

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

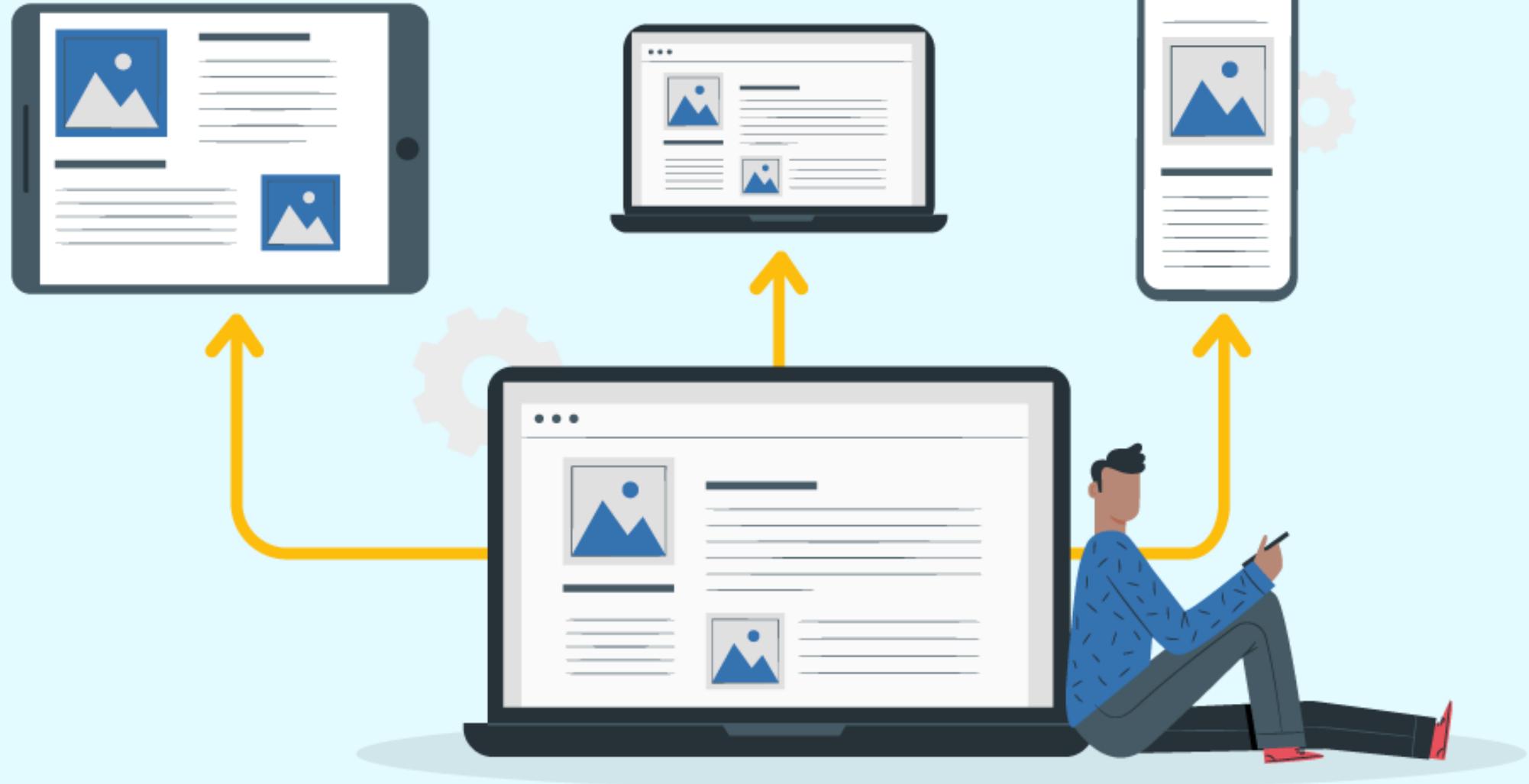
LUDWIG-
MAXIMILIANS-
UNIVERSITÄT
MÜNCHEN

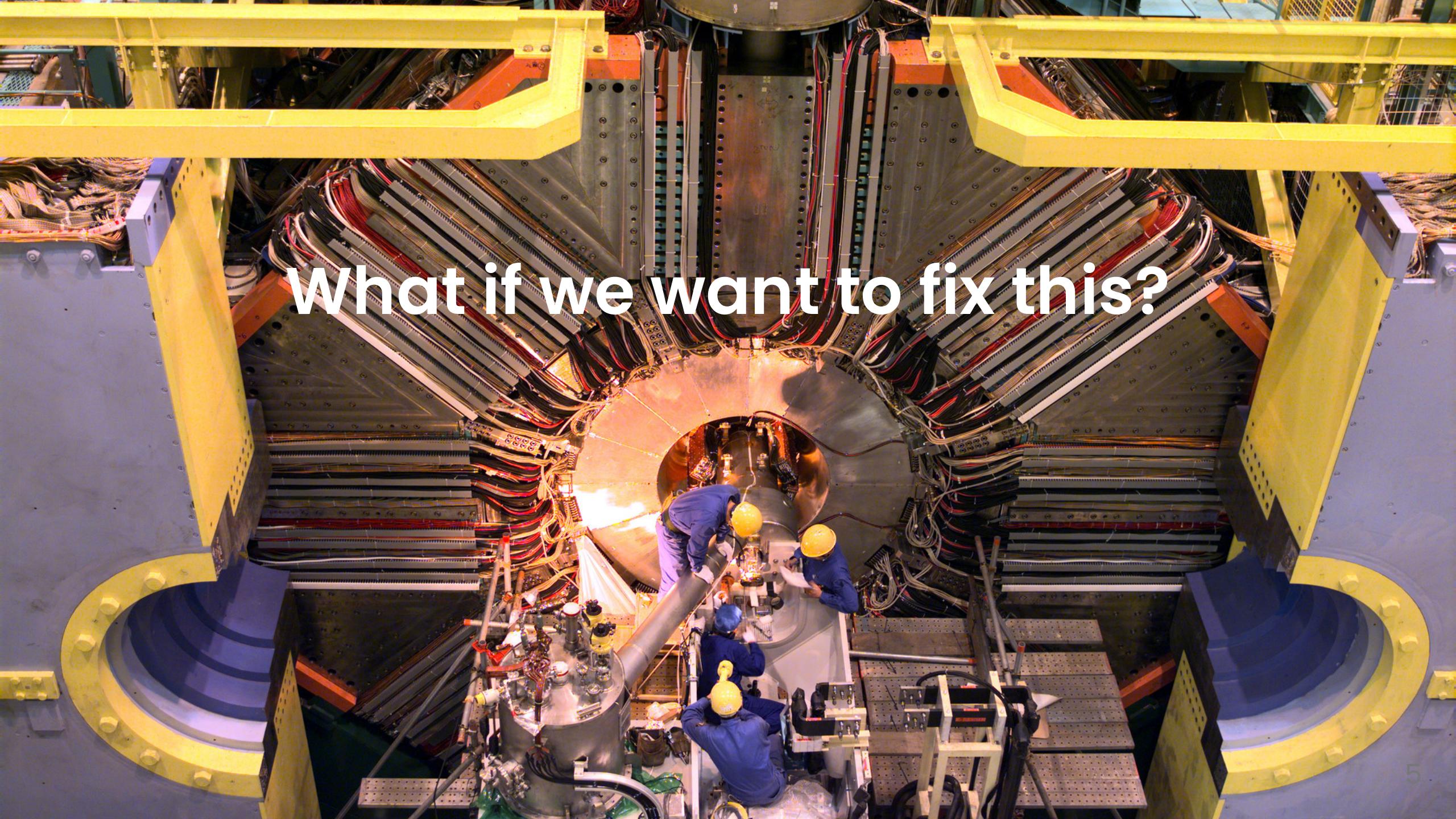


Bitbucket



... or just screen-share





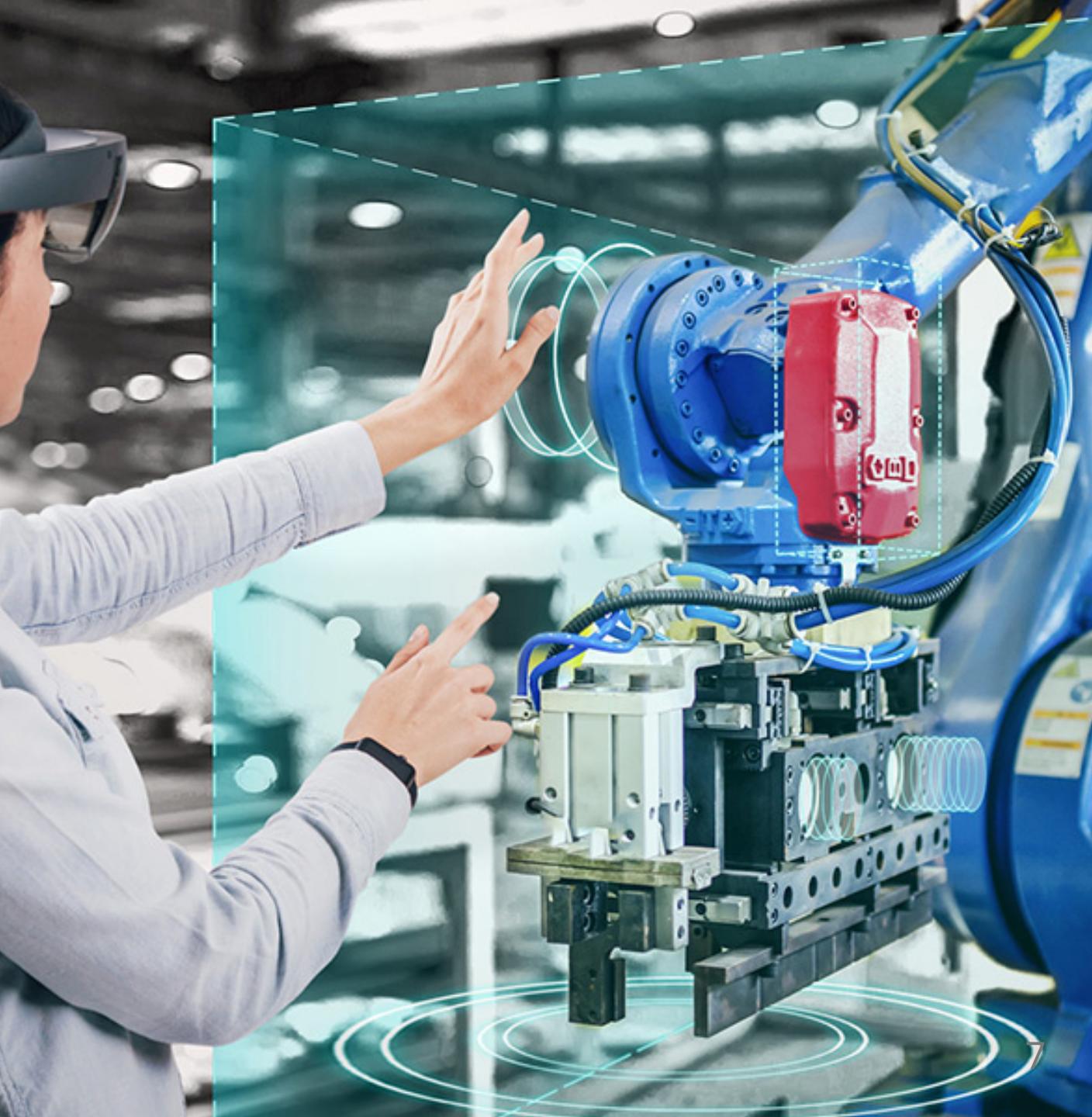
What if we want to fix this?

So far ...

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

AR approach

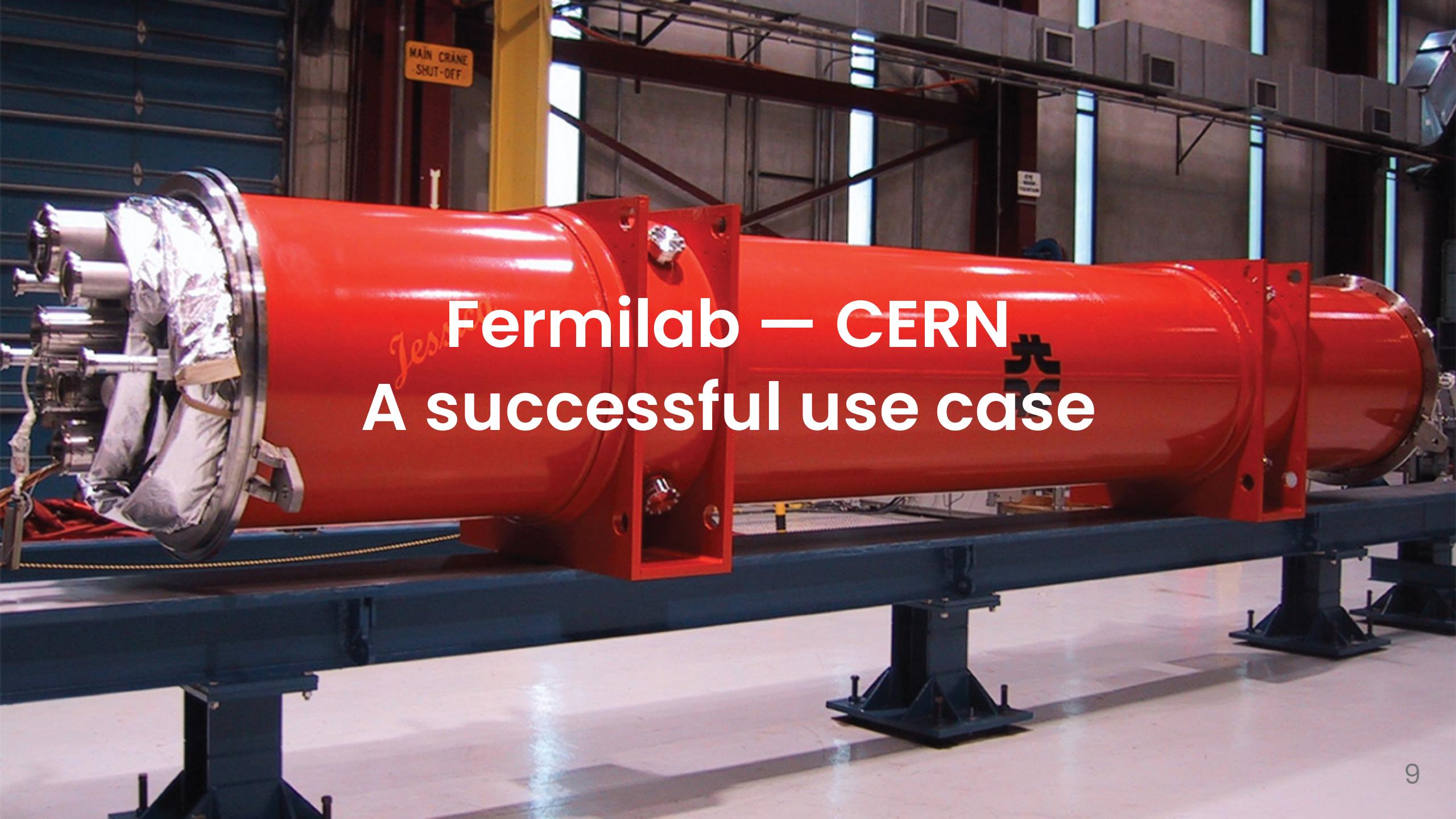
Enhance quality of communication with off-site experts



Benefits

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





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

Budget plan

Total budget needs	
Trimble XR10 with HoloLens2	5400€
Student assistan (9 months)	4500€
Software liscences	800€
Total	10700€

