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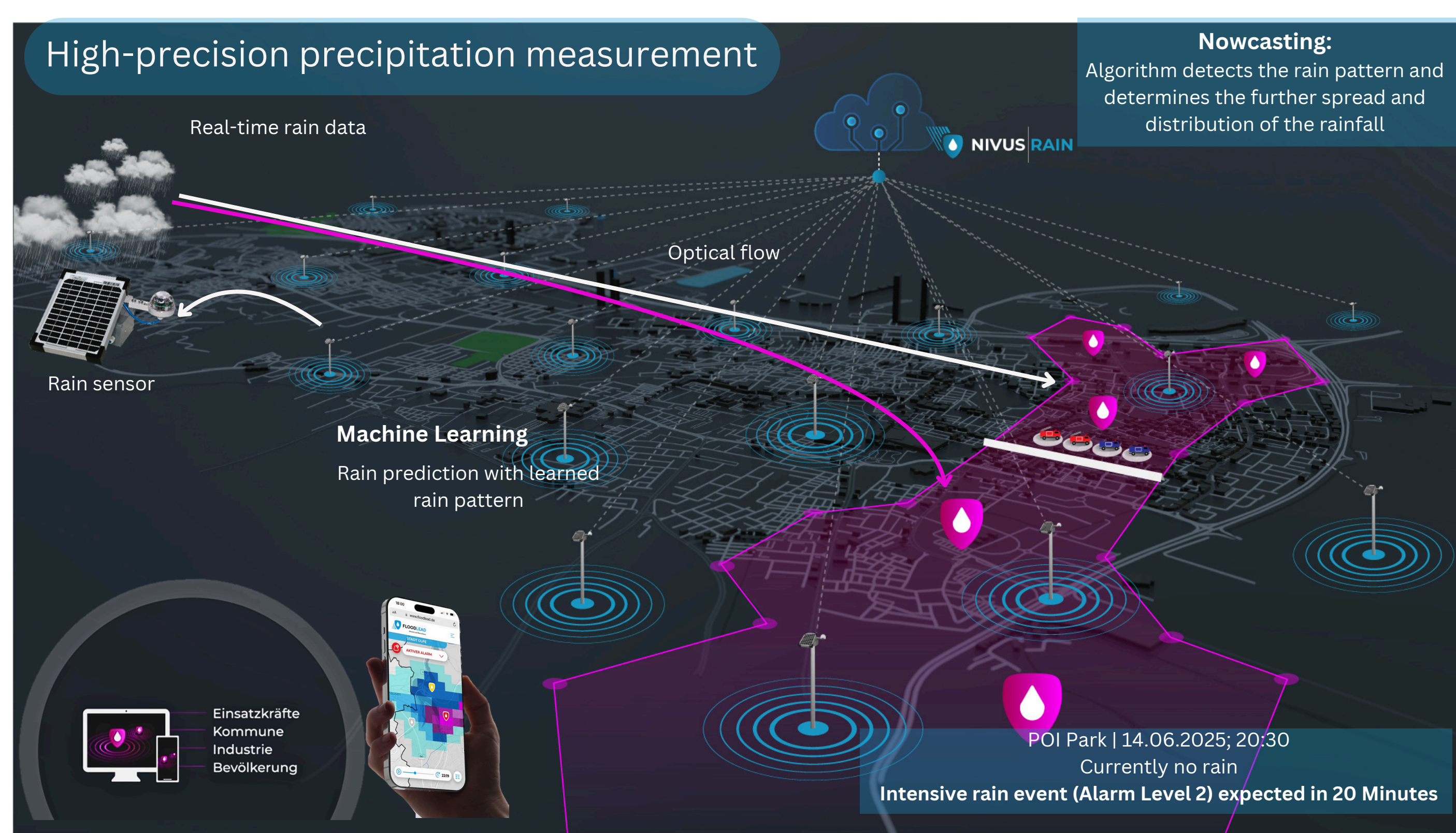
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Why Heavy Rain Forecasting?

- **Undetected heavy rainfall** events significantly increase the risk of widespread damage to residents, urban areas, and industrial infrastructure.
- Climate change is expected to further exacerbate this situation, leading to **more frequent** and **intense convective rainfall** events.
- **Weather radar** and **climate model** often tend to underestimate or overlook extreme convective precipitation.
- An **early warning** time of up to one hour before catastrophic rainfall events is crucial to **minimize the chaos phase** and improve **emergency response**.

How it works



How the heavy rain forecast works (Source: NIVUS GmbH)

- Low-cost, energy-efficient, self-sufficient and maintenance-free optical **rain sensors** are distributed in a dense **swarm network**
- Three projects : **Liederbach am Taunus, Olpe, OOWV Oldenburg**
- Utilisation of **LPWAN** technology to transfer rain data to the cloud and further on to **AI**
- **Optical flow** method for immediate prediction of the rain pattern
- **Artificial intelligence** (AI) to predict heavy rainfall events **up to 60 minutes** in advance
- Strategically placed **water level sensors** on rivers, streams and in the sewer network to **monitor water levels**
- Developed as a digital service where rain information is available for **freely selectable points of interest (POIs)** via messages and preferred digital platforms



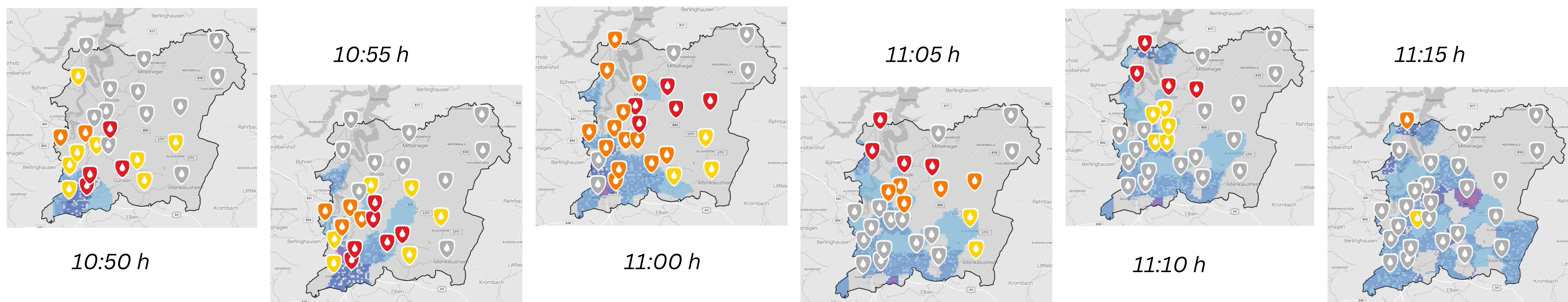
Source: AI-generated picture (snipki.de)

Running Projects and Results

Rainfall event in Olpe on 07 November 2024



Check the live status in Olpe



Rain event display in the NIVUS RAIN frontend (Source: NIVUS GmbH)

Current Status

- The ongoing projects in the three locations with **over 100 rain sensors** in total have been providing **heavy rain alerts** to the rescue forces and general public.
- Artificial intelligence **continuously learns** with each rain event to comprehend **the rain pattern** better
- The **warning and hazard water levels** for the user-defined critical river locations are set up and used to generate alarms
- **Case study** from **Liederbach am Taunus** shows how the system worked during the heavy rain event on **16th August 2023**

Future Perspectives

- Implementation of the project in other municipalities with the potential for **inter-municipal network**
- **Integration of ICON D2-Model** data to monitor the approaching weather conditions
- Improvement of the **alarm concept** with DWA heavy rain index and other findings
- Potential for expansion as a **global SaaS (Software as a Solution)** through **international partnerships** with engineering companies

