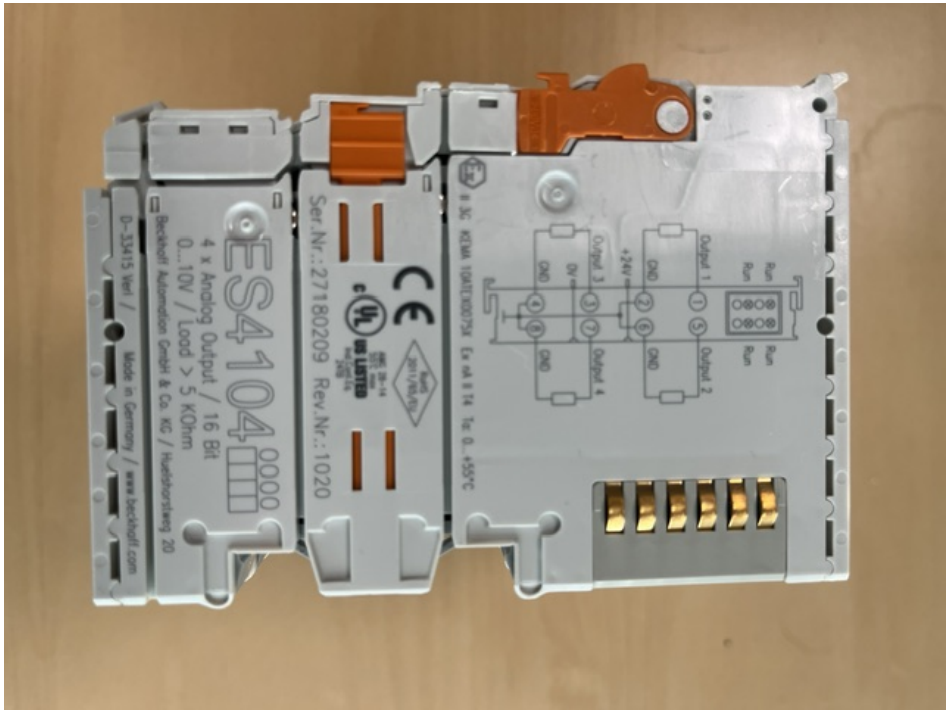
EUROPEAN SPALLATION SOURCE

EtherCAT train

Torsten Bögershausen

EtherCAT frames

- EtherCAT terminals:
  Have electrical contacts left and right to transport Ethernet frames.

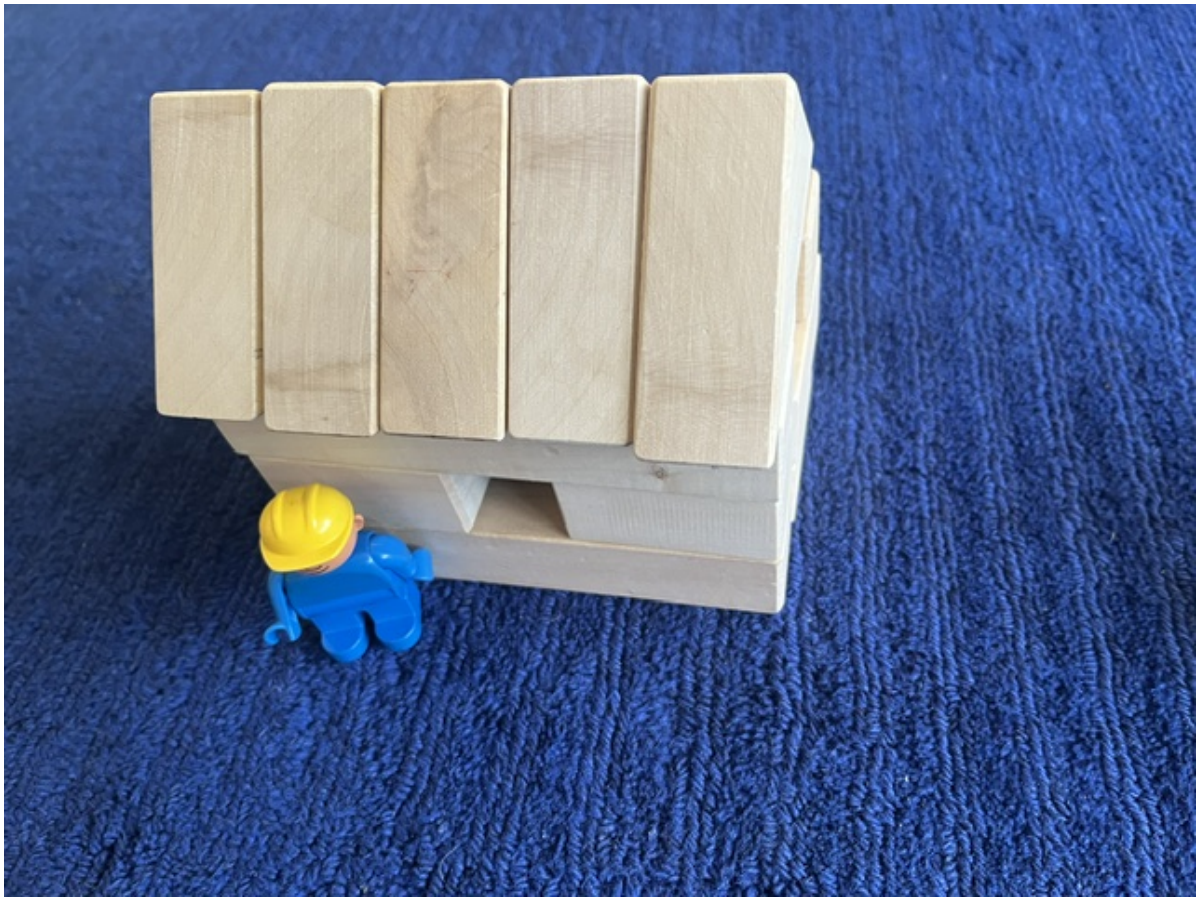


EtherCAT frames

- EtherCAT terminals assembled together

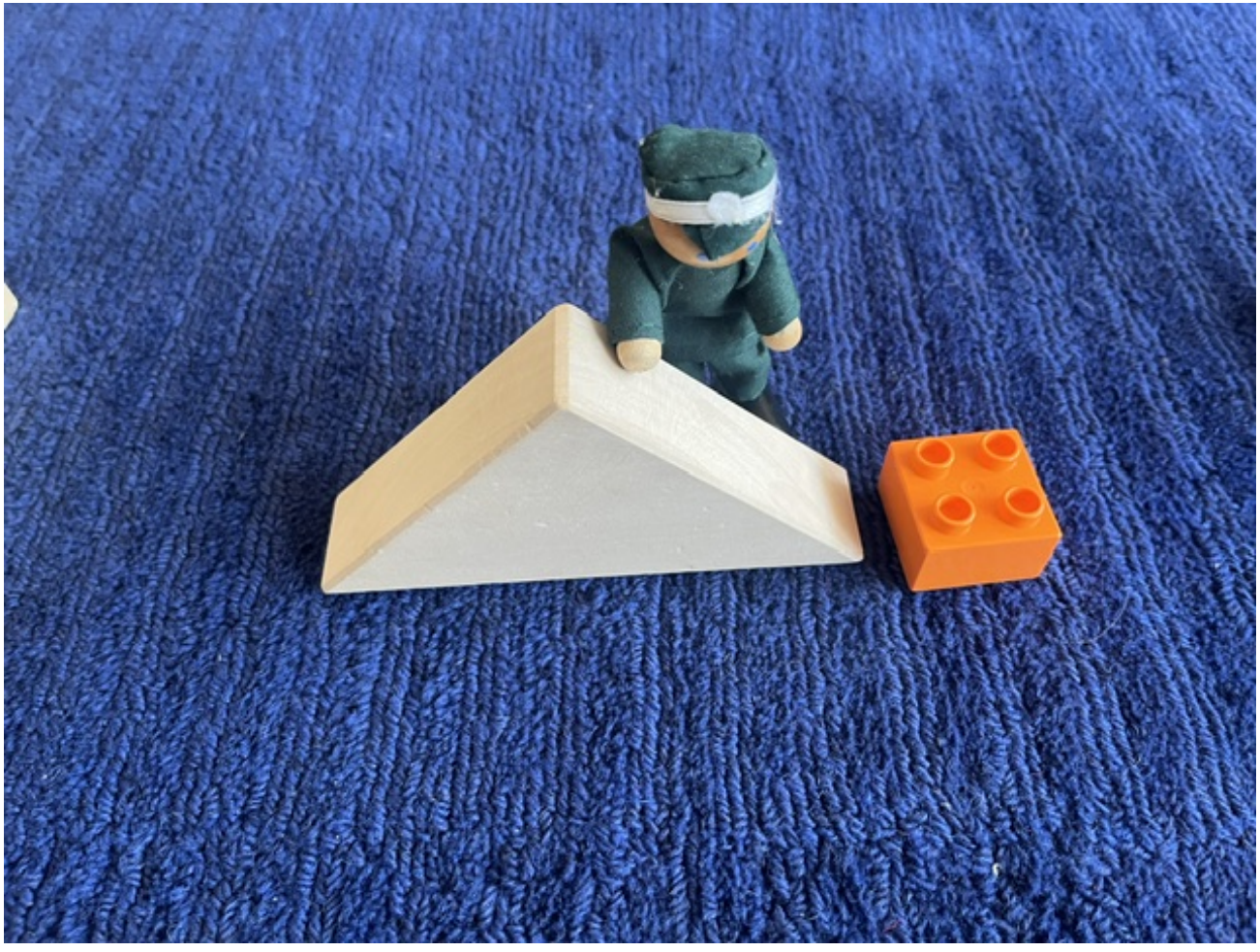
EtherCAT frames

- Main station, CPU



EtherCAT frames

- Output terminal

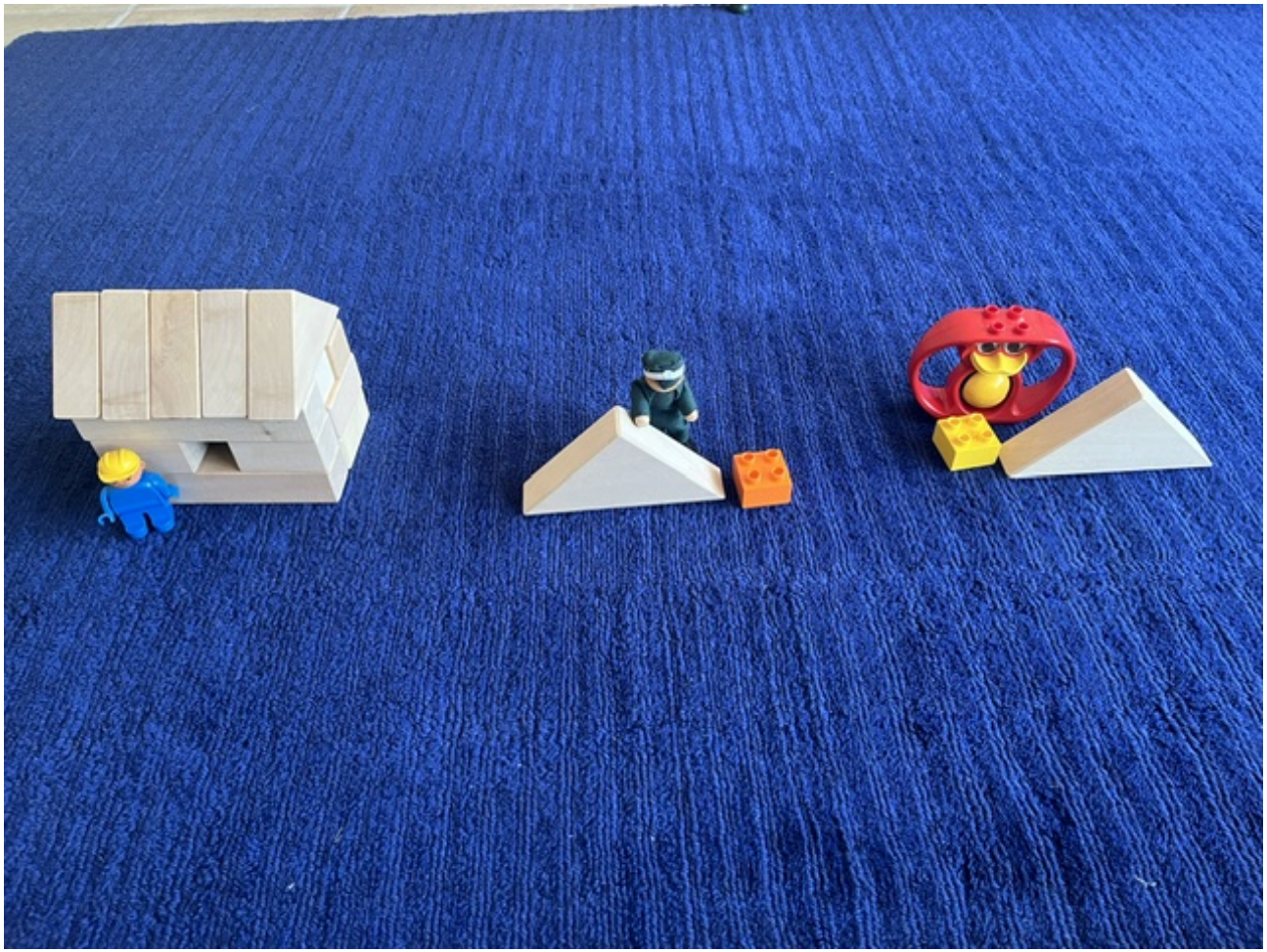


EtherCAT frames

- Input

EtherCAT frames

- EtherCAT stations

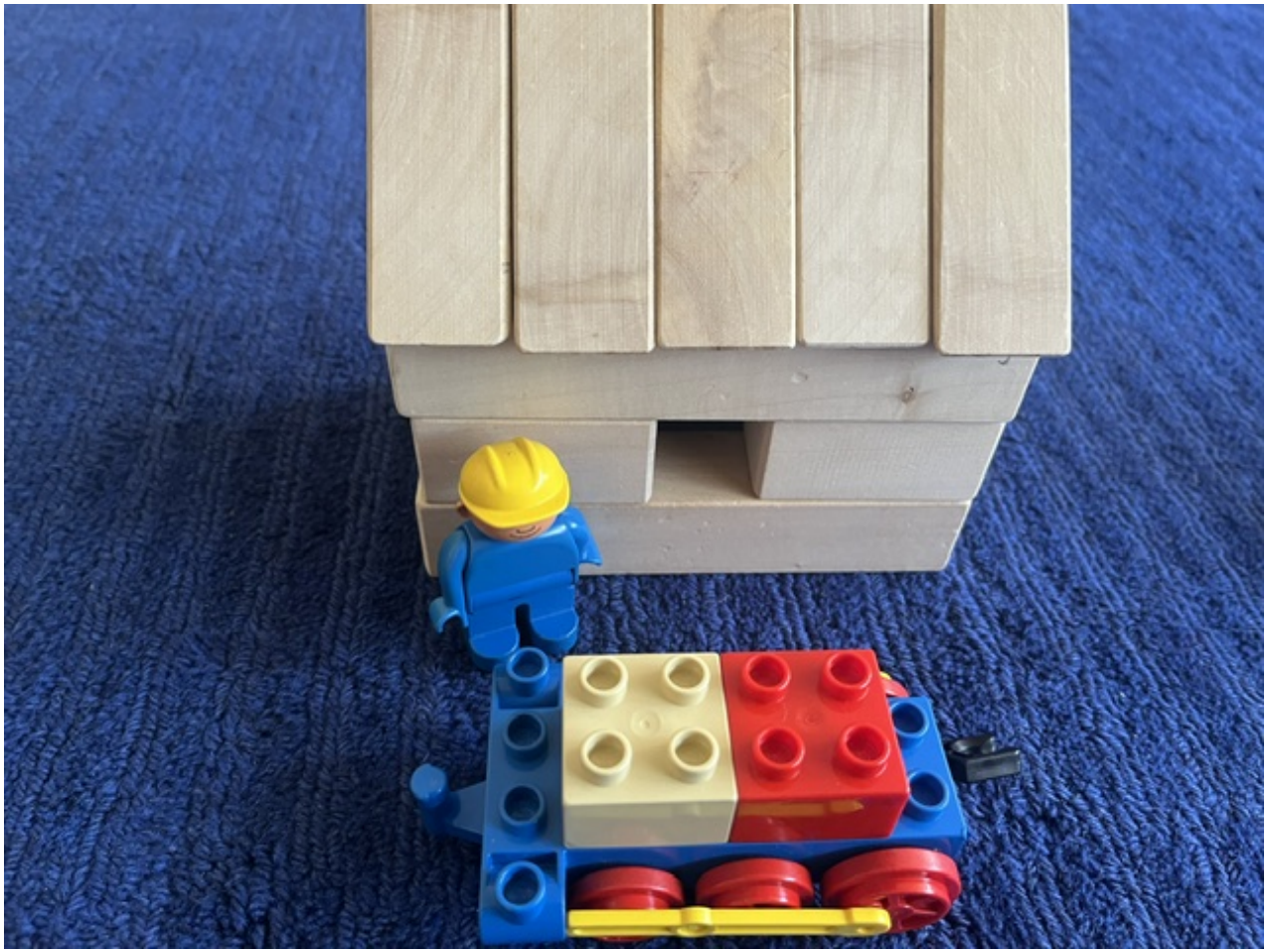


EtherCAT frames

- Ethernet frames:
  - generated and send out in master
  - travel through all terminals
  - input data is manipulated on the fly
  - modified framed received by master
- See next slides

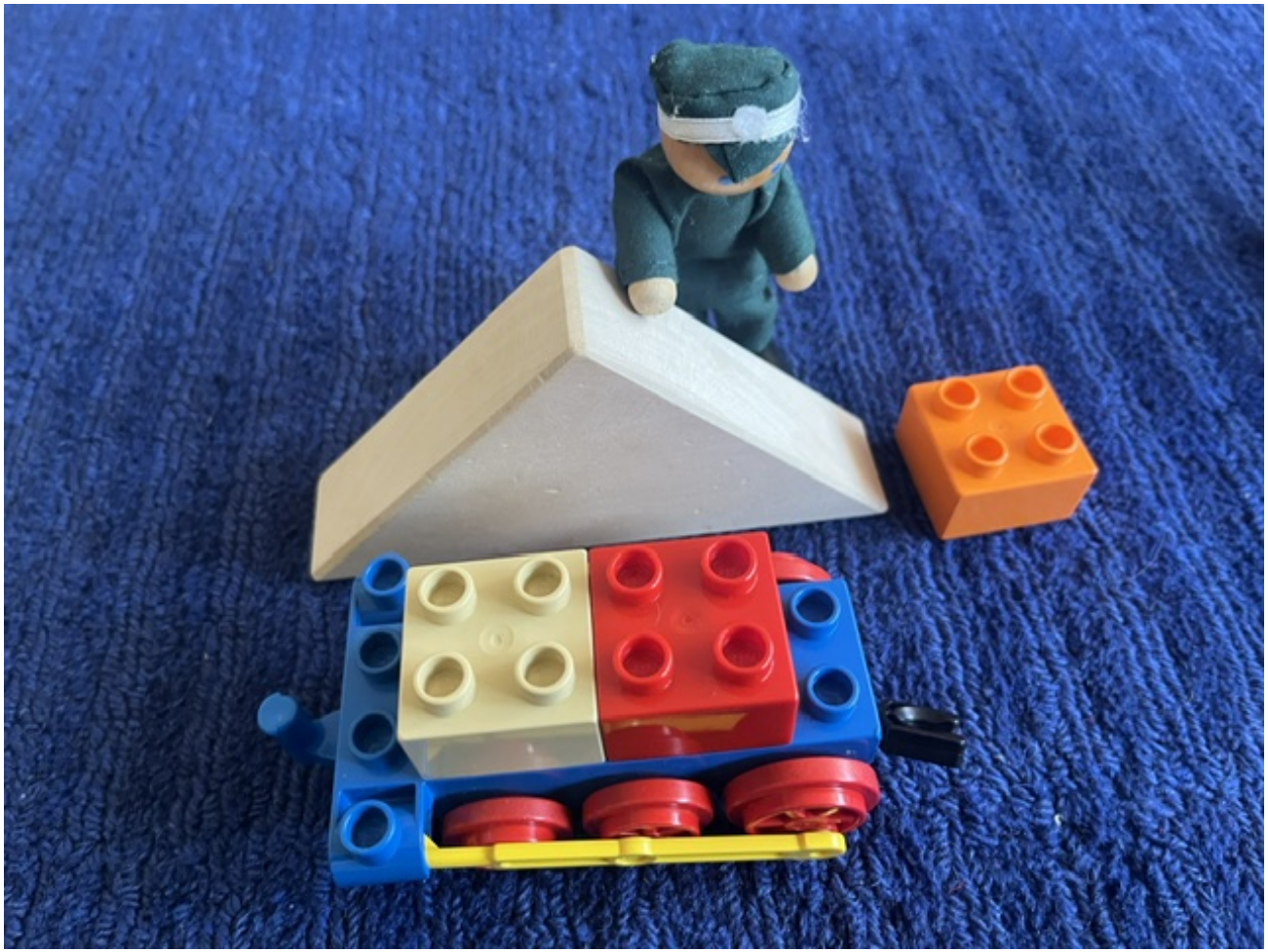
EtherCAT frames

- The frame is build



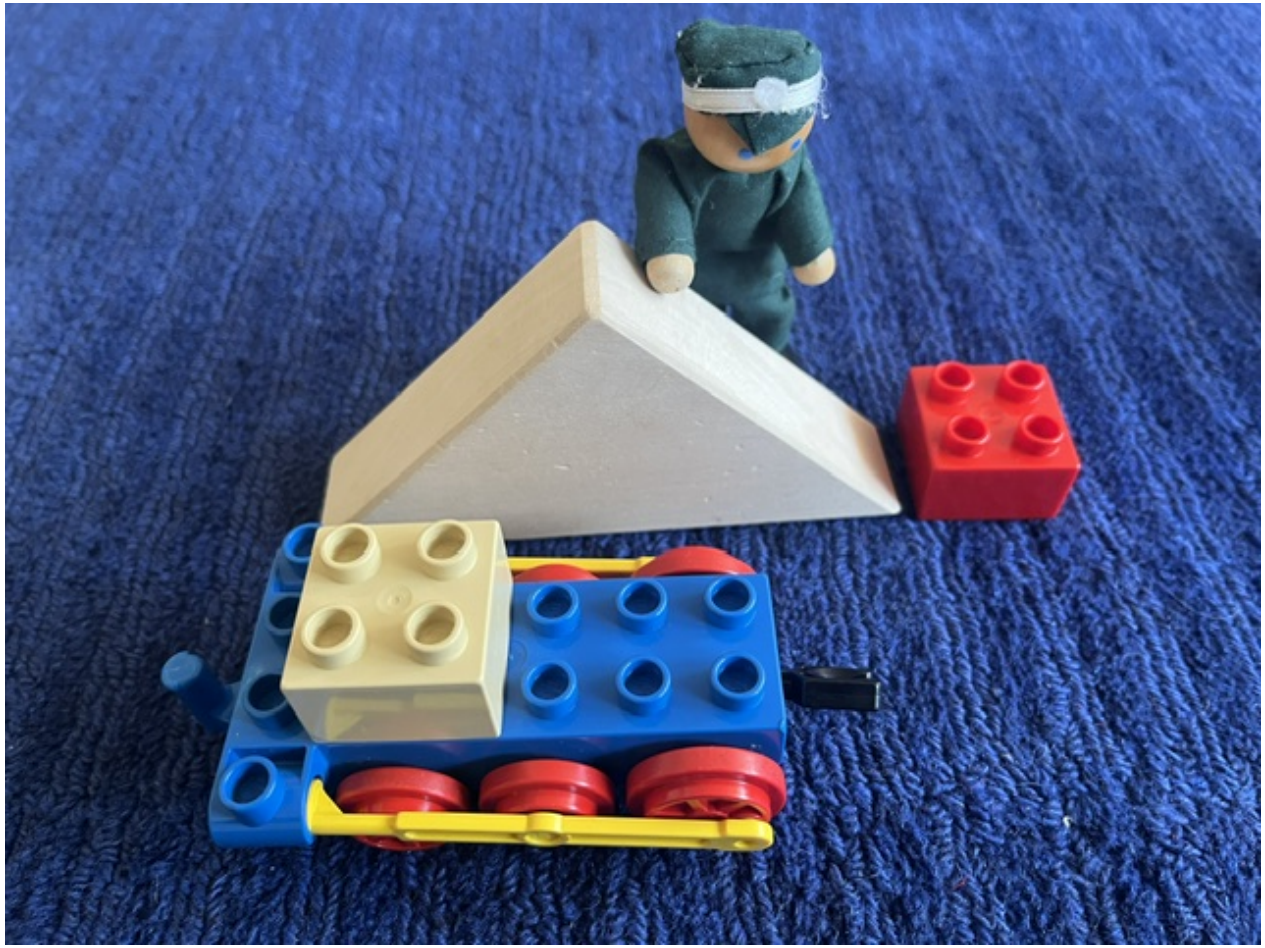
EtherCAT frames

- Frame arrives at the output



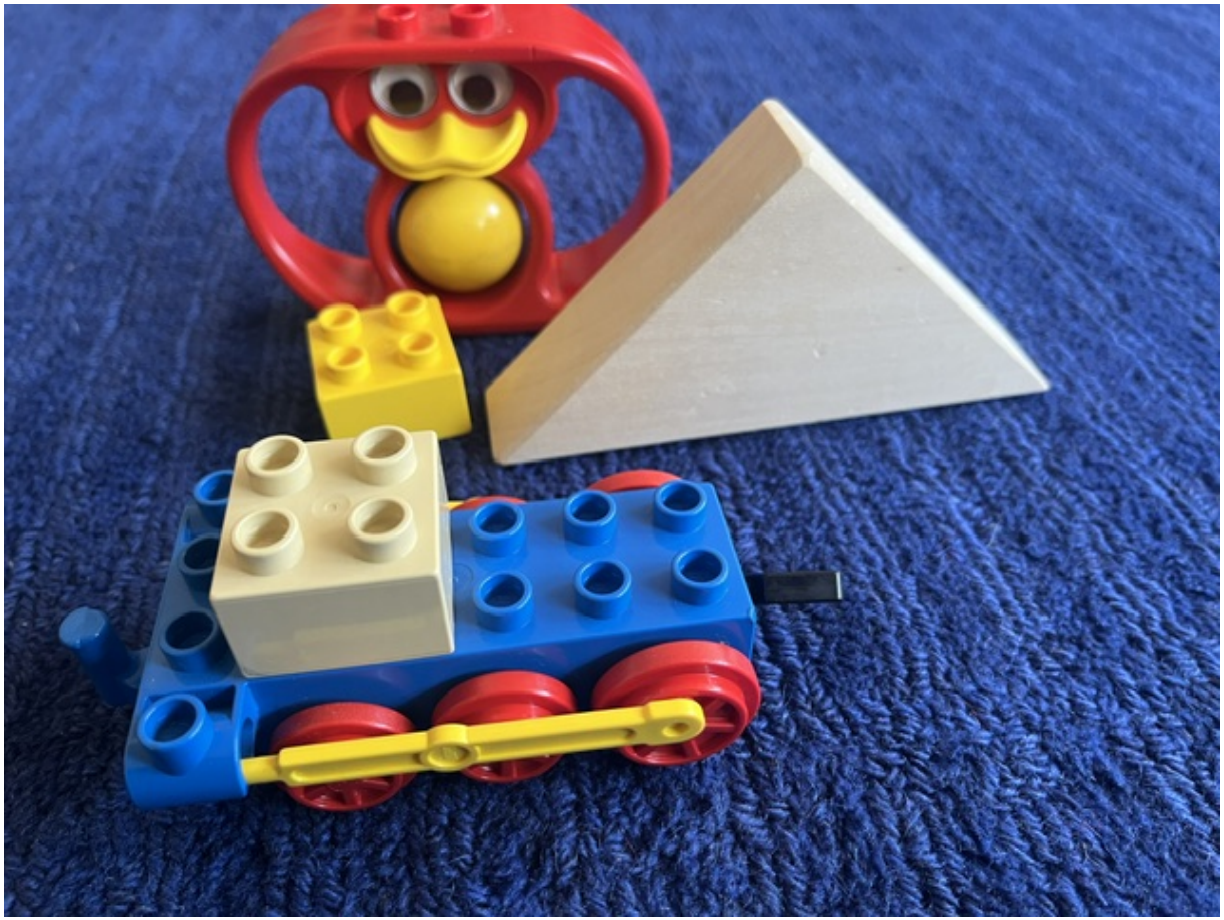
EtherCAT frames

- Output takes information



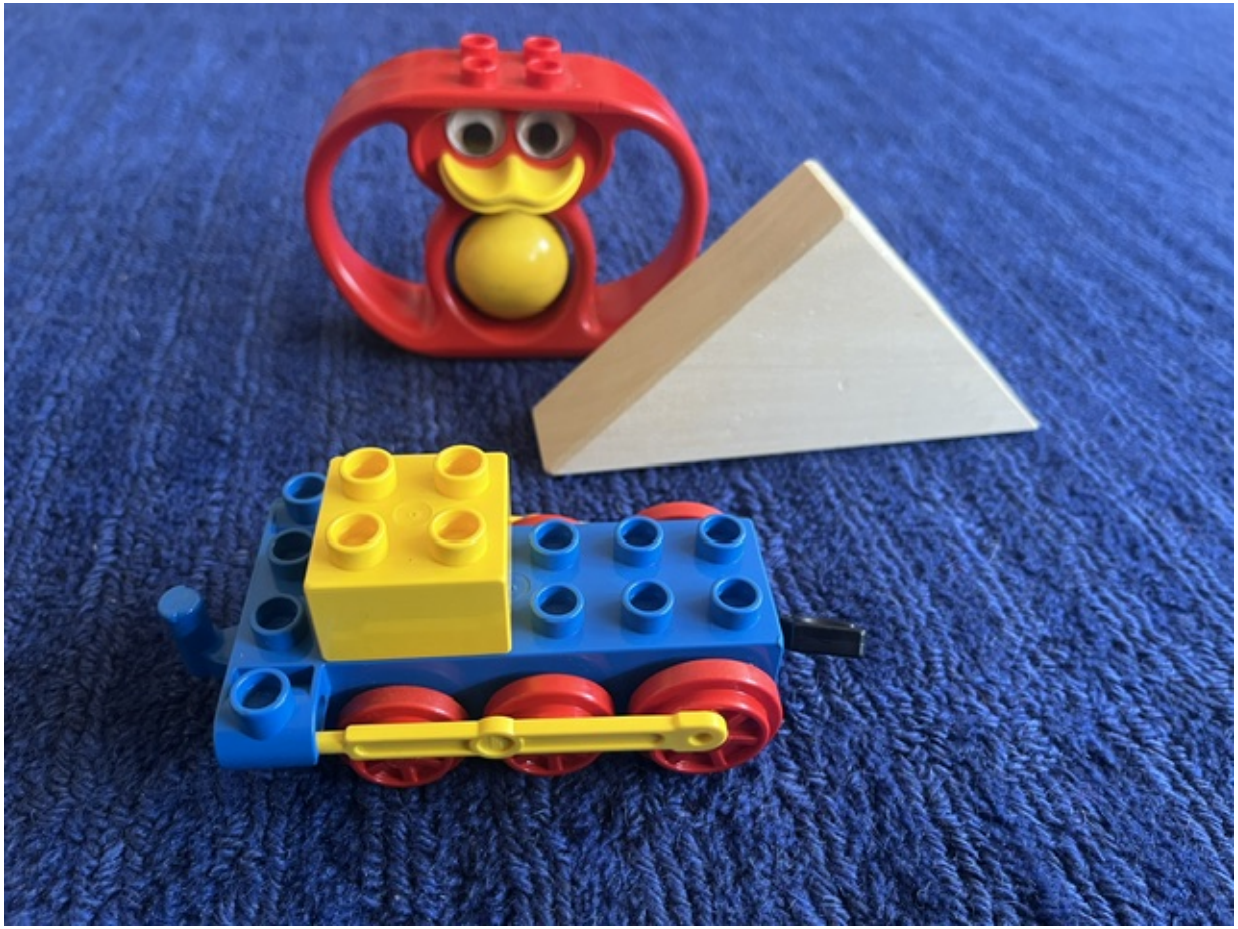
EtherCAT frames

- Frame arrives at input



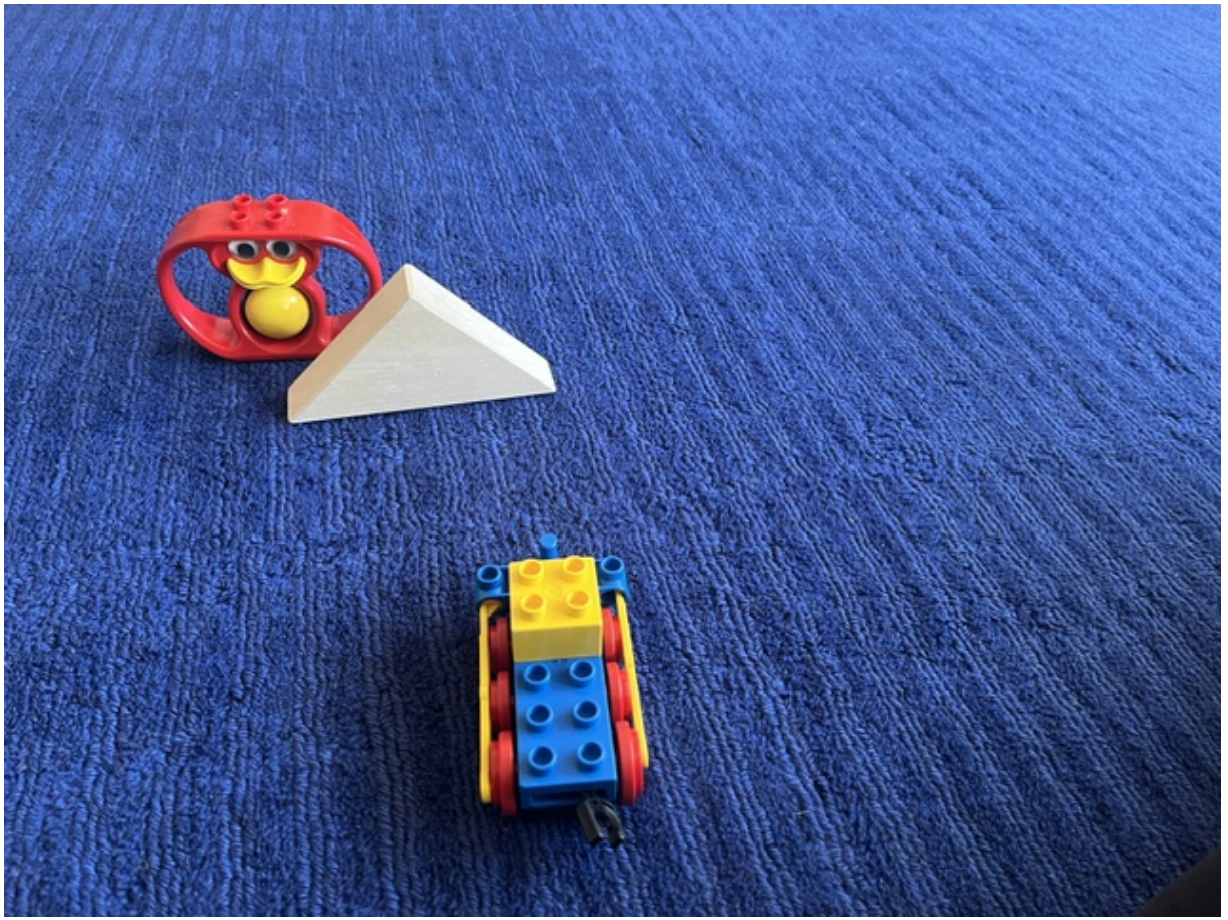
EtherCAT frames

- Data transfer on the fly



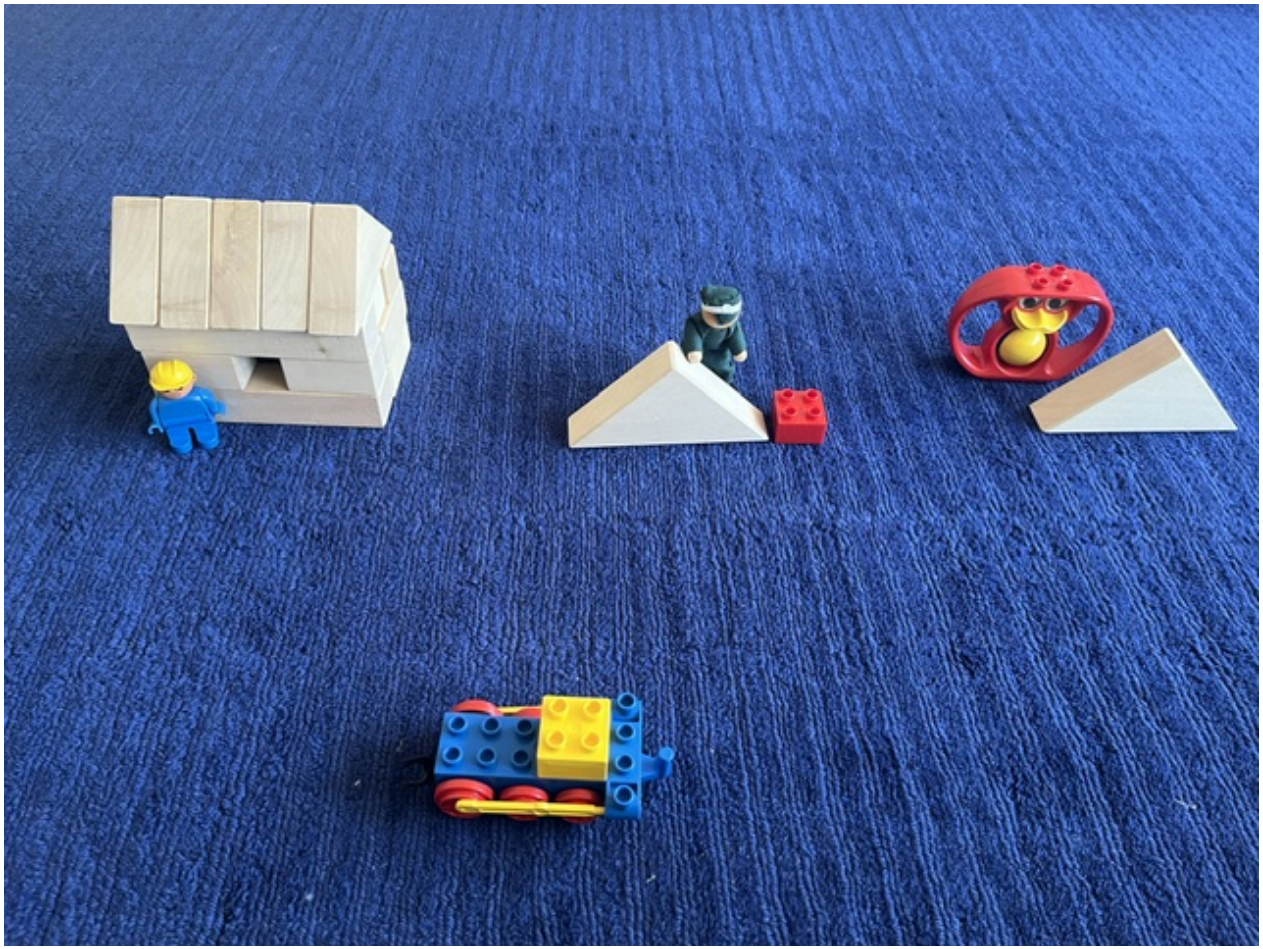
EtherCAT frames

- Frame is send back



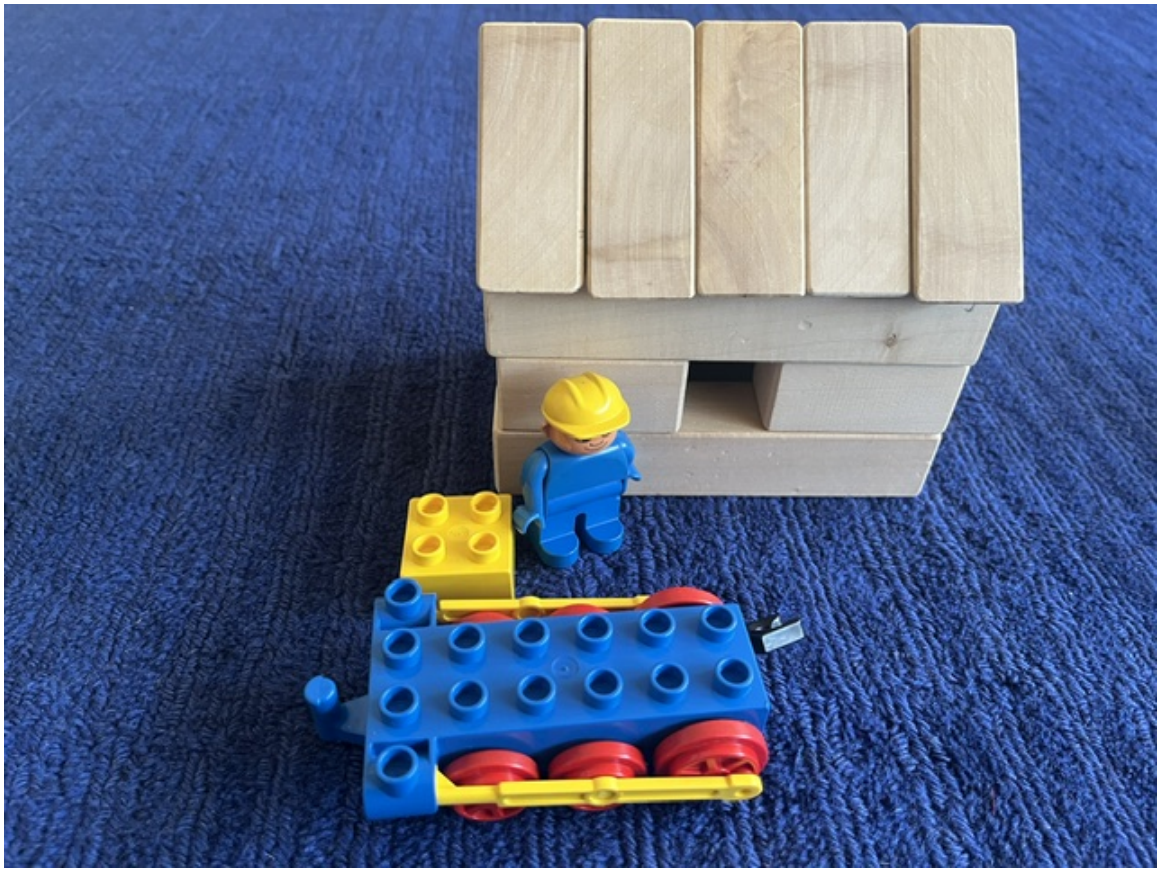
EtherCAT frames

- Frame returning



EtherCAT frames

- Frame is returned. Input data retrieved. PLC cycle.



EtherCAT frames

- Summary:
  - Every x (x=0.1,1,10,100msec) a frame is assembled.
  - (The frame has more bits and bytes than shown)
  - The frame is traveling through all terminals:
  output terminals take the value and apply it
  input terminals ”patch the frame on the fly”
- Modified frame is received at the EtherCAT master:
  The CPU running code.
  PLC task(s), Numeric Control task are scheduled.

More details – not covered

- Not covered:
  - initialization of slaves
  - address assignment
  - different frames possible
  - process data objects (PDO) (output value)
    versus
    service data objects (SDO) (state registers ?)

Conclusion about EtherCAT

EUROPEAN SPALLATION SOURCE

- Modular system (buy and build what you need)
- High-precision timing possible
- Good standardization (ethercat.org)
- Many software solutions

End of intro

- Short questions: here and now
- Over to Anders and ecmc