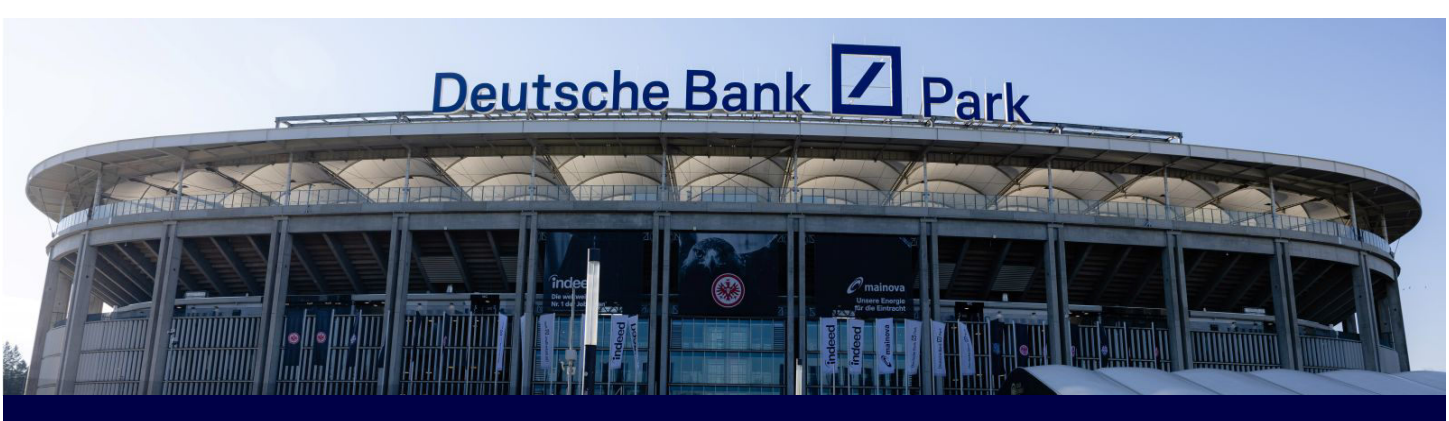
Media & entertainment case study

EintrachtTech implements an AI-powered visitor flow management system

EintrachtTech, the digital subsidiary of Eintracht Frankfurt, worked with Cognizant to implement an AI-powered visitor flow management system to improve efficiency at Deutsche Bank Park.



At a glance

Industry
Media & entertainment

Location
Germany

Challenge
Improve the visitor experience, reduce risk and increase revenues with an AI-powered visitor flow management solution.

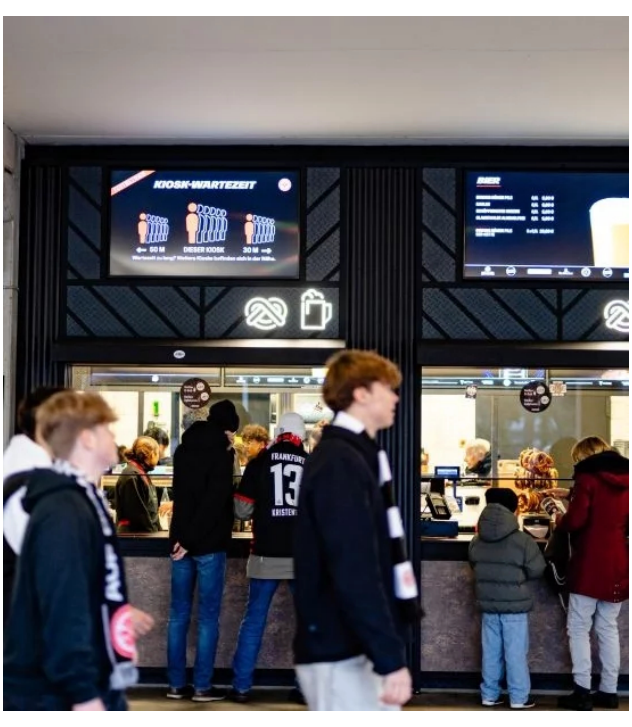
Success Highlights

- **Up to 60,100** football fans enjoy an enhanced experience with less time spent queueing
- **Over 2 million** annual visitors to Deutsche Bank Park stand to benefit from shorter queues
- **Over 90%** accuracy achieved by the solution in calculating wait times

The challenge

EintrachtTech is responsible for digital transformation and the development of innovative digital business models at and around Deutsche Bank Park, the home ground of Bundesliga powerhouse Eintracht Frankfurt Fußball AG.

Germany's fourth-largest football club by membership numbers regularly draws up to 60,100 fans to the stadium. But Eintracht is also more than just a football team—over 50 sports are played under the Eintracht brand—and Deutsche Bank Park is more than just a football stadium. This vast 420,000-square-meter venue hosts concerts, festivals and exhibitions, welcoming over 2 million visitors annually.



Handling visitor flow at the stadium on busy match days

Like most large sports and entertainment venues, Deutsche Bank Park faces challenges around handling visitor flow at busy times. On match days, the entry gates open two hours before kickoff, and visitors tend to leave in a tight, 30-minute timeframe after the match. This results in long queues at entrance and exit gates, and at the kiosks inside the stadium.

It's a similar story at concerts and other events, creating several challenges. Long wait times impact the visitor experience—fans would much rather settle in with a beer and a bratwurst than stand in line waiting to be admitted. Large crowds also create heightened security risks, especially if there aren't enough stewards available to ensure things go smoothly. Lastly, long queues at gates and kiosks mean less revenue for Eintracht and its catering partners.

Eintracht's independent digital subsidiary, EintrachtTech, was asked to find a flow management solution to improve queue management in specific areas of the stadium. It collaborated with Cognizant to develop an IoT and AI-based solution.

Our approach

As the integration lead, Cognizant orchestrated the design and development of a visual sensing platform that can calculate wait times and provide the basis for taking appropriate action.

Real-time footage from cameras at gates and kiosks would feed data protection compliance into an AI model trained to analyze visitor flow. The estimated waiting times calculated from this data are displayed on screens above the kiosks. In the future, this data may also be displayed in mainaqila, the app developed by EintrachtTech. The data could also be used to direct stadium staff to congested areas to help manage the crowd.

Key elements of the project included:

- **Hardware integration:** Cognizant integrated cameras chosen by EintrachtTech into the visitor flow management solution.
- **Camera locations and angles:** Establishing the right locations and camera angles was crucial to the success of the project. We trialed different locations and angles until a good selection of monitoring points was established.
- **AI-model training:** The AI model had to be capable of observing people in a given area and calculating how long an individual had to wait. While this worked well in some areas and conditions, the model had to be fine-tuned to handle certain conditions and cases, such as:
  - People in similar clothing: Many fans arrive on match days wearing Eintracht tops and scarves, potentially undermining the AI model's ability to distinguish individuals.
  - Weather and light conditions: Rainy days bring out umbrellas, making it hard for the model to detect how many people might be underneath one. In winter months, fans sometimes leave the stadium after dark, creating more identification challenges.
  - Queuing versus loitering: The model had to be trained to distinguish between people queuing and people simply being in the area of their own accord.
- **Data privacy and GDPR:** The model is trained to observe and follow faces, requiring the capture and short-term processing of facial metadata. EintrachtTech required this data to be fully anonymized, such that the solution cannot perform facial recognition of individuals. While test data was kept for 72 hours to train the models, live data is deleted immediately after processing, in compliance with the EU General Data Protection Regulation (GDPR).
- **Testing:** The solution was tested on match days at both the men's and women's games, as well as on concert days, to test with differing crowd levels. The model was refined after each test. After testing at multiple games, the solution achieved over 90% accuracy in predicting wait times—meaning that in over 90% of the cases, the prediction matched the expected range. It was now ready to go live.

"This was a challenging project for many reasons, but every obstacle was tackled by Cognizant with a positive attitude and a creative collaborative spirit. Our experience of working on this project has increased our trust in Cognizant with specific expertise in AI and IoT, as well as global industry knowledge and shared values around sustainability."

—Marvin Arnold, Senior Project Manager, Digital Center "Arena of IoT," EintrachtTech

Business outcomes

EintrachtTech now benefits from an AI-powered visitor flow management solution that is delivering significant benefits to Eintracht Frankfurt, the stadium and the millions of fans who visit Deutsche Bank Park each year. With the solution live at five kiosks, benefits achieved to date include:

- **Enhanced visitor experience:** Improved capacity management means visitors spend less time queuing and more time enjoying being at one of the world's top stadiums.
- **Increased revenue potential:** The solution cuts waiting times at kiosks, reducing abandonment rates. This creates higher revenue potential for Eintracht and its catering partners, as well as a better experience for visitors.

A win-win solution for the stadium and its visitors, powered by AI

Managing visitor flow at busy times is a challenge for any large venue. But every challenge is also an opportunity to innovate, and this is exactly what EintrachtTech has done. Working with Cognizant, it developed, refined and implemented an AI-powered visitor flow management solution that reduces queuing, boosts security and helps with scheduling. Fans and visitors can maximize their time at the stadium rather than waiting in line, creating a more enjoyable experience and boosting efficiency and revenue potential for Eintracht and its partners. The club plans to expand its use of the solution to more entrances and kiosks to capitalize even further on the benefits it can deliver.

60,100

average visitors on match day

Over 2 million

stadium visitors annuallys

90%+

accuracy in calculating wait times

About EintrachtTech

EintrachtTech GmbH is the independent digital subsidiary of Eintracht Frankfurt Fußball AG. It is responsible for internal digital professionalization and the development of new digital business models that reach far beyond the stadium's borders. EintrachtTech plays a central role in securing the club's present and future financial independence and growth potential using a holistic and far-reaching approach. For more information, visit https://club.eintracht.de/eintrachttech/

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World Headquarters
300 Frank W. Burr Blvd.
Suite 36, 6th Floor
Teaneck, NJ 07666 USA
Phone: +1 201 801 0233
Fax: +1 201 801 0243
Toll Free: +1 888 937 3277

European Headquarters
280 Bishopsgate
London
EC2M 4RB
England
Tel: +44 (01) 020 7297 7600

India Operations Headquarters
Siruseri-Software Technology Park of India (STPI)
SDB Block—Ground Floor
North Wing
Plot No H4, SIPCOT IT Park
Chengalpattu District
Chennai 603103, Tamil Nadu
Tel: 1800 208 6999

APAC Headquarters
1 Fusionopolis Link, Level 5
NEXUS@One-North, North Tower
Singapore 138542
Phone: +65 6812 4000
Email:
inquiry@cognizant.com

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