Winter as it was before the corona-
virus: First mentioned in 1434, the
Striezelmarkt in Dresden is consid-
ered the oldest Christmas market in
Germany. It attracts roughly two
million visitors per year throughout
the Advent period — at least in
pre-pandemic times.

Where is Emma?

It's the stuff of nightmares — a child vanishing without warning. Thanks to close collaboration with Fraunhofer IVI, the police in Saxony have a tool to help direct searches in a more targeted way and quickly narrow down the search area.

By Dr. Monika Offenberger

Imagine a winter without the coronavirus. People would watch the New Year's Eve fireworks, raise a glass to the new year and share embraces. And before that, there would be all the get-togethers over mulled wine and stollen at the Christmas markets in Nuremberg or Dresden. Then, imagine a nightmare scenario striking, right in the middle of the festive atmosphere: Little Emma has disappeared! She was just standing in front of the carousel with her bag of Christmas cookies, but now it's as though she vanished from the face of the earth. You search, and call her name, but still nothing. So you reach for the phone and dial the emergency number.

"A child missing in a large crowd of people is a typical incident for our task forces," relates Jan Hentschel, head of the information and communication department in Saxony's police administration office. "In such cases, we send the next available patrol car there immediately and request a photo of the child from the mother. We send this to all the officers in the vicinity using MePol, the new police messaging app, along with a map that displays the child's last known location. We can also use the map to show our officers' current locations and the direction in which they are headed. In addition, the tool also allows us to estimate how quickly the child is advancing in the crowd and the radius in which they might currently be located. We conduct a targeted search within this area, and as a rule, the missing child is found quickly."

The Fraunhofer Institute for Transportation and Infrastructure Systems IVI in Dresden developed MePol in close cooperation with the Saxon police force for use in standard police services. The Free State of Saxony provided approximately three million euros in funding for the project. To date, the app has been installed on 4300 smartphones operating within a specially protected IT environment and is administered by the Saxon police themselves.

Comparing the old process with the new system effectively shows the extent to which the app has simplified the work of the state's police force. "Previously we spoke to the mother first, of course, and requested a photo of the child," Hentschel explains. "But then we had to take the photo away with us in order to create a wanted poster for the public search. Next, we would send out a radio message with a short description of the person and details of the last known location. Our officers had to remember this information or make notes."

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Jan Hentschel,
Police administration office, Saxony

No photo? No map of the area? No auxiliary functions? And all this in the age of WhatsApp and Signal and all the rest? "As a police force, some of the data we work with is highly sensitive. This means that we must guarantee a high degree of data protection and IT security, so using a commercial service would be totally unacceptable for us," counters Hentschel.

The idea of developing their own communication service was conceived in 2019. On the one hand, it would need to provide the same services as commercially available apps, such as the ability to send and receive text and voice messages, images and videos, and to create groups so all members can keep each other updated at all times. On the other hand, however, it would also have to meet additional requirements specific to the police — for example, operations management, real-time location display, compliance ▶

with legally required deletion deadlines and decision-making support.

The police and researchers worked together closely to develop MePol. They defined priorities, specified requirements and discussed ways of working. "It's an ongoing process in which users in the field and researchers continuously exchange ideas and coordinate with each other. This close collaboration is the key to success," emphasizes Dr. Kamen Danowski, Head of the Strategy and Optimization department at Fraunhofer IVI. Since 2002, his team has been working on new technologies for operations management and secure information transmission in the areas of disaster control, firefighting, rescue services and the police forces. An innovation partnership with the State Office of Criminal Investigation in Saxony was launched in 2013. With more than 20 federal state and national agencies currently participating, this partnership is focusing on developing a solution for special forces whose operations in the fight against terrorism and crime come with serious potential risks. The result of this joint development effort is "SE-Netz," a network for special forces that has been adopted as a nationwide standard and that garnered the 2020 Joseph von Fraunhofer Prize. This technology supports fast, secure and reliable communication across federal states and agencies during special forces operations. "With SE-Netz as a foundation, we were able to develop a solution to support standard police services," says Hentschel.

The result is a flexible system that connects various servers, end devices and mobile apps, while simultaneously guaranteeing high levels of data and IT security. It can also be linked to the "SE-Netz" tool if necessary. "A major advantage of MePol is that it connects smartphones with the internal computer infrastructure of our command and control centers. This makes exchanging information between our mobile units and operations management significantly easier," Hentschel relates. The core functionalities of MePol include not only information exchange and location display but also intelligent algorithms that calculate the optimal deployment of personnel and resources in a specific case within seconds. Jan

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Hentschel explains: "Let's say a bag was snatched in Dresden's city center. We know that the incident took place ten minutes ago in front of the Kreuzkirche church and the perpetrator has escaped on foot. Our colleague in the situation center can then identify certain search areas on the map and select the five nearest police cars to route them there. This is another situation where the app could create a visual representation of the target's possible movement radius using its distance/time calculation function. This is a classic tactical challenge in police work, and with MePol, we can accomplish it in a highly effective way."

The new messaging service has been very well received by the police officers on the force, according to Hentschel: "The broad range of functions and ease-of-use have played a pivotal role in this high level of acceptance, as MePol essentially looks much the same as the commercial apps that people use privately. Furthermore, we take on board the suggestions and wishes of our colleagues who use the system every day on an ongoing basis. And here we have a great advantage in that we can implement new requirements very quickly with Fraunhofer IVI."

One of these requirements involved transferring the entire MePol system to the Saxon police force's cloud infrastructure, which was accomplished in 2021. "With this highly available, scalable cloud we have succeeded in taking a major step toward storing our sensitive data securely, without impacting functionality," stresses Hentschel. In fact, it's not only the available technologies that change; the responsibilities of the police force and the threats they face are also constantly in flux. "In police operations, optimized location display, real-time position data for our officers and resources, and the identification of important points and areas are all critical for a successful outcome. To this end, in addition to conventional 2D digital maps, we are also using augmented reality in MePol. We are conducting future-oriented research on 3D virtual walk-throughs, drone integration and the use of wearables," outlines Dr. Danowski. "This is what I believe is our responsibility as Fraunhofer researchers: working with users to develop new technologies and making them available quickly for use by the task forces." ∎