

# Next generation detector operations with augmented reality

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# How to get things fixed?

Does it move?

- Yes → send to expert
- No → get expert

# For software

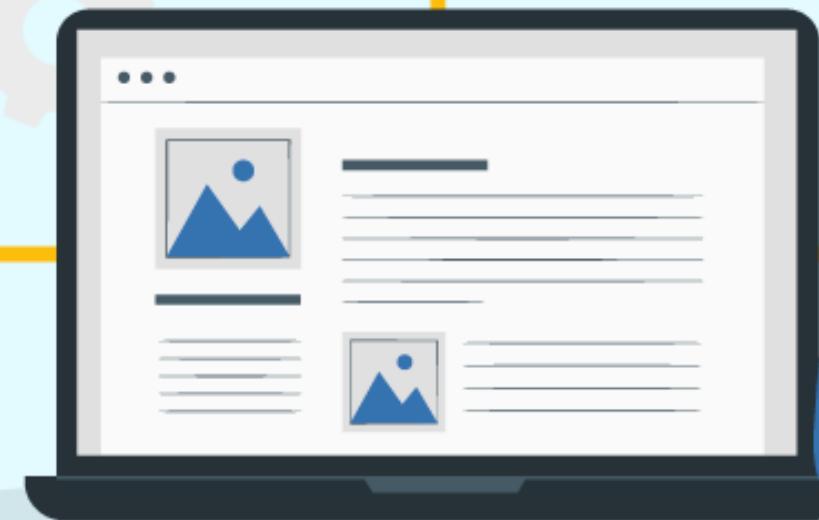
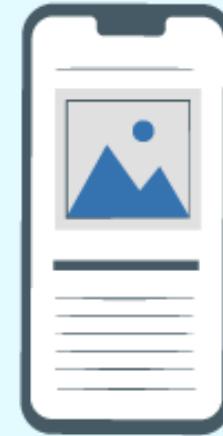
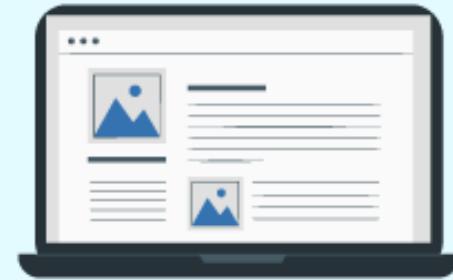
LMU

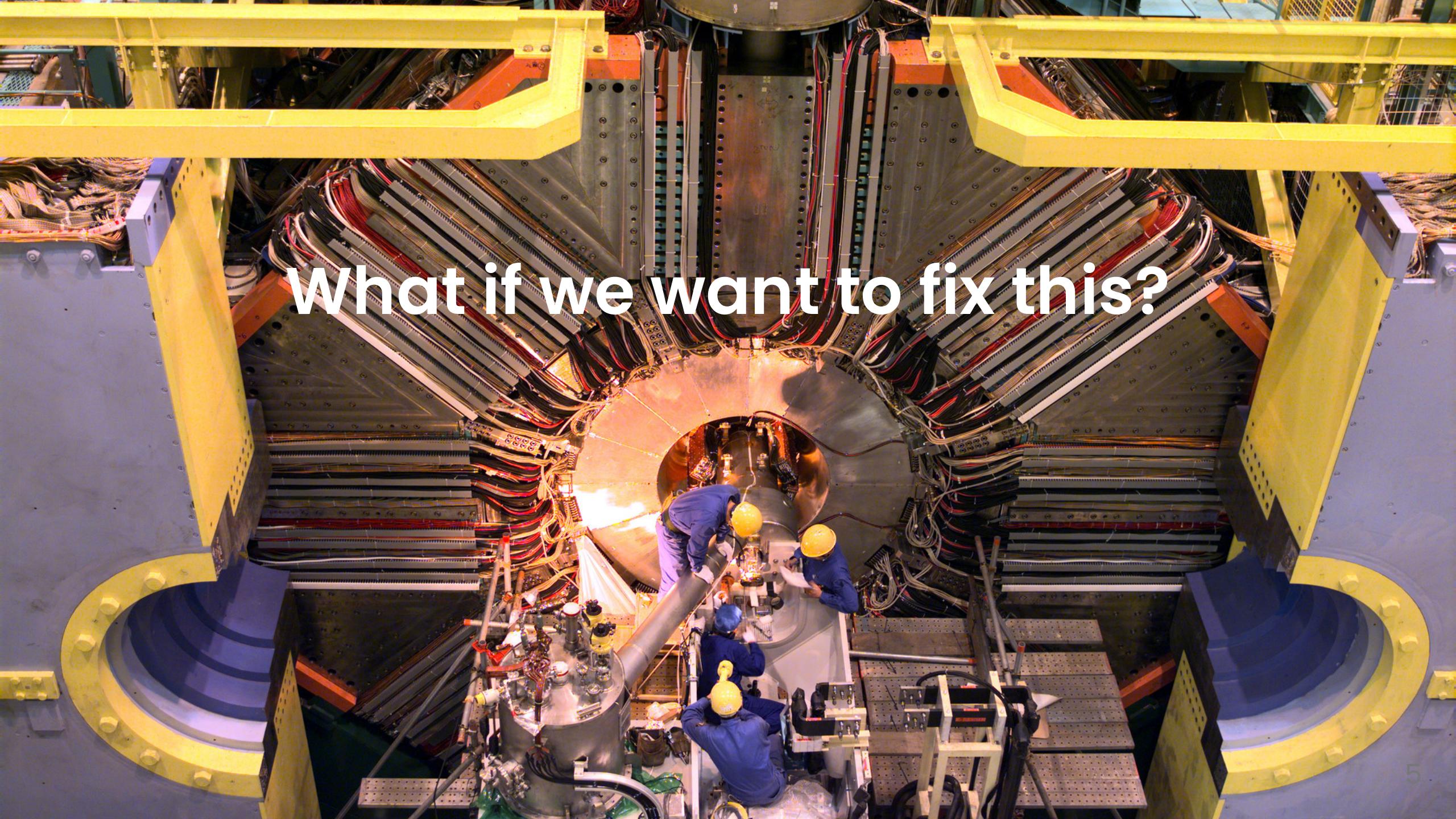
LUDWIG-  
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MÜNCHEN



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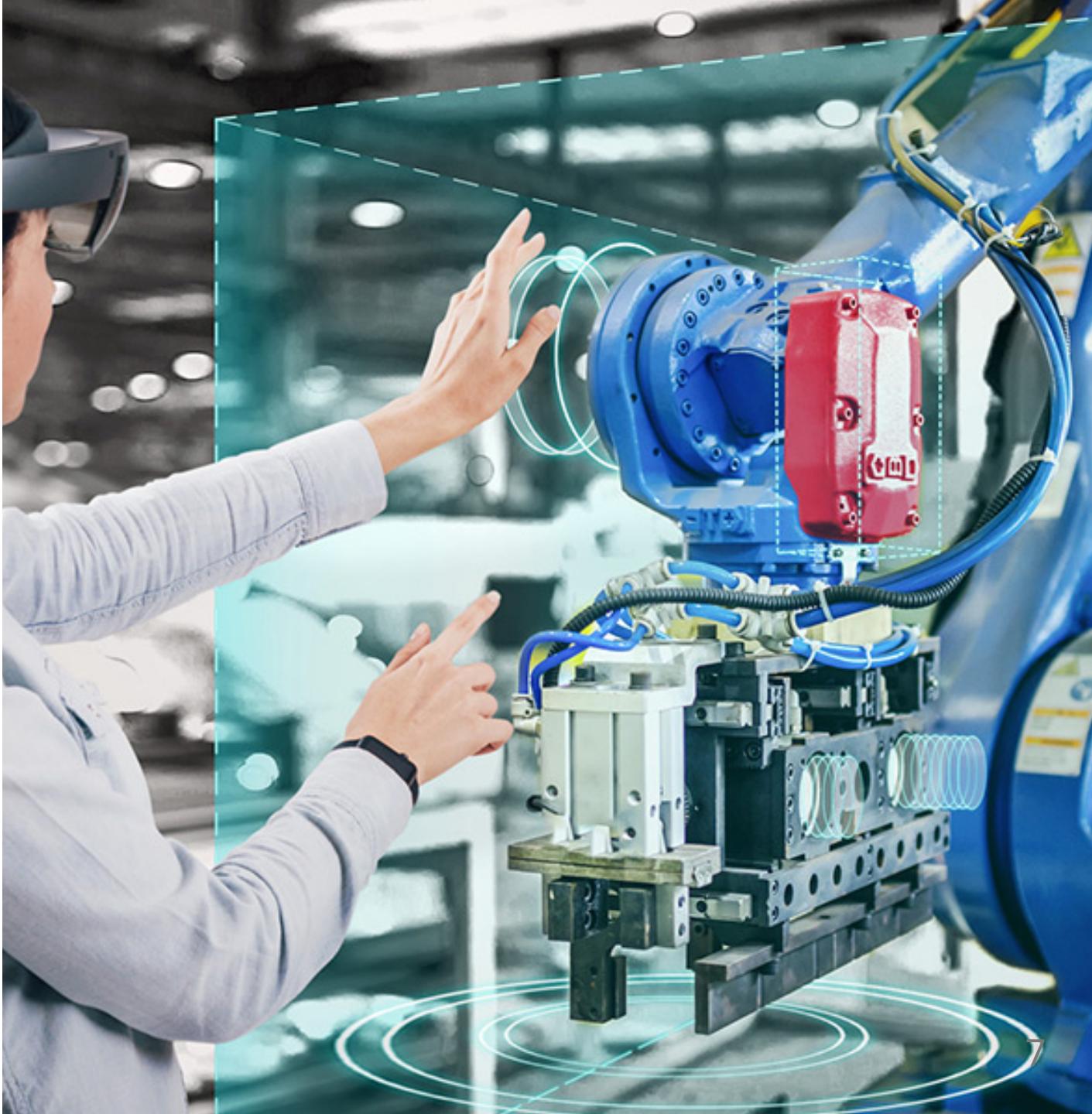
What if we want to fix this?

## So far ...

- Bring experts to site – **high cost**
- Communication with experts via text / audio – **low quality**

# AR approach

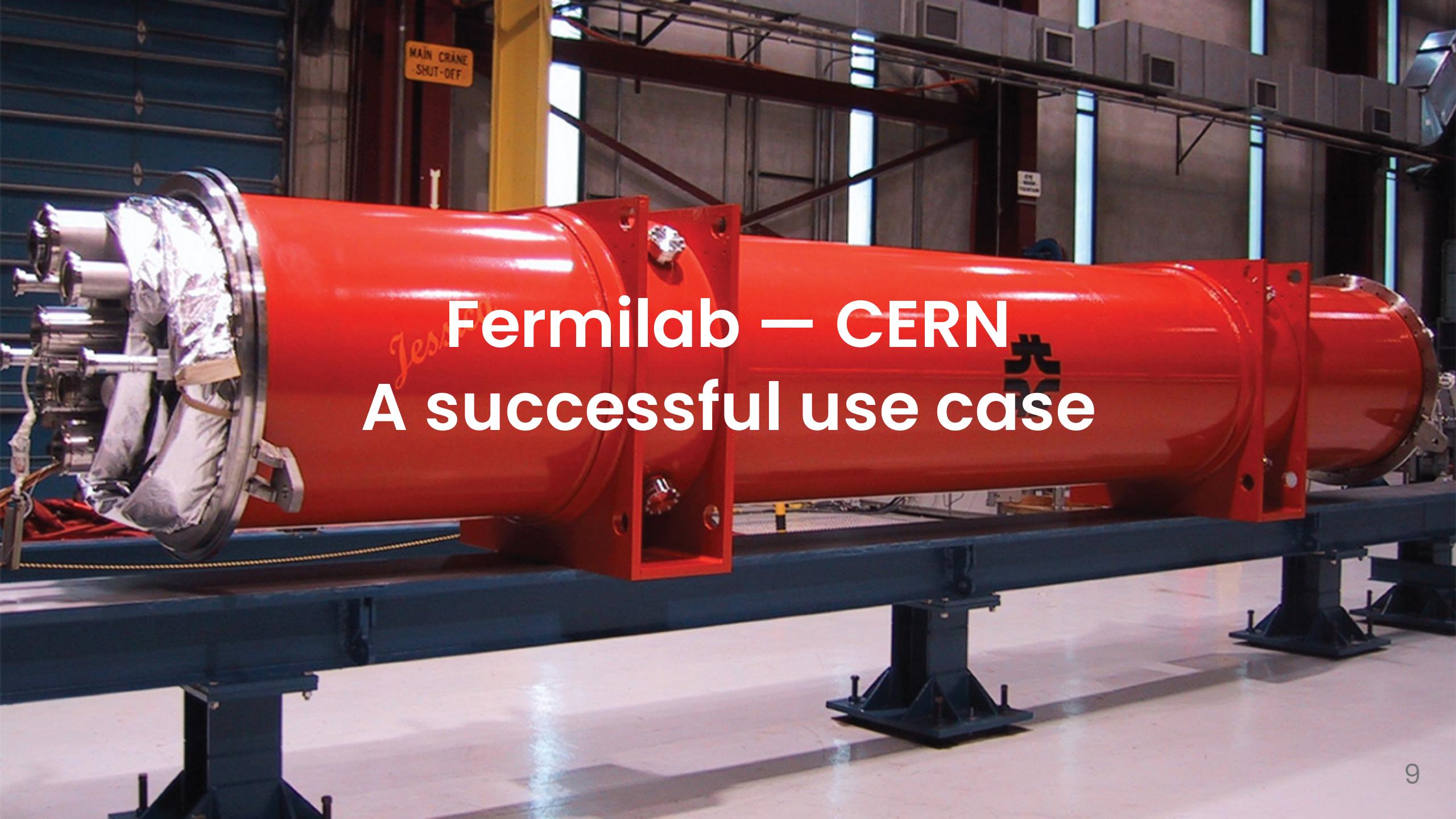
Enhance quality of communication with off-site experts



# Benefits

- Live audio-visual communication
  - Hands-free work for on-site worker
  - Experts can point/ draw
- + Efficiency
- + Speed
- Human error





*yes.* Fermilab – CERN  
A successful use case

# Cost

- Trimble XR10 with HoloLens 2
- Experts on-site
  - large travel cost
  - massive environmental impact
  - very time consuming



# Scalability

If technology meets the needs for remote assistance...

- AR technology is readily available.
- CERN experiments can directly benefit from Belle II test case.



# Summary

- Remote repairs using AR
  - Already widely used in science & industry
  - Potential for massive reduction in cost and environmental impact
- ✓ More efficient and reliable detector operation
- ✓ Improved data in particle physics