



Future Trends for Sustainable Operations

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Emergency Response BASF SE**

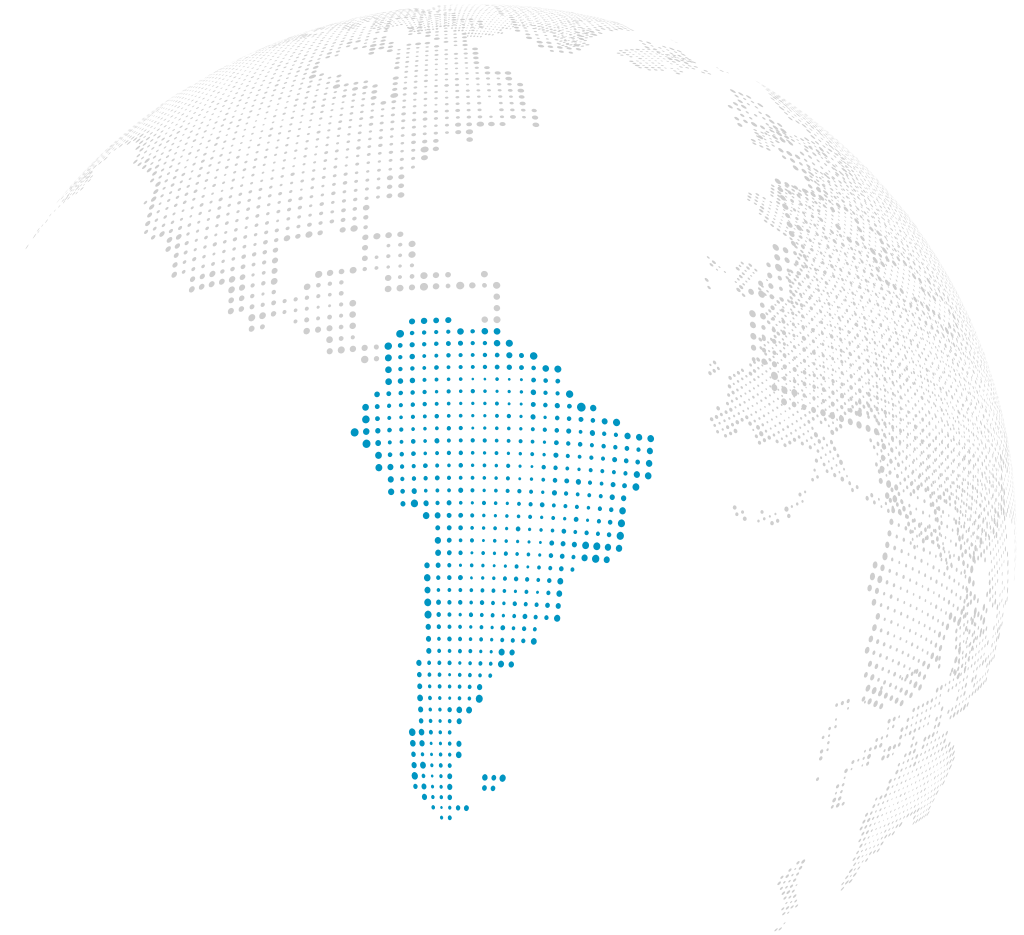
Future Trends for Sustainable Operations

- Early detection
- Information
- Operations



Future Trends for Sustainable Operations

- Early detection



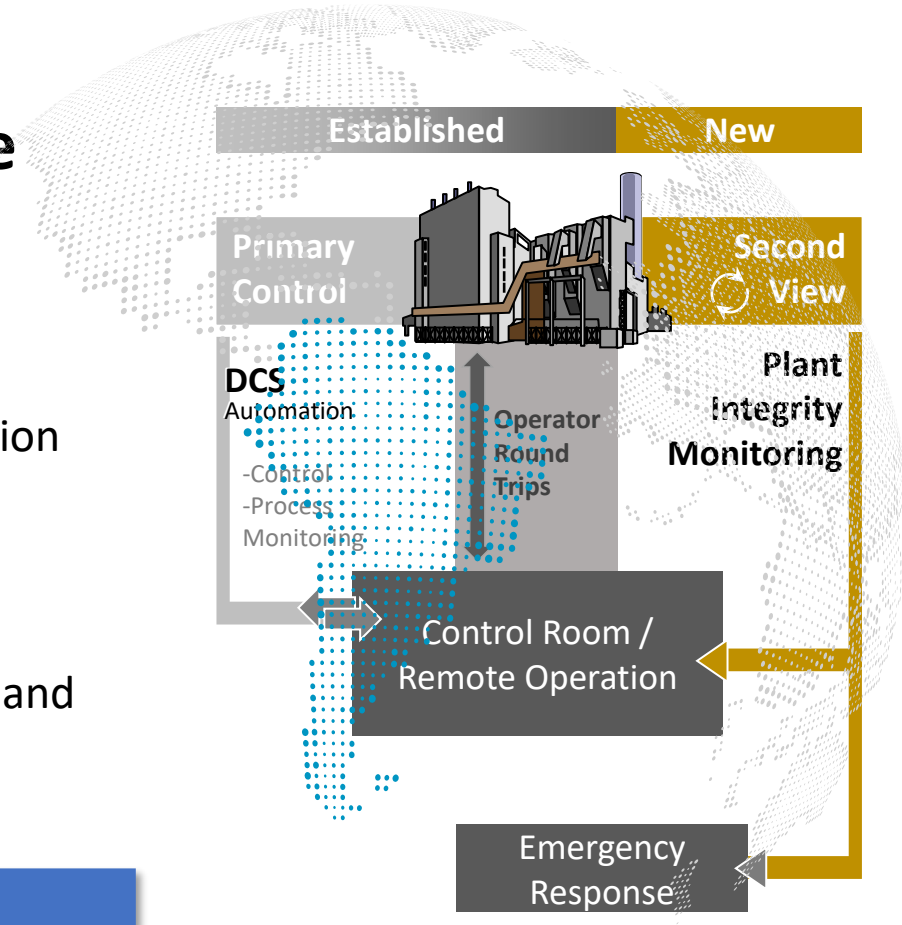
Objectives / Conception

Innovative sensor- & detection-systems allow a safety-focused and comprehensive 2nd view on the plant's integrity, enabling early identification of unwanted or even critical situations.

Plant Integrity Monitoring...

- operates as an independent system in addition to the core process automation DCS and by this adding a second and independent layer for risk mitigation.
- supports operations as an assistance system, especially with respect to the continuously increasing extent of remote operation and the extending areal distance between control-rooms and production assets.
- is to be integrated into the well established emergency response structures and into technical site service processes related to these.

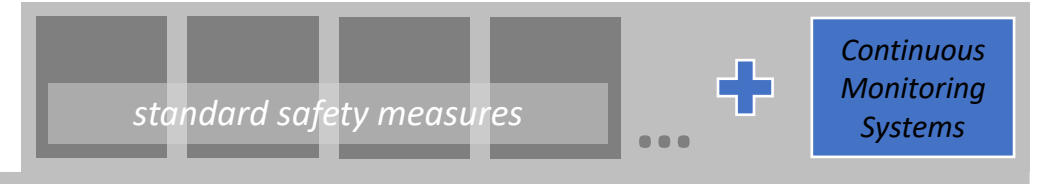
Operations gains a new kind of transparency based on real-time capture of what happens along their assets and in their plant as a whole.



Driving Value for BASF

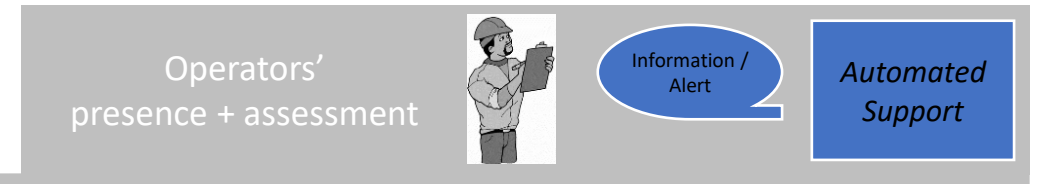
Increasing overall Plant Safety

Periodic monitoring via man-based round trips will be substituted by continuous monitoring via sensing- & screening-systems with abilities for early detection of unwanted & critical plant situations, reducing equipment damage and plant shutdowns.



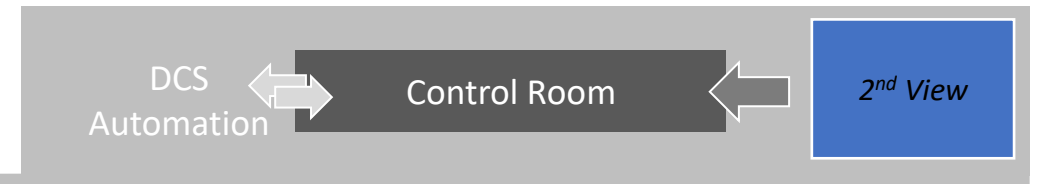
Providing Assistance for Operators

Operators will be supported through preselected / preprocessed information or triggers regarding assets and environment, so the necessary time for operators' physical presence within critical areas is reduced to a minimum.



Following the Path to further & true Remote Operation

Now and in future continuously increasing distances between control room and plant make the provision of an personnel-independent and continuous view on plant integrity more and more indispensable.

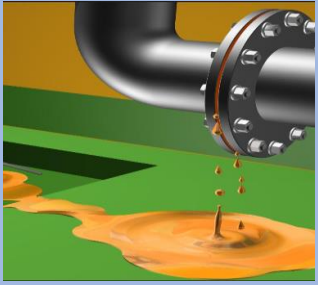



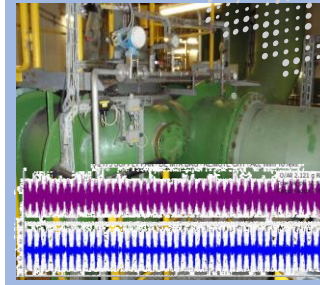
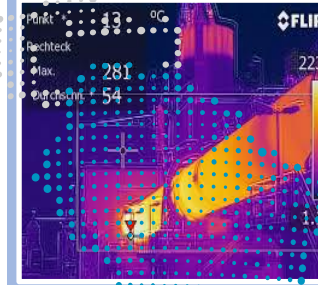



Acceptance & Appreciation to be expected

Plant Integrity Monitoring offers the chance to provide appropriate compensation measures in order to allow further advancements in automated operational modes of process industry plants. At the same time this establishes a basis of acceptance not only for authorities but also regarding the public opinion.



Scenarios on how an approach could support ...

leakage			abnormality			worker protection
liquid	solid	gas	acoustic	vibration	overheating	
						

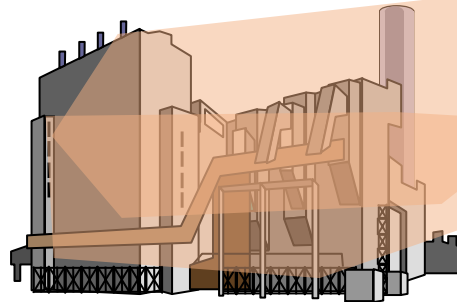


round trips

4-12h

4-12h

... so far



- vibration
- visible light
- infrared
- sound
- temperature
- ...

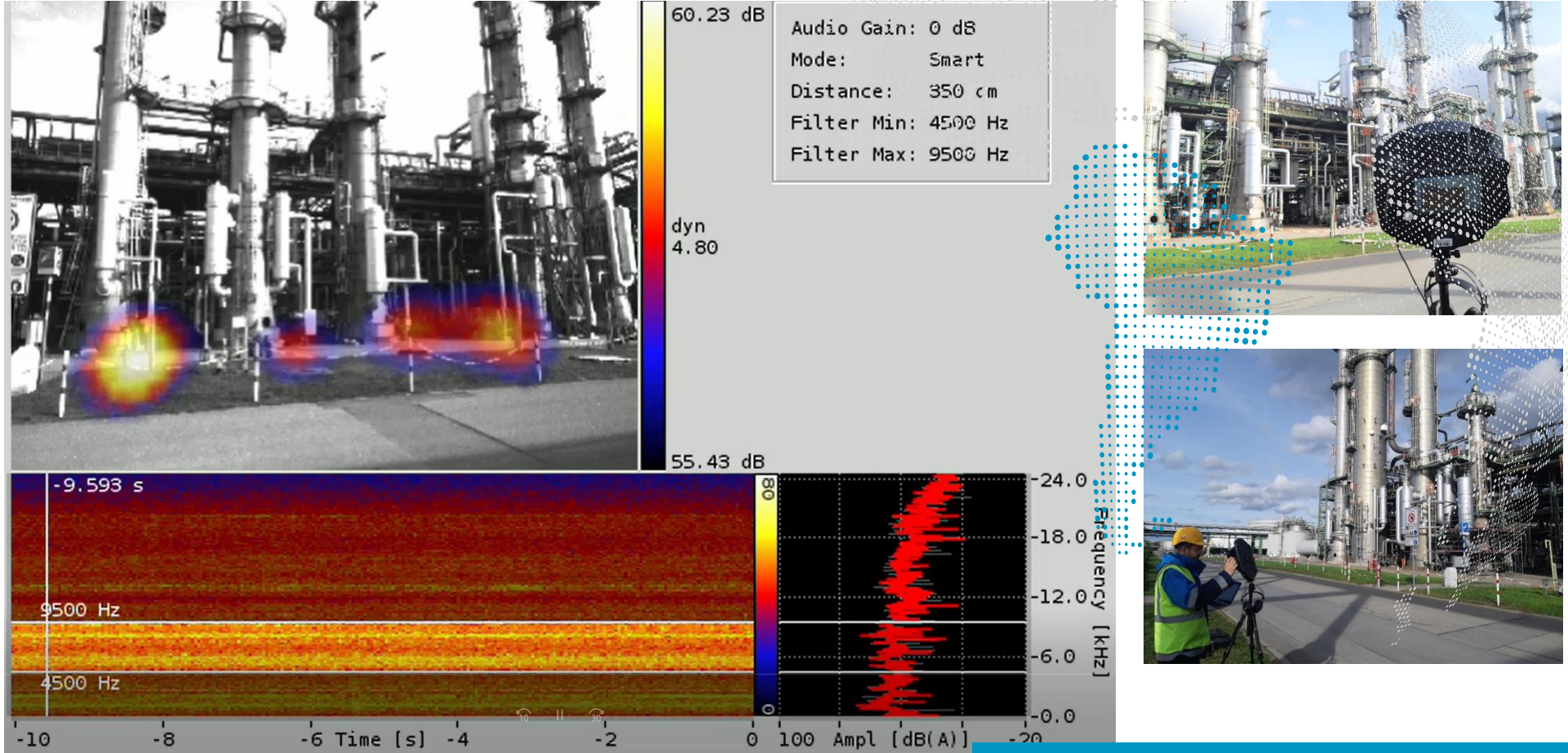
Plant Integrity Monitoring

WP2 – Evaluation of technologies

Acoustics sensors

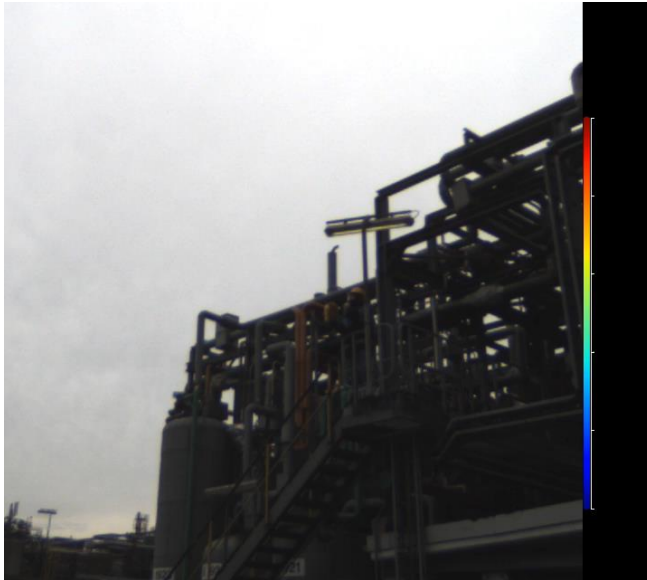
- **Acoustic camera**

- *Measurements in Aro Plant Friesenheimer Insel*



WP2 – Evaluation of Technologies Spectral Camera Systems for detecting Gas Leakages

- New technology - Evaluation of spectral cameras for gas leakage detection as identified key use case



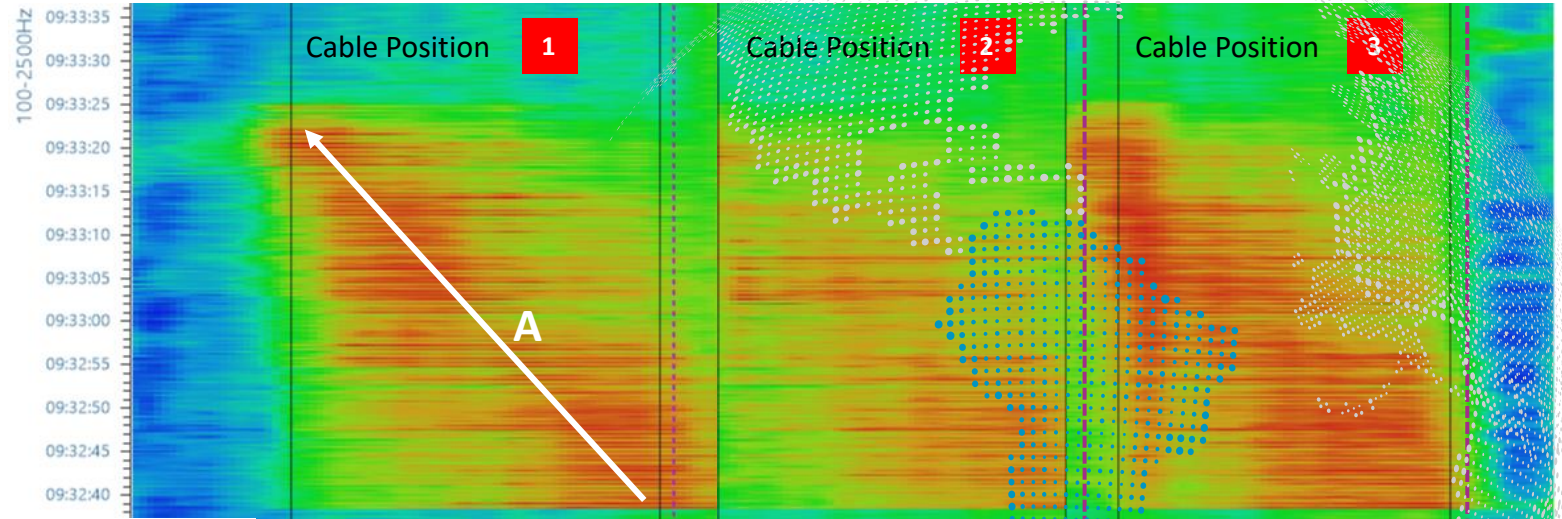
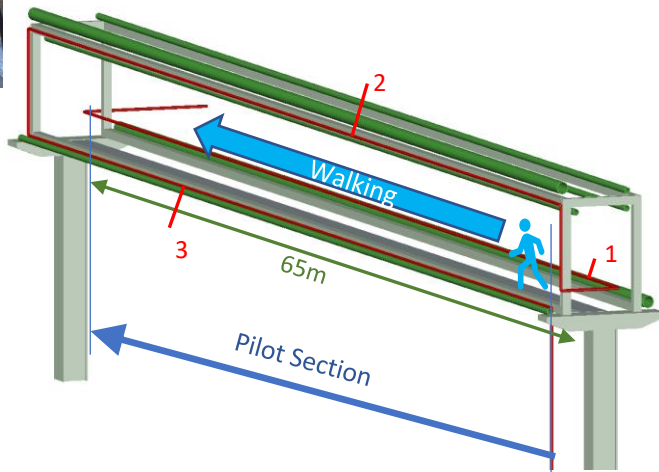
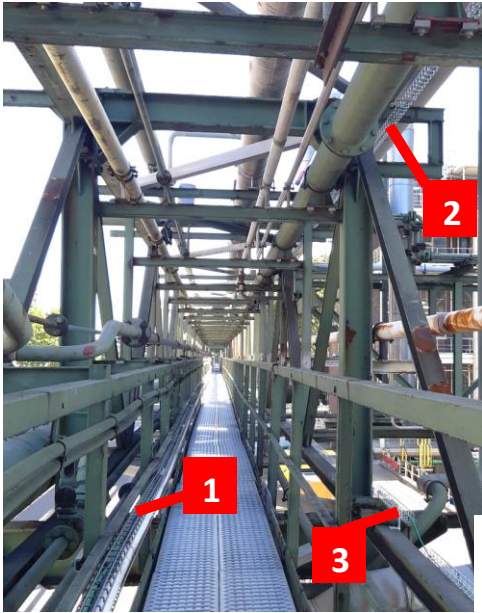
Detection of propene
Rebellion Photonics

Detection of ammonia
Bruker



WP2 – Technologies

Vibration and temperature sensor cable



$$A: v = \frac{65 \text{ m}}{46 \text{ s}} = 1,41 \frac{\text{m}}{\text{s}} = 5,09 \frac{\text{km}}{\text{h}}$$

- First starting measure at pipe rack
Sensor system measure capture walking on pipe rack footbridge

WP2 – Technologies Camerasystems

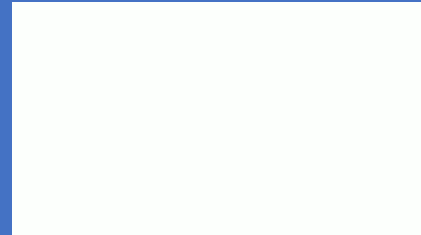
Original camera view range



Image Processing with
conventional filter mask methods



Motion Detection I



Motion Detection II



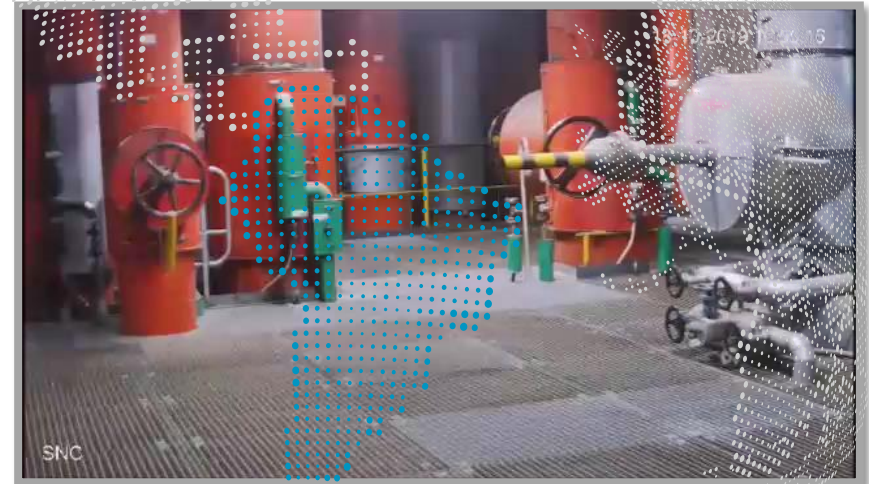
Brightness Filter



Color Filter

Internal

Result with alarming



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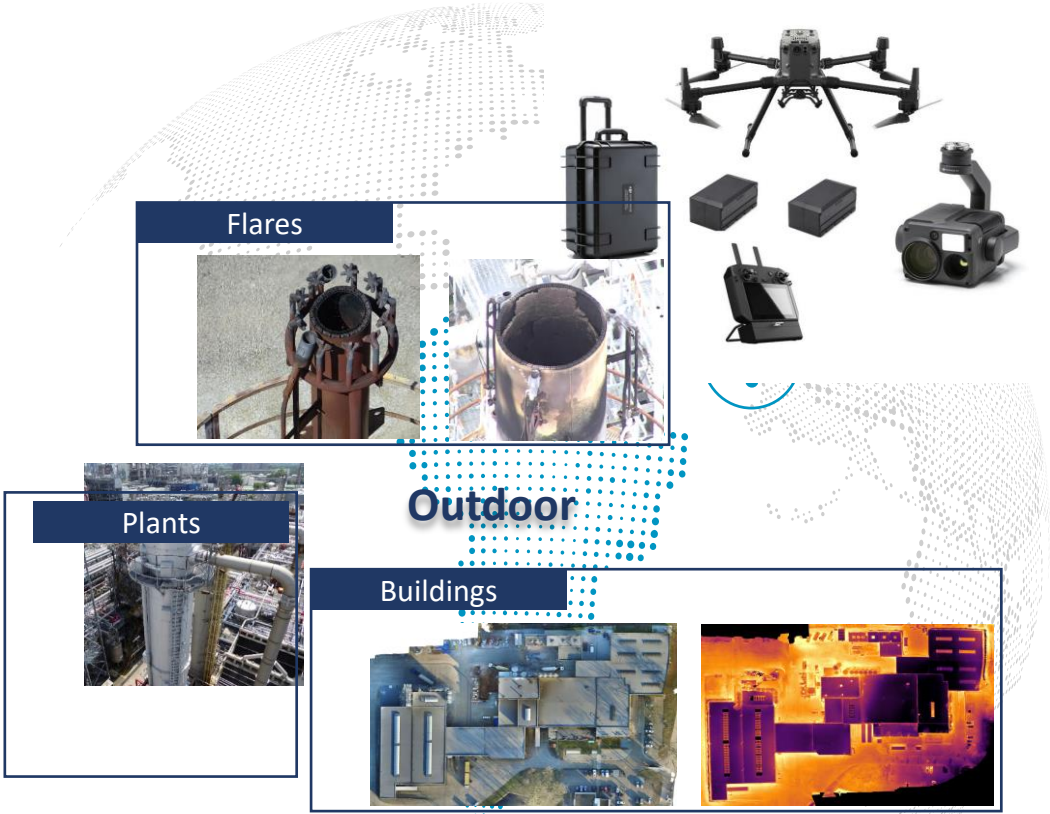
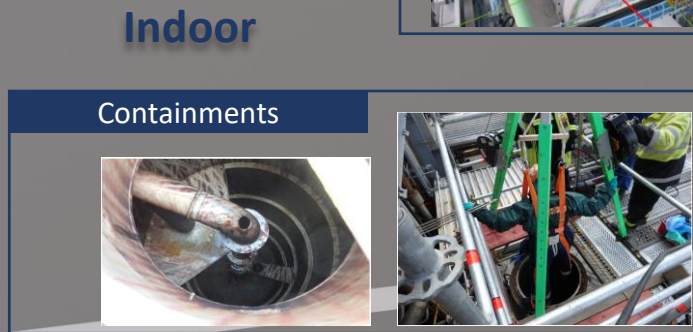
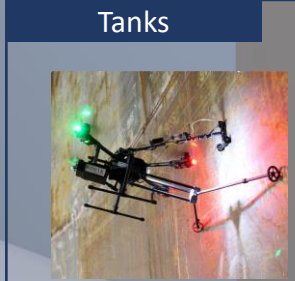
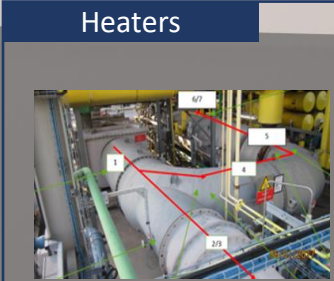


- Information



Drones @ emergency response

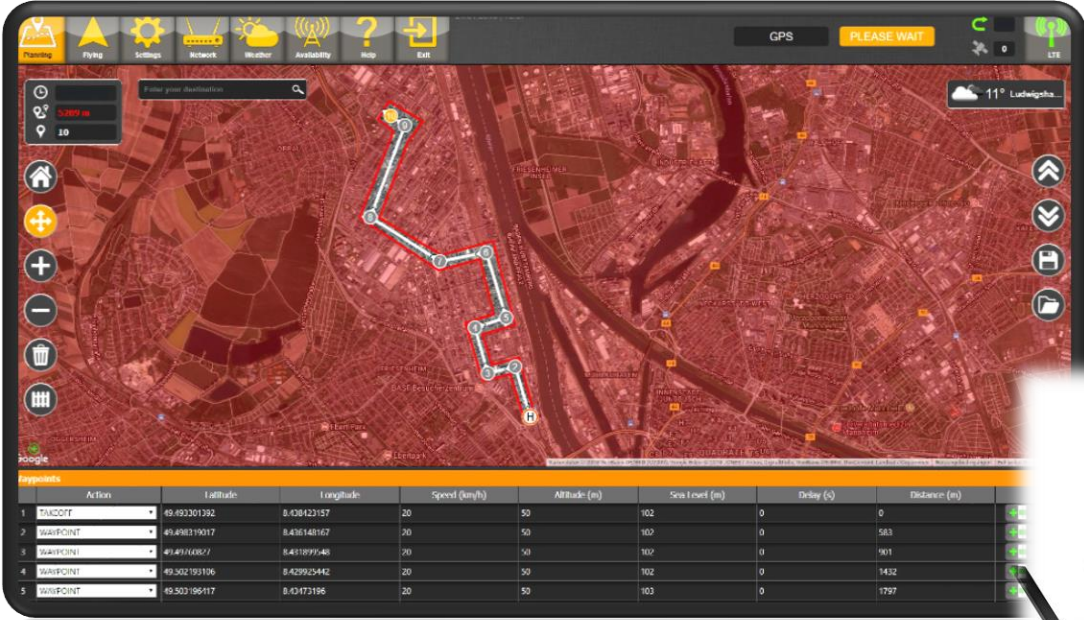
More than 10 years of experience...



Drones @ emergency response

New LTE-control mode in progress

- Implementation of semi-autonomous controlled flights on site



Drones @ emergency response

Standby in Piggyback: roof top drone-port solution



Current



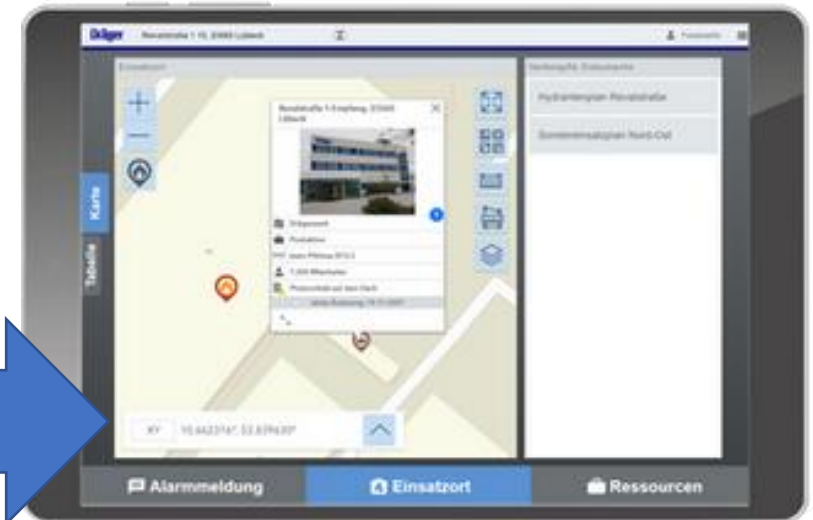
With this basics...



- Currently developing „Mission-Support-System“

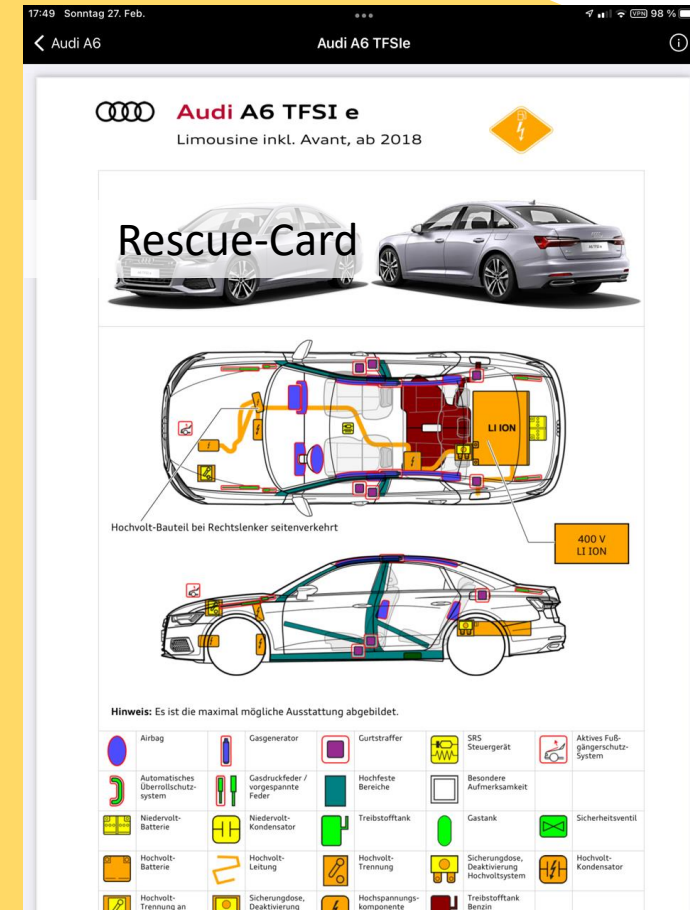
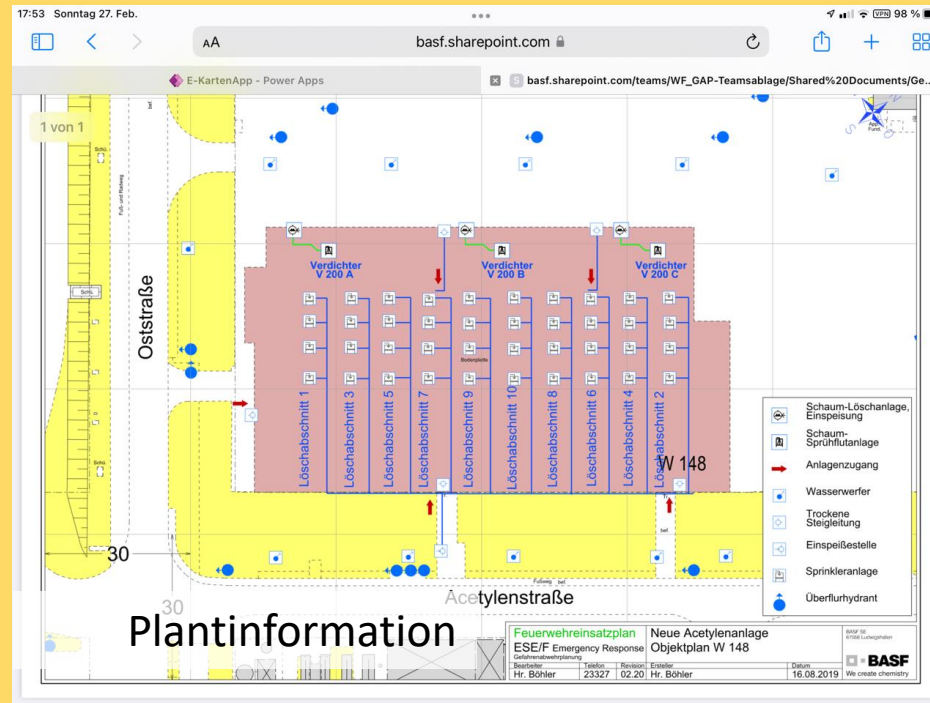
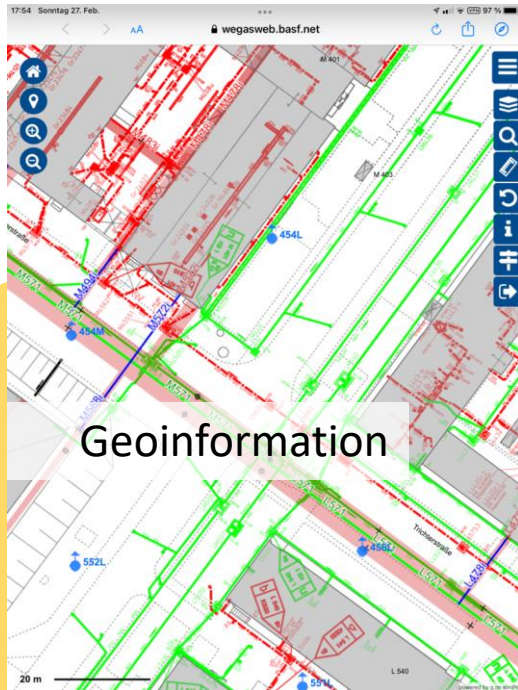
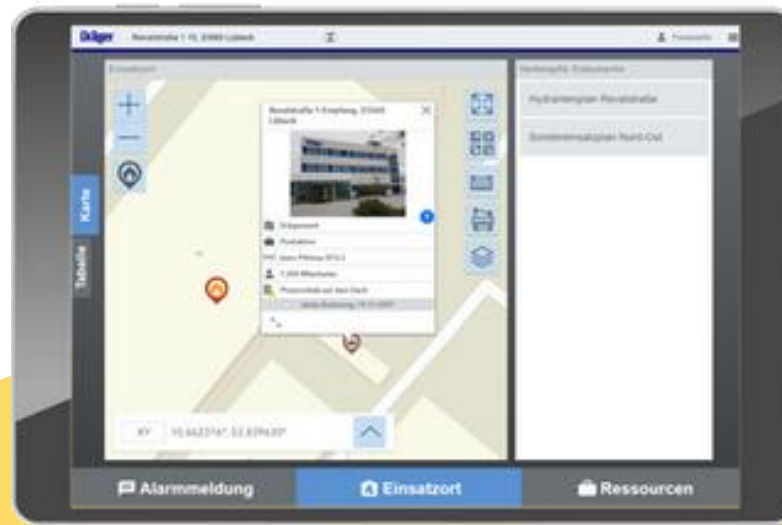
- shows Geoinformation
- shows Building/Plant-Documentation
- shows several specific information

All related to the emergency-location!



Current

„Mission-Support-System“



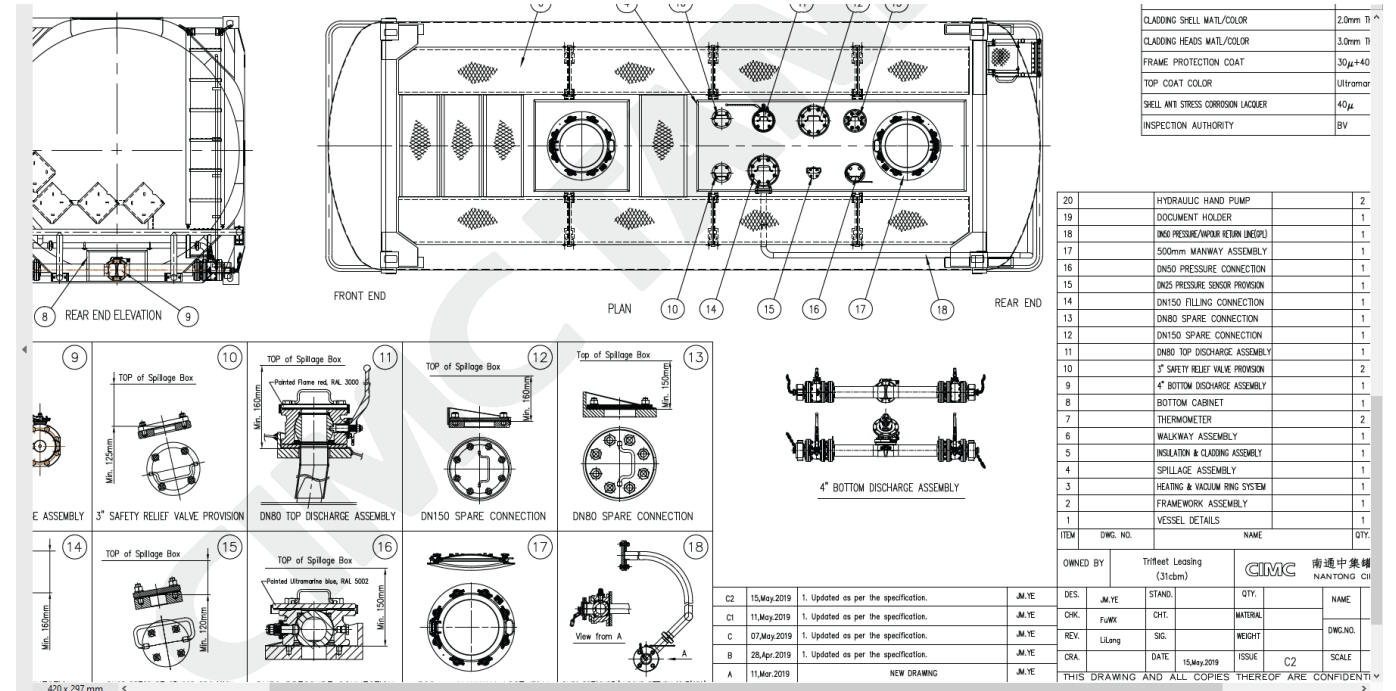
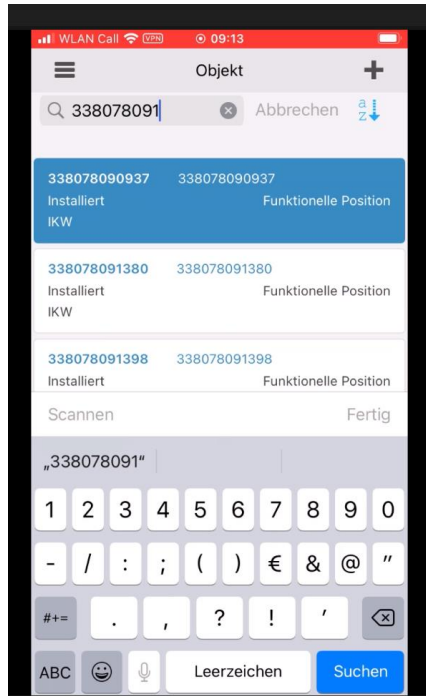
Medium-term



- Mobile access to Distributed-Control-Systems
 - live values in picture and trends
 - simple process overview

Medium-term

- Mobile access to tank-wagon information



Medium-term

- Firefighter Training with VR (Virtual Reality)
- Advantages
 - Exercise without many equipment
 - Train not simulatable scenarios
 - Foam application
 - Handling of vehicle-failures



VR TRAINING HAZMAT TRANSFER

Long-term

- Extending of Drone-Use-Cases
 - Site-located Drones for fast autonomous flight to the incident area



EmergencyEye – Command is going to be operated via BASF ECC Lu - no app or additional Software required („call and go“)

- Supports command and control, crisis and disaster management teams, supervisory authorities and decision-makers / managers in the case of in the case of special operations and major emergencies. Decisions can be made with a larger information background.
 - COMMAND enables a live video function, a precise continuous localization, a chat function with instant translation to overcome language barriers, and via the additional functions Cursor, Picturies and GEOsms to the levels of responsibility
 1. photo documentation and forwarding of image material to further decision makersthrough the Picturies function
 2. a target-oriented routing of peripheral task forces and decision makers by the GEOsms function
 3. target-oriented guidance through the Cursorfunction
- Strengthen BASF Emergency Response Team approach – ECC available 24/7 with access to operationally experienced technical incident commander
- Available in 2022 / technical check done / procurement process activated

Chat
Live-Chat mit integrierter Übersetzung in zahlreiche Sprachen

Video
Bessere Lagebeurteilung und Diagnose durch Live-Video

Lokalisierung
Punktgenaue Ortung des Smartphones nach Zustimmung durch den Anrufer

Foto
Bilder nach Zustimmung durch de Anrufer festhalten.

GEOsms
GEO-Daten an weitere Unterstützer übermitteln und diese zielgerichtet zum Ort des Geschehens leiten.

Cursor
Zielgerichtete Anleitung des Live-Videos.

[Video: Startseite - emergencyeye.de](https://www.emergencyeye.de)

BASF
We create chemistry

Future Trends for Sustainable Operations



- Operations

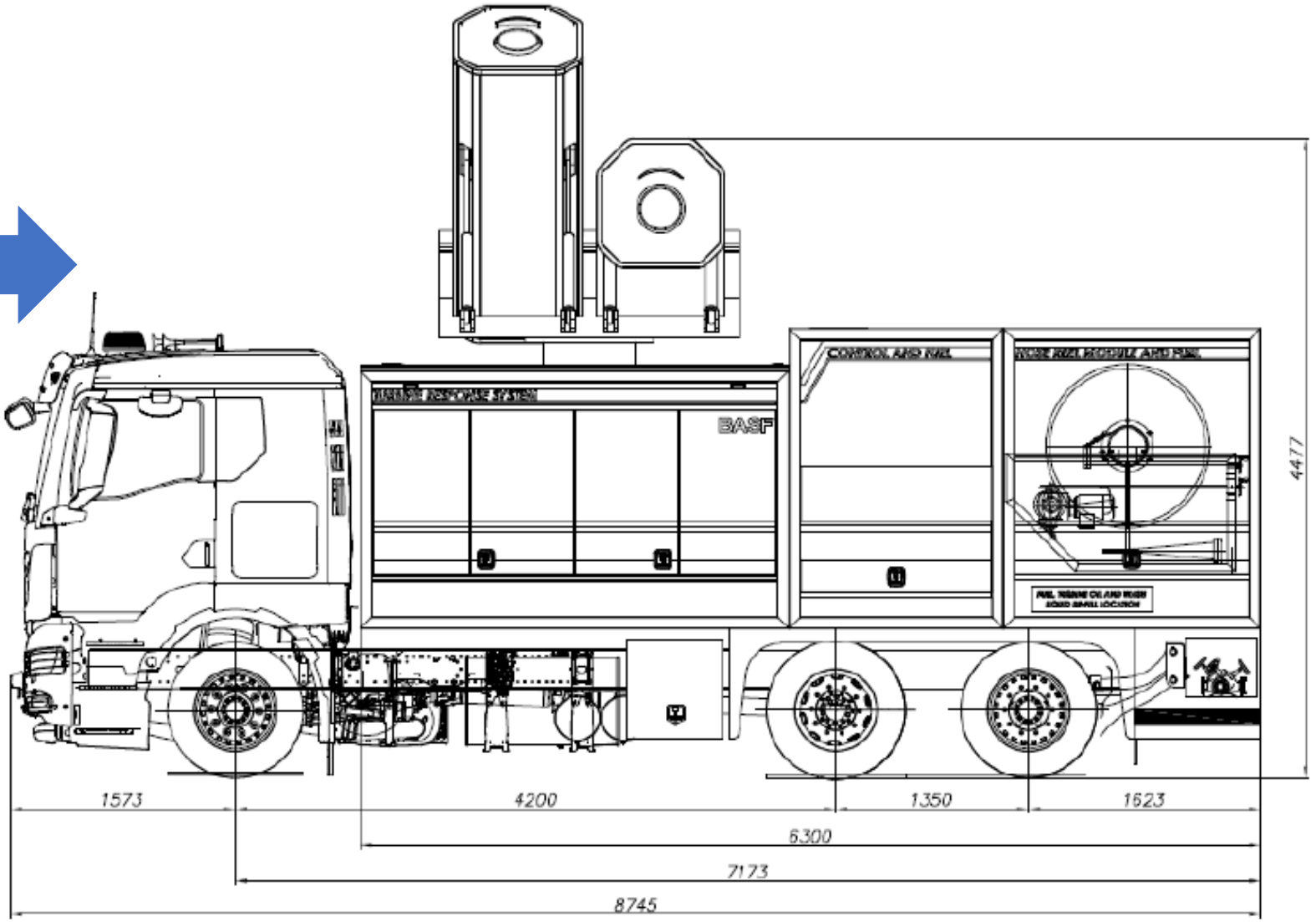
Next generation *Turbo-Extinguisher*

Proven technology:
our current models
in operation &
practicing



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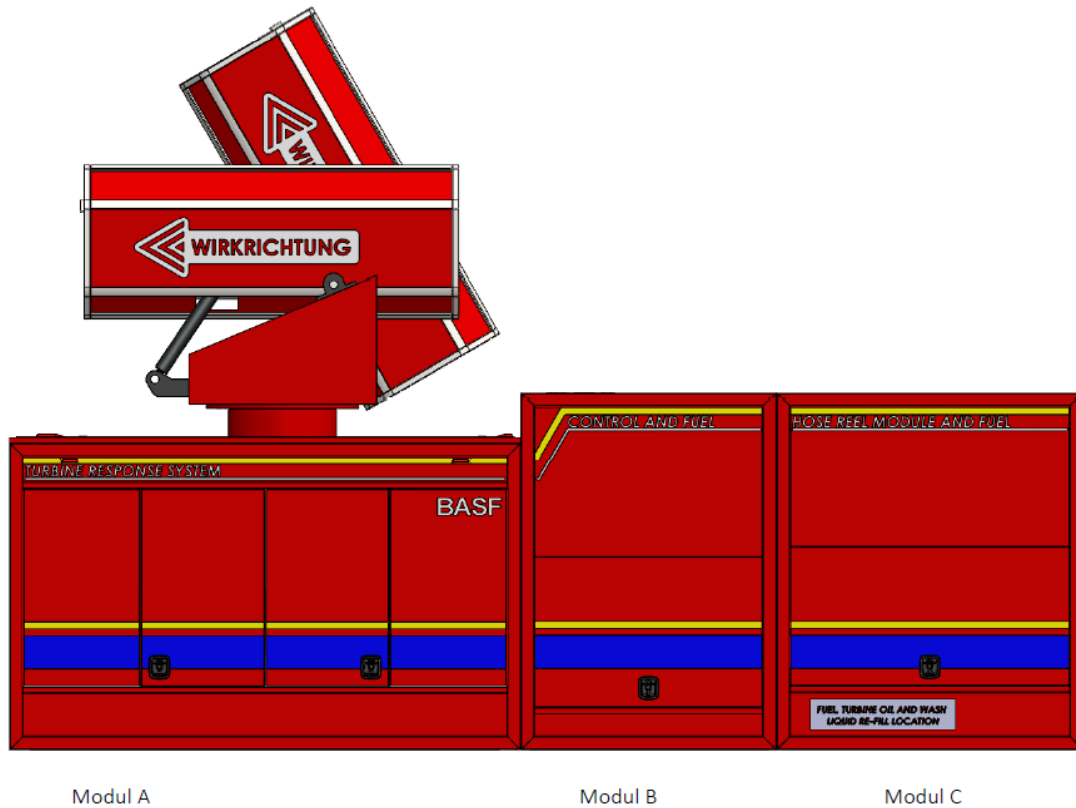
Next generation *Turbo-Extinguisher* further development



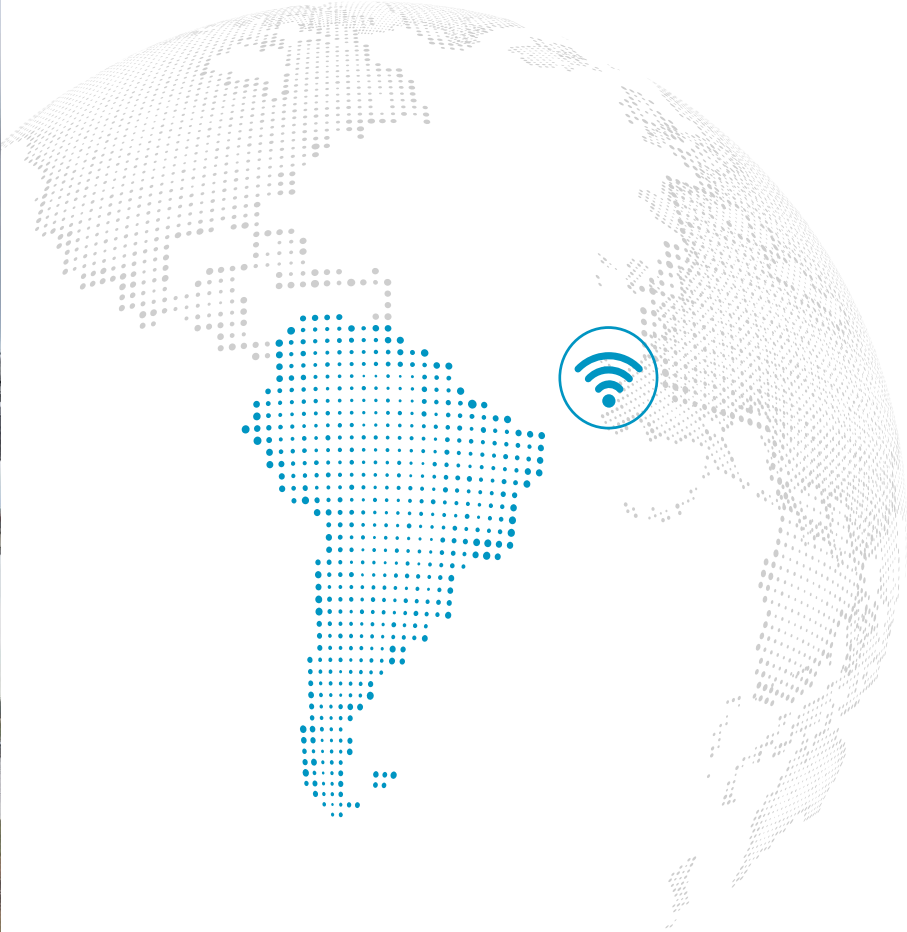
We create chemistry

Next generation *Turbo-Extinguisher*

New functions



- **Safety**
 - Remote-Control & Drone-view
 - Larger distance to incident location
- **Fast response**
 - Automatic hose supply system (200 m)
 - 360°-rotation: less vehicle maneuver
- **Versatility**
 - Increased range
 - Horizontal Aerosol-fan (Innovation)
 - doubled operating time (without refueling)
- **Sustainability**
 - Modular structure
 - CAD-based FEA



 - **BASF**

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