For guides
        - From same App on their smartphone or tablet with specific guide interface
            - With possibility of interface with the Multimedia Guide too
        - To allow guides to interfere for their group with the timeline of each installation
            - Start/Stop/Resume and more to devise

- …

5.13.3. Media server system

The notion of show control also include the media (contents) server system which is intimately linked to the scenario they are involved in and related time lines.

The media server system should:

- Deliver audiovisual contents
    - As required in real time by the show controller
    - In sync when required
        - Sync should be to the frame, audio and or video

- Quality of contents delivered should comply with specification of display element
    - e.g. 4K 3840 x 2160 resolution when this is the display device resolution

Of course, the Web oriented contents referred to in previous chapters aren't concerned by this media server, as the distribution of contents, for them is achieved by means of a standard Webserver (with no show control capabilities).

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5.13.4. Digital processing unit

The show control and media server system should include digital processing tools that may be of importance for running and tuning some specific installations, depending on the specificity of various scenario.

For example, the Specific Installation in room 11 include a series of 8 gobo-like videoprojectors, which, at the moment are not provided with a built-in autocalibration or edge blending or mapping features. Whereas the scenario may (now, or in the future) require that such feature be available.

Hence the need for a digital processing unit whose specifications-features are:

- Ability to connect to a camera locally installed as part of the Specific Installation
- Analyze real time displays
- Tune colorimetry of separate displays
- Adjust digitally each video signals to achieve edge blending and/or mapping
- …

5.13.5. Positioning of the show control system

The show control system as specified-described by the above features (including the core of the show-controller as well as the media server and the digital processing unit and any required interfaces) may be either centralized in the technical room of the museum, distributing contents through the optic fiber network infrastructure of the building, or scattered nearby the various Specific Installation rooms (especially room 11 and 16), or a mix of central/local dissemination.

The localization of the show control system whatsoever shouldn't alter in any way the availability of above required features.

The central position is preferred, but should be thoroughly commented and described by the competitors to the present tender, as a maximum reliability of the various shows is also strictly required, as well as a perfect sync to the frame of various display (video and audio) for each Specific Installation. These requirements should also be commented, and, if necessary, the central position of the system should be reviewed partially or totally, in favor of a closer-to-display type of positioning.

5.14. Webserver

The Webserver device is intended for the distribution of Web oriented contents to 15" tablets and some other screens and videoprojectors that are not part of a Specific Installation running according to a scenario timeline managed by the show controller system.

The specifications for the Webserver are:

- PC type unit
- Standard Webserver hardware dedication
    - UC i7 quadcore minimum
    - Ram tailored to in-rooms distribution of contents
        - To the 15" tablets
        - To a few other LED screens
    - Storage

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- SSD preferred
- Tailored to amount of contents
  - Bandwidth
    - Adapted to worst case
    - i.e. video streaming on each connected device at the same time
- Standard OS And software platform for server usage
- …

At this stage of the competition, the study is still in progress to define whether this Webserver will ultimately be positioned within the museum premises, of at the producer of contents facilities with delivery of contents through the Cloud, or whether it will be instead a virtual server rented from a hosting company. This will be clarified for the next phase of the competition.

End of document

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