

# Building Software for Future Science

Experience at the European Spallation  
Source

Owen Arnold

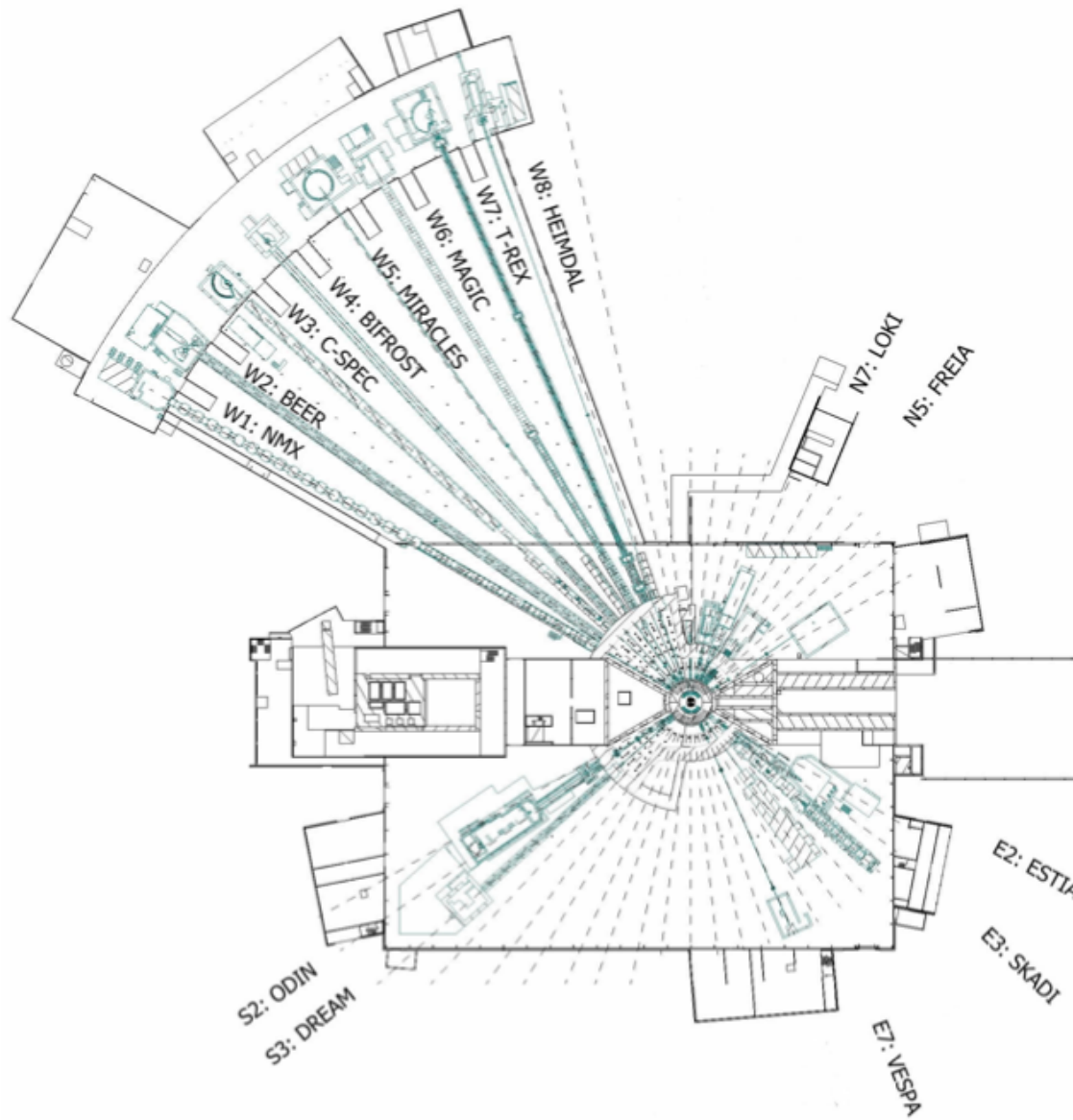


# ESS Artist Rendition



# ESS Reality



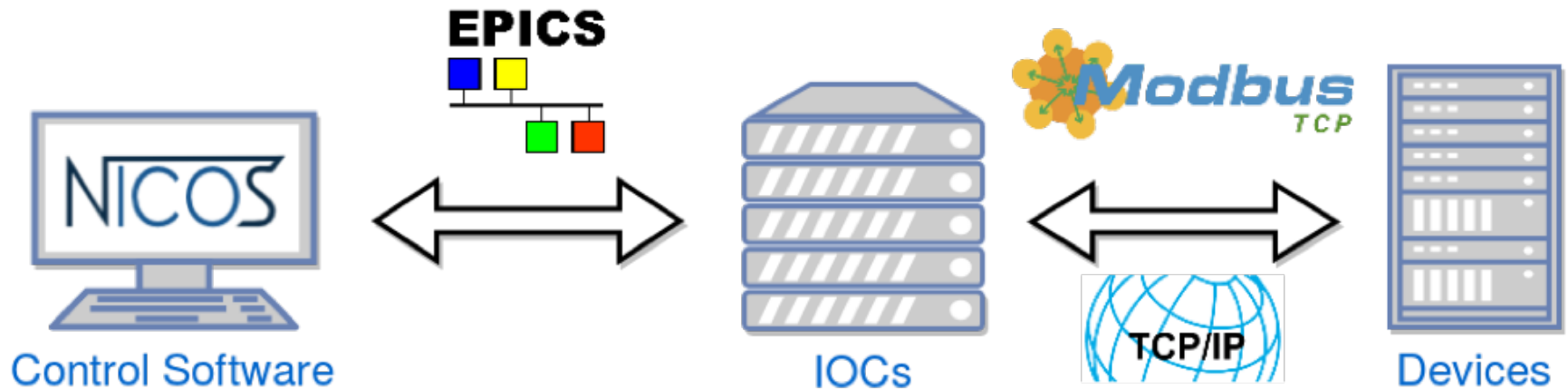


# Selected Challenges

- User Programme Starts in 2023
- 15 Instruments on day one of operations
- 6.4 Gb/s data stream per instrument for real-time processing and visualization
- New detector technologies and instrument arrangements

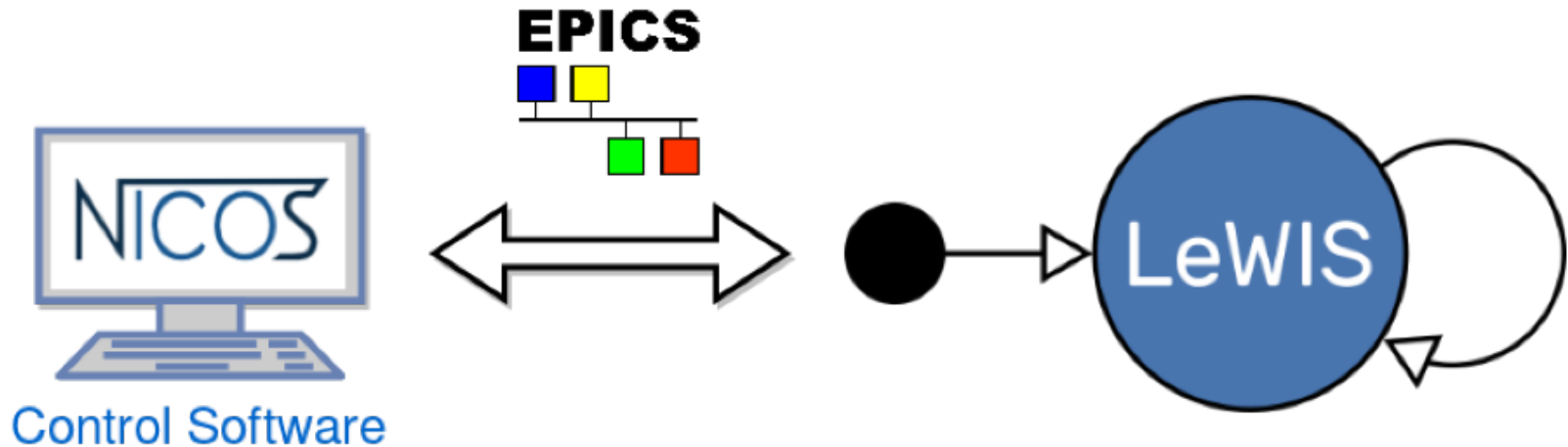
# 1. Emulation

- Replace Devices + IOCs with software emulator



# 1. Emulation: Replace IOC

- Replace devices + IOCs with Lewis



## 2. Establishing Concepts

- Building Software Concepts that are
  - Robust
  - Reusable
  - Correct
  - Well Tested
- Significantly harder in operations

[CppCon 2016: David Sankel “Building Software Capital ... – YouTube](#)



# 3. Solving Critical Performance Issues

- Prototyping essential
- It can take significant time to fix root causes
- All users benefits if done right
- Easy to optimise the wrong thing!

# 4. Community

- Benefits of working on established packages with real and active user and development communities
  - Users testing features now
  - Development expertise
  - Feature and expertise exchange



# 4. Community

- Good collaborations have communication overhead
- FOSS is not enough



**FRM II**  
Forschungs-Neutronenquelle  
Heinz Maier-Leibnitz



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# Questions

Thank you, for your time