Presentation of acoustics of vanished concert halls in an exhibition on music history of Helsinki

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2A-Insinöörir Suunnittelu Oy
3Helsinki City Museum
Introduction

- Exhibition at Helsinki City Museum 3/2015-
- History of music lovers, listeners and enthusiasts

- One aim of the exhibition: an audible experience of concert halls from 19th century Helsinki
# Vanished concert halls of Helsinki

<table>
<thead>
<tr>
<th>Hall</th>
<th>Time in use</th>
<th>Reason for vanishing</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Auditorium of the University of Helsinki</td>
<td>1832–1944</td>
<td>Air raid of the Continuation War in 1944, rebuilt and enlarged in 1944–1948.</td>
<td><img src="image1.png" alt="Picture" /></td>
</tr>
<tr>
<td>The 1st Banquet Hall of the Hotel Societetshuset</td>
<td>1833–1862</td>
<td>Changed into hotel rooms in 1862.</td>
<td><img src="image2.png" alt="Picture" /></td>
</tr>
<tr>
<td>The 2nd Banquet Hall of the Hotel Societetshuset</td>
<td>1863–1887</td>
<td>Enlarged in 1887. The original roof is still existing in the assembly hall of Helsinki City Hall.</td>
<td><img src="image3.png" alt="Picture" /></td>
</tr>
<tr>
<td>The Banquet Hall of the Voluntary Fire Brigade House</td>
<td>1889–1907</td>
<td>Altered to assembly hall of Finnish Parliament in 1907. The building was demolished in 1967.</td>
<td><img src="image4.png" alt="Picture" /></td>
</tr>
</tbody>
</table>
Multidisciplinary procedure

1. Architectural history
2. Geometrical modelling
3. Room acoustical modelling
4. Composition, size and seating arrangements of the orchestras
5. Presentation in the exhibition
Geometrical modelling

Main Auditorium of University of Helsinki

2nd Banquet Hall of Hotel Societetshuset

1st Banquet Hall of Hotel Societetshuset

Banquet Hall of Voluntary Fire Brigade House
Room acoustical modelling

Curves and parameters are interesting. **But how do the halls sound?**
Auralization

- Vorländer 2009: “Auralization is the technique of creating audible sound files from numerical (simulated, measured, or synthesized) data”

- Room acoustical modelling produces an impulse response of a room
  - Impulse ≈ clapping of hands in a room
  - Response ≈ decaying sound in a room

- If impulse was replaced by an anechoic recording of some sound, response corresponded to decay of that sound in a room

- Anechoic recordings of orchestras:
  - Work: Beethoven’s 7th Symphony, 1st movement

Test person screaming in an anechoic chamber
Seating arrangements and sizes of auralized orchestras

- Helsinki
- European orchestras

<table>
<thead>
<tr>
<th>Hall</th>
<th>Size of the orchestra</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Main Auditorium</td>
<td>50</td>
</tr>
<tr>
<td>Hotel Societetshuset I</td>
<td>31</td>
</tr>
<tr>
<td>Hotel Societetshuset II</td>
<td>29</td>
</tr>
<tr>
<td>Voluntary Fire Brigade House</td>
<td>34</td>
</tr>
</tbody>
</table>

Seating arrangement in the 2nd Banquet Hall of Hotel Societetshuset
Presentation in the exhibition

Let’s listen to the first movement of Beethoven’s 7th Symphony.

Whenever the picture changes, also the place or hall and the acoustics change.
Auralization as augmented reality?

- Most applications of augmented reality are connected with visual reality.
- Audio augmented reality has been defined as introduction of artificial sound material into the real world.
  - Sound reinforcement?
  - Assisted reverberation systems?
- Our auralizations augmented the visualization of vanished buildings by adding an aural sensation to them.
Thank You for Your attention!

Questions?

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