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SOUND OF UNITY

Avicii Arena's vast dome becomes the setting for a radical rethink of arena sound. **Anna Mitchell** tells the story of how a Swedish sporting icon got its voice back.

When Stockholm's iconic Avicii Arena underwent a radical renovation, it wasn't just about revitalising a venue, it was about redefining what a stadium could sound like. The aim was nothing less than turning the largest spherical building in Europe into the most intimate sporting and concert venue on the continent.

At the heart of the transformation is a highly ambitious and unprecedented audio system, designed and installed by Danish AV integrator and consultant Stouenborg in partnership with Meyer Sound, NCC Construction and acoustician Efterklang. With Meyer Sound's Constellation and Spacemap Go technologies deployed together, and a remarkable retractable acoustic ceiling enabling both sonic intimacy and serious rigging strength, this project takes arena audio into uncharted territory.

"The owners of the Avicii Arena definitely wanted something that had never been done before," says Anders Jørgensen, project manager at Stouenborg. "We went from a venue that was considered the worst sounding in Northern Europe to one that's now arguably the best."

The vision

Much of project's impetus came from Mats Viker, the CEO of Stockholm Globe Arena Fastigheter (SGAF), the company that owns the Avicii Arena. Viker sought to create the intimacy and excitement of smaller venues, specifically Stockholm's Hovet ice hockey stadium, within the monumental scale of Avicii Arena.

Hovet, a low-ceilinged tent structure, was originally built as a temporary venue to host ice hockey tournaments while the Avicii Arena was renovated. In the end, it was far from temporary, going on to host matches for 20 years and generating its own fans as it became much loved for its atmosphere, offering the intimacy that the Avicii Arena lacked. "In the old days, ice hockey matches in the Avicii Arena were difficult to hear. The players didn't feel the spectators, the spectators didn't feel the players," notes Jørgensen.

As the Avicii Arena prepared to host top-tier hockey once again, the goal was to replicate that visceral connection, only this time in a dome 85m high, 110m in diameter, and holding 14,000 seated sports fans.

Jørgensen explains: "The whole driver was 'how do we get to a point where, if one group of fans sings a chant, someone on the other side of the arena can actually hear them?' That became the guiding principle. It was about bringing people closer, acoustically.

"We wanted to capture audio from one side and move it to the other and mimic Hovet. To do that we needed to steer and control the acoustics."

Charting a new Constellation

To achieve this unprecedented goal, Stouenborg turned to Meyer Sound's Constellation active acoustic system. Typically used to adapt concert halls and theatres to different performance types, Constellation was radically

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Anders Jørgensen, Stouenborg

reinterpreted at Avicii Arena as a crowd enhancement system designed to distribute chants, cheers and songs around the vast dome and simulate the feeling of being enveloped in audience energy.

"This is not a typical Constellation system," says Jørgensen. "It's the first of its kind. We're using it to capture audience reactions and reproduce them in real time across the venue. It turns individual cheers into shared moments."

The 12-zone system features 84 Meyer Sound Ultra-X40 and Ultra-X42 point source loudspeakers, paired with 72 DPA 2017 shotgun microphones, 56 of which are mounted in the ceiling and 16 installed on a truss surrounding the central LED cube. Each speaker is uniquely angled and placed for precision coverage, mounted on a custom-built ceiling shaped like a vast Pringle crisp, and suspended 40 metres above the floor.

The result is an immersive, emotionally connected environment for sports and concerts alike. "You can hear the crowd from the other side of the arena, and you feel like you're part of something," says Jørgensen.

Acoustic engineering

None of this would be possible without the stunning feat of engineering that is the retractable acoustic ceiling. Designed in collaboration with Taiyo, structural engineers in Germany, construction firm NCC, and acousticians Efterklang, this suspended steel-panel ceiling is both an acoustic surface and a new rigging infrastructure.

Comprising roughly 40 tonnes of steel panels, with absorptive materials on both sides, the ceiling can be deployed or retracted in around 15 minutes. Closed, it transforms the acoustics of the arena; open, it reveals the iconic domed roof. Importantly, the ceiling also doubles as a rigging structure, capable of supporting up to 100 tonnes of load for centre-stage events with the ceiling infrastructure able to support 200 to 300 tonnes in total.

"This ceiling is really a dual

system," says Jørgensen. "It brings the reverberation time down to levels similar to Hovet, and it provides all-new rigging capabilities."

Suspended via a complex cable net system, the ceiling required meticulous structural coordination. Cable tension, load distribution, and clearance tolerances were modelled in 3D and updated constantly. Every 15mm of clearance was calculated in relation to speaker angles and panel movement.

Military-grade precision

One of the most remarkable aspects of the Avicii Arena project is the military-level logistical planning behind the installation. With just eight days to complete on-site works, compressed due to the looming IIHF Ice Hockey World Championship, Stouenborg undertook an exhaustive pre-installation campaign in its Copenhagen warehouse.

Every single loudspeaker and bracket was uniquely configured, assembled, and tested off-site. Speakers were mounted, angled, and labelled with extreme precision. Pipes were cut to specific lengths. Checklists were developed, based on aviation maintenance protocols, and rigging procedures were rehearsed repeatedly.

"We knew we had no margin for error," Jørgensen says. "We built every speaker as it would be hung, rehearsed the rigging, and shipped it ready to fly. It was a military operation. We got it down to one speaker installed every hour onsite."

Over the course of 80 hours, the Stouenborg team mounted all 84 loudspeakers and 72 microphones. The checklist system came into play again during installation to record that each element was mounted correctly. "This meant I could sleep at night," says Jørgensen. "My biggest worries were we forgot to tighten a clamp, put on a safety wire or create the right angle for a speaker."

To reduce cable runs, two separate racks were installed, bringing the longest cable down from 175m to 100m. These housed the Meyer Sound Nadia processors and fibre-linked Netgear switches.

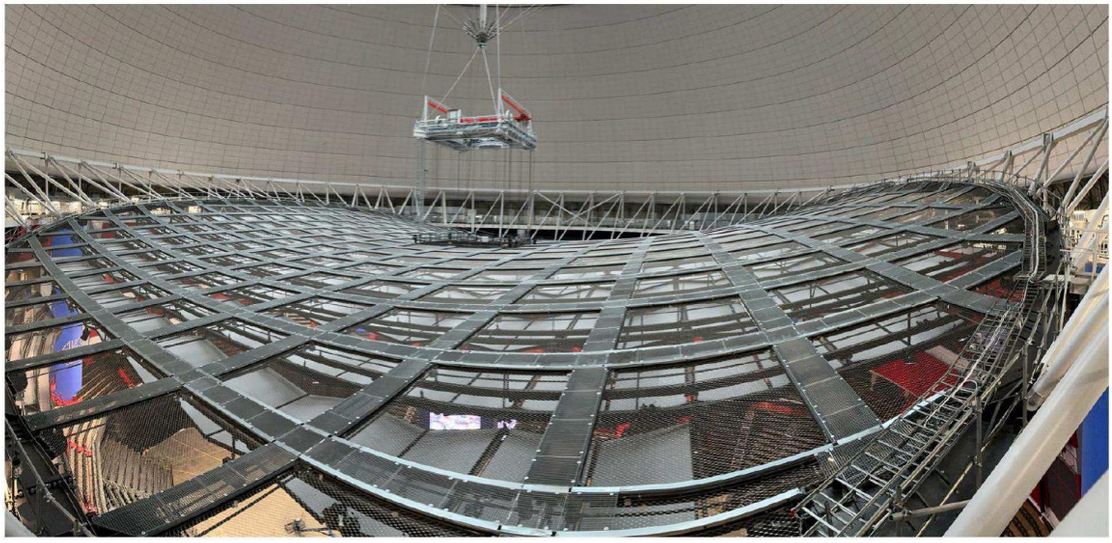
Working 32m above the floor, in a venue with stringent Swedish safety regulations, required extensive training. Stouenborg's entire staff, including office and admin personnel, undertook working-at-height certifications, not because they'd all be on boom lifts or in harnesses, but because shared understanding was essential.

"Even the accountants undertook the training," says Jørgensen. "It meant that when someone called with a problem, everyone could understand the context.

Interestingly, digital microphones and network-based input cards on the X40s, that would have allowed for digital infrastructure, were

Tech-Spec

- DPA 2017 shotgun microphones
- LEDventure four-sided 4.8mm LED cube
- Meyer Sound Ultra-X40 and Ultra-X42 loudspeakers, Galileo Galaxy network platforms and Nadia processors
- Netgear M4250-26G4XF PoE+ managed switches
- Pharos lighting control
- Surgex SX-AX16Ei Axess Elite IP Surge Eliminators



discounted in favour of, as Jørgensen says, "a good old analogue system".

Two drivers behind that decision were reliability and speed. "If you have an input card that fails or network plug that doesn't work and it's 32m in the air... you have a problem," says Jørgensen. "Also laying out standard XLR cable was roughly twice as quick as laying out network cable."

"Nobody believed we could do it in time," adds Jørgensen. "But we did. No faults. No injuries. Every speaker, every clamp, every cable was perfect."

With the precision demanded by this project, modelling became essential. "It would have been impossible without a 3D model," says Jørgensen. "We originally thought we would spend around £10,000 on 3D modelling. We ended up spending in the region of seven times that. But that money was saved in other places. It allowed us to prepare in Copenhagen and install rapidly and accurately when we got on site."

Touring integration

The Avicii Arena system also integrates Spacemap Go, Meyer Sound's spatial sound design platform, within the same infrastructure as Constellation. Powered by Nadia processors, the system can operate in both acoustic enhancement and immersive audio modes.

Jørgensen explains: "The Nadia processor lets us run Constellation and Spacemap Go simultaneously, which was very difficult before. Running them together means you're able to use Constellation for ice hockey games and when the players enter the pitch you can use the Spacemap Go system to create immersive effects, move the sound around the space."

Six pre-programmed spatial presets allow quick deployment of immersive effects with minimal setup. From centre-stage reverb to sweeping crowd simulations, the presets deliver flexible soundscapes tailored to various events and requirements.

When a touring act arrives in a venue engineers are short on set up time and Jørgensen says the presets offer a wide range of creative options that can be accessed and implemented quickly.

"A larger international touring act would quite possibly use something like TC System 6000 or Waves multichannel reverb. That potentially gives us six reverberation channels back from the FOH mixer and the tour. Those six channels can be sent into the Spacemap Go system and you can tap through the presets to listen to how they sound," he explains.

Lighting and video

Beyond audio, the arena's transformation includes lighting and video elements that complement the immersive experience. A four-sided 4.8mm pixel pitch LED cube from Swedish firm LEDventure hangs at the centre of the ceiling, doubling as both a screen for scores, replays and more; and microphone rigging point for some of the Constellation system microphones that capture the lower part of the audience. Its placement within the acoustic ceiling was carefully coordinated, with a 10m x 10m aperture built into the roof structure for parking and lowering the screen.

Lighting has been overhauled to support both sports and entertainment using Pharos infrastructure and a dedicated network based on Netgear. Lighting runs on a separate network to audio and "the reason for that is safety," says Jørgensen. "If one network goes down the other cannot be taken with it."

Longevity and evolution

The final system isn't just high-tech, it's adaptable. From sports to concerts, and whether for live audiences or broadcast, the new Avicii Arena can adapt its acoustics, lighting, and visuals to suit any occasion. Crucially, the Constellation system enhances the spectator experience while supporting pristine audio capture for broadcast.

"This was a giant leap," Jørgensen says. "Normally you climb one step in an AV project. This was like jumping from step five to step eight. It sets a new standard."

From impossible brief to international benchmark, the Avicii Arena now stands not just as an architectural icon, but as a symbol of what's possible when technology, creativity, and precision come together.

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>
> *Anders Jørgensen, Stouenborg*

REWRITING THE RULES

A new category of Constellation has emerged; one that doesn't just shape the room, but connects the crowd. **John Pellowe** outlines how Meyer Sound redefined what's possible in one of Europe's most iconic venues.

When the puck dropped at the 2025 IIHF World Championship in Stockholm's Avicii Arena, it wasn't just the players who were performing. Suspended high above the ice, 84 Meyer Sound loudspeakers and 72 microphones quietly went to work, redistributing the roar of 14,000 fans in real time. For those in the crowd, it wasn't immediately obvious what had changed, only that the game felt closer, the atmosphere more alive, the cheers more contagious. That's exactly how Meyer Sound wanted it.

Behind the scenes, this groundbreaking audio system was conceived and designed by Meyer Sound's John Pellowe, project director for Constellation; and Ana Lorente, senior acoustic engineer. They worked in close collaboration with Anders Jørgensen and the team at Danish integrator and consultant Stouenborg, building on an original acoustic concept developed by Adam Foxwell and Sebastian Holm from Efterklang.

The result was a world-first deployment of Constellation and Spacemap Go, used in tandem to deliver what Pellowe calls "crowd enhancement", a unique approach that reshapes the arena experience by allowing fans to hear and feel each other, even across one of Europe's most cavernous venues.

The idea wasn't entirely new. More than a decade ago, Meyer Sound deployed Constellation in Vendespace, a 5,000-seat venue in France. Though originally installed for opera, the system also enhanced crowd noise during sports. That seed of an idea grew over time.

"It made us realise that if we were ever to do this in a larger space, we would need a lot more power in the system," says Pellowe. "Now, in 2025, we have the technologies to make that vision a reality."

A system like no other

The completed system at Avicii Arena spans 12 acoustic zones and includes 84 ULTRA-X40 and ULTRA-X42 loudspeakers and 72 microphones, all running through NADIA processors, Meyer Sound's flexible and powerful audio platform. NADIA's unique partitioning capabilities allow Constellation and Spacemap Go to operate independently, each with its own timing, routing, and delay structure, yet using the same speaker infrastructure.

"In a very big space, delay optimisation is critical," explains Pellowe. "We use proprietary methods to match the speed of sound throughout the arena. NADIA allows us to set one configuration for Constellation and a completely different one for immersive effects via Spacemap Go."

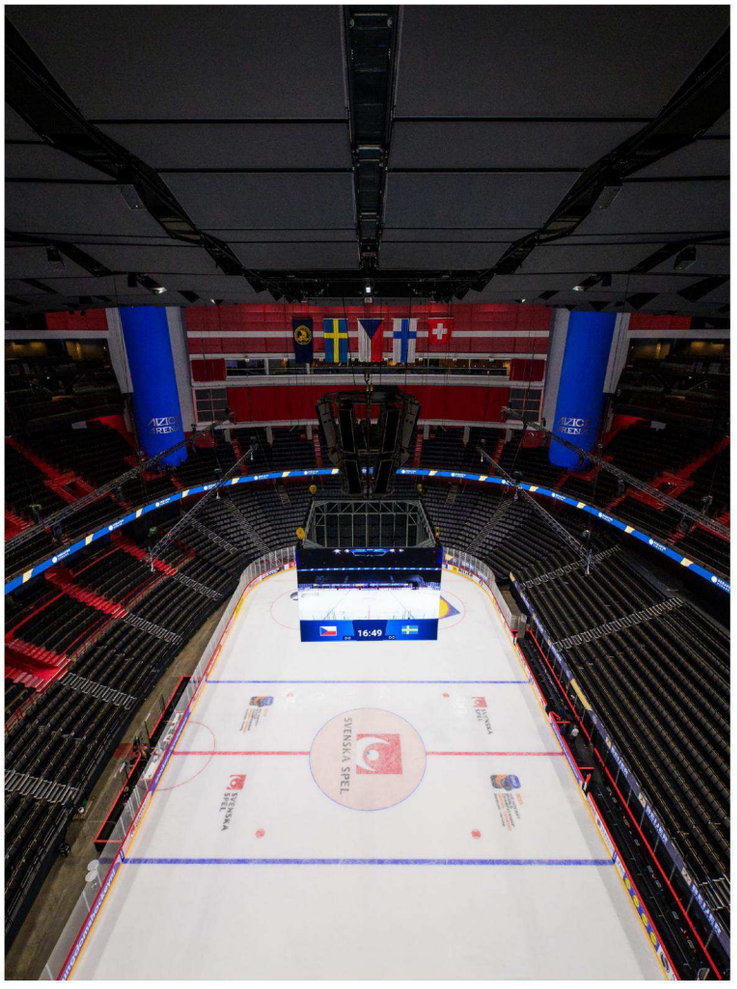
Those effects come to life particularly during sports presentations and team entrances, when movement-based audio - such as crowd sweeps, music swirls, and environmental sounds - adds drama and dynamism to the show.

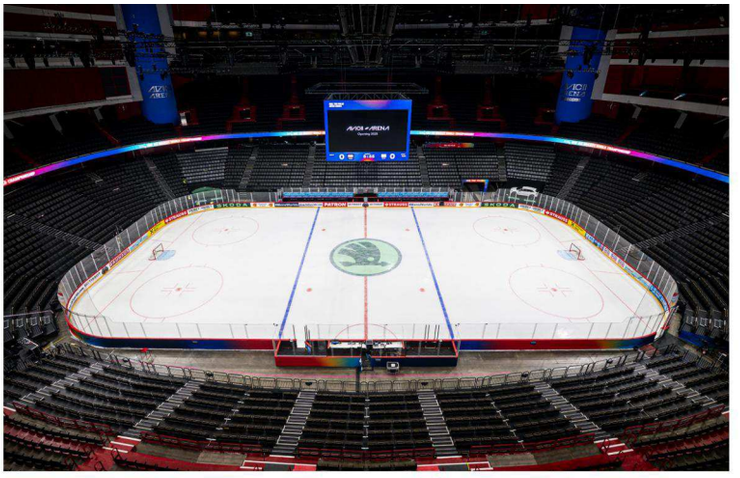
Solving a complex puzzle

Installing a system of this complexity inside Europe's largest spherical building was never going to be straightforward. The arena's new retractable ceiling, designed to enhance acoustics and double as a rigging structure, presented significant spatial and engineering constraints.

"The Pringle-shaped canopy was both a blessing and a challenge," says Pellowe. "It improved the acoustics dramatically, but it meant our microphones and loudspeakers had to be installed with remarkable precision. If a bracket or pipe was even slightly off, it would collide with the moving roof."

Adding to the pressure was a dramatically compressed timeline: delays in building work left only two weeks for overhead Constellation equipment to be installed. That's where long-time partner Stouenborg came in. Working from detailed designs provided





by Meyer Sound, the Danish integrator prefabricated the entire system in its Copenhagen facility, rehearsing the rigging process and assembling every speaker in advance.

"We've worked with Stouenborg for many years, and their attention to detail is second to none," says Pellowe. "They made a two-week install possible."

In fact, the strength of partnerships was key to the project's success. Meyer Sound worked closely with acoustician Adam Foxwell from Efterklang, whose original vision for the arena's acoustic treatment included both the mechanical ceiling and the electroacoustic overlay.

"Adam's predictions for the canopy's performance were perfect," Pellowe notes. "We did everything we could to match that vision with Constellation. That level of alignment between physical and electronic acoustics is rare and incredibly powerful."

This hands-on, collaborative approach is something that sets Meyer Sound apart. Unlike most audio manufacturers, the company remains deeply involved throughout the design and commissioning process of every Constellation system. That commitment has paid off: Constellation has a reputation not just for acoustic quality, but for long-term reliability and client satisfaction.

A sound that travels

One of the most innovative aspects of the Avicii Arena installation is how it reshapes the crowd experience itself. The arena was divided into eight triangular "pizza slice" zones, each with loudspeakers and microphones. Sound from any one zone can be redistributed to any or all others in real time, ensuring that fans singing at one end of the arena can be heard clearly at the other.

"The objective was to increase emotional connection," says Pellowe. "We wanted competing teams to actually hear each other's fans, not just see them. That changes the whole dynamic of the game."

The result? A new category of Constellation system, one that doesn't just manage reverberation or support performances, but actively amplifies the audience's own presence.

When the system went live during the World Championship, the reaction was immediate. "You can design, model, and test in an empty room," says Pellowe, "but the real test is when the building's full of energy. When the crowd came in and we set the final levels, we knew it worked. That was the moment of truth."

Feedback from fans, broadcasters, and arena management has been overwhelmingly positive. "We have heard from the highest level of management at the Avicii arena that they are very pleased with the system," adds Pellowe.

For Pellowe personally, the transformation is especially meaningful. "I mixed Pavarotti here years ago. Back then, the space was so reverberant that even audience applause sounded distant. Now it's full of life. It's a complete turnaround."

Like the venue itself, Meyer Sound is always evolving. "We're constantly learning," Pellowe says. "What we're doing in 2025 is a world away from how we worked when we launched Constellation in 2006. That's how it should be."

And while the scale of Avicii Arena might be extraordinary, the philosophy behind the project - close collaboration, technical precision, and audience-first design - is core to every Constellation installation.

For Meyer Sound, it's not just about sound. It's about creating connection and amplifying the moments that bring people together.

meyersound.com/product/constellation

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