Top and Tail Transformation
A Grand Challenge in Energy Networks

EPSRC
Engineering and Physical Sciences Research Council

University of Strathclyde Engineering

Protecting the LVDC last mile: translating concepts to technologies

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Top&Tail annual meeting 17th-18th Nov 2014 Southampton UK

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Concept: Multi-function LVDC protection scheme

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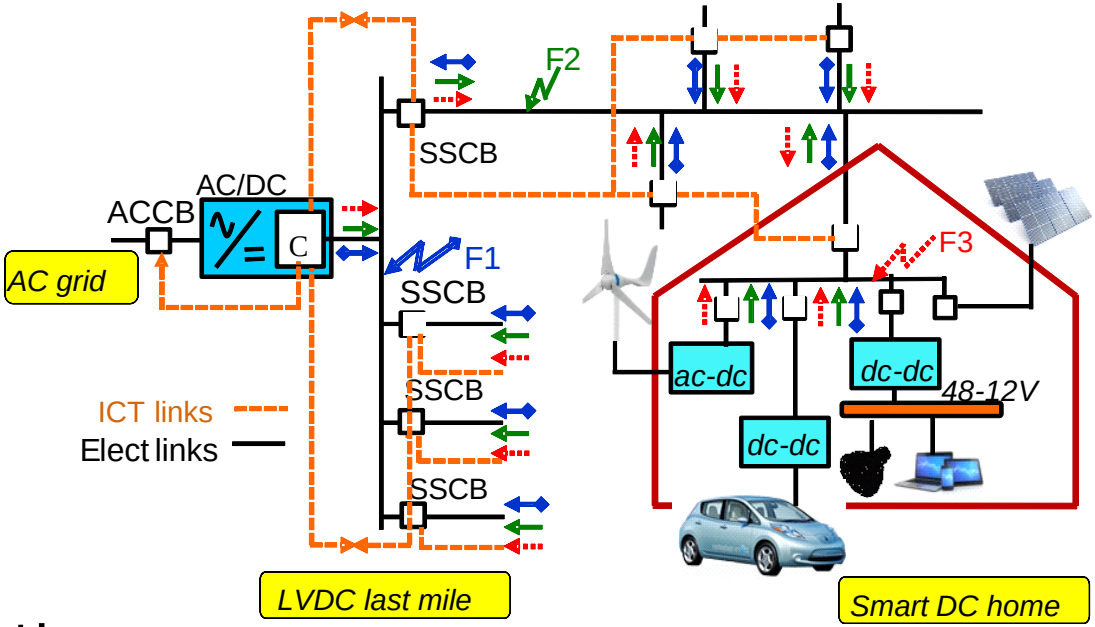
Features

- Communication-assisted
- Fault detection and locations are based on DC current directions and magnitudes, and DC voltages
- Using multiple IEDs
- Using solid state circuit breakers for interrupting DC faults



Offered Functions

- Fast detecting and locating DC faults
- Good level of selectivity
- Fast interrupting DC faults at low level
- Blocking reverse DC fault current
- Fast reclosing function

From concept to realisation of technologies

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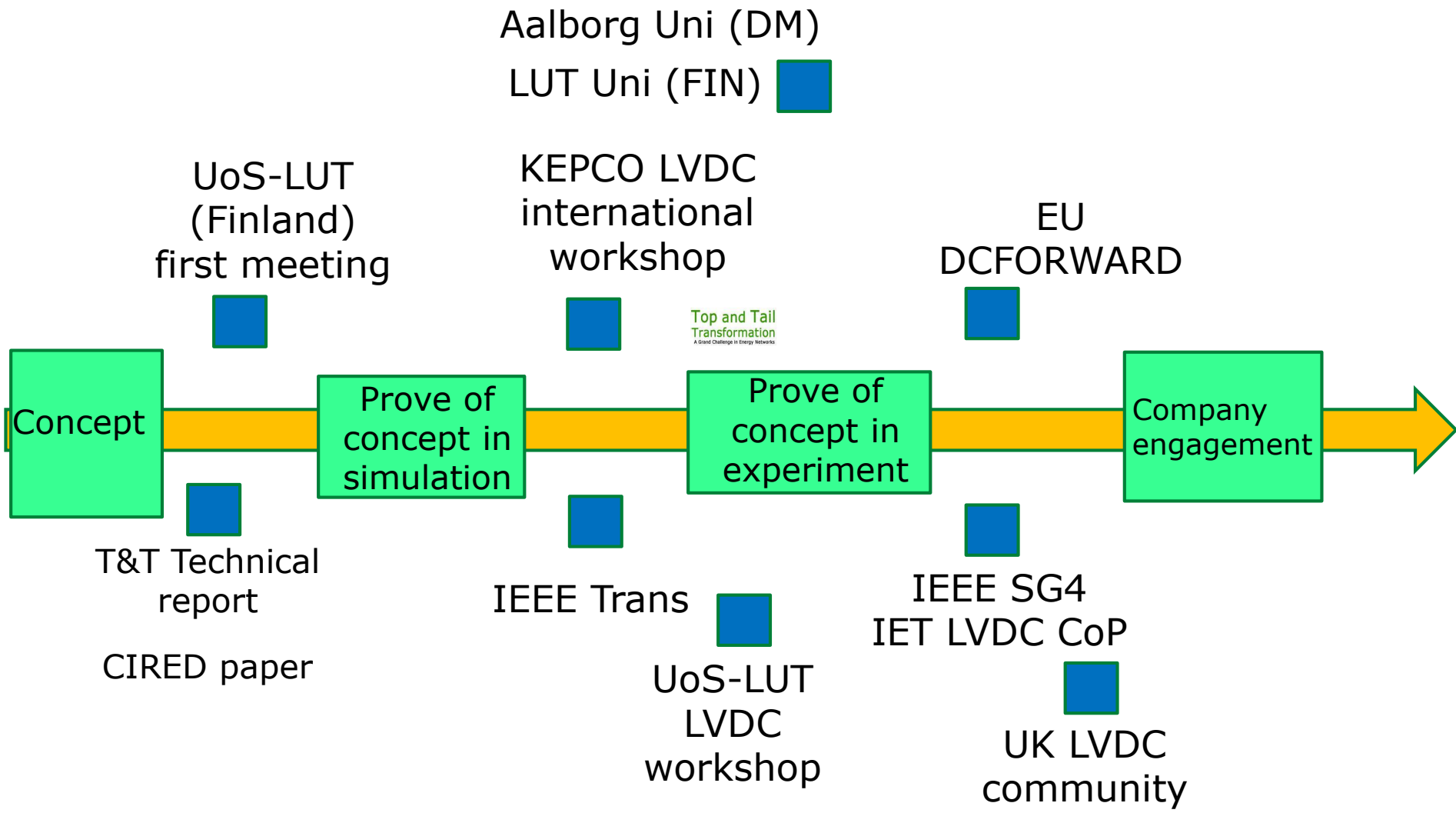

International collaborations

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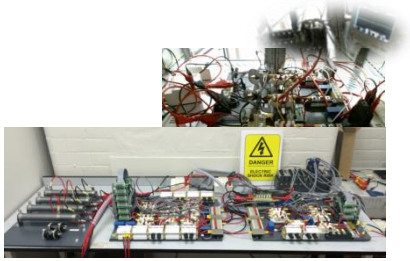
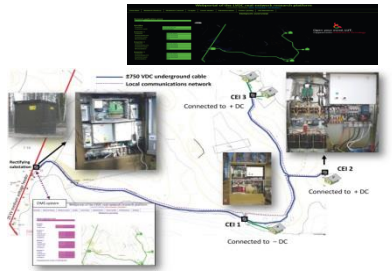
- Invited talk: LVDC international workshop2013 by KEPCO South Korea (29-30th Oct 2013)
- Ustrath (UK)-LUT (Finland) LVDC workshop (29th Nov 2013)
- DCFORWARD consortium across EU (2014) (good LVDC networking opportunity)

Open your mind. LUT. Lappeenranta University of Technology
TU/e Technische Universiteit Eindhoven University of Technology
Aalborg Universitet
University of Strathclyde Engineering
National Technical University of Athens
VTT
moixa TECHNOLOGY
Fortum
ABB
BOSCH
tiete
Suur-Savon Sähkö
NATIONAL CONSUMER RESEARCH CENTRE
KONČAR
ELENIA
ENSTO



Strathclyde PNDC and DC protection facilities (UK)



LUT LVDC network (Finland)

Aalborg DC home (Denmark)

Supporting standards and policy (IEC SG4 and IET CoP)

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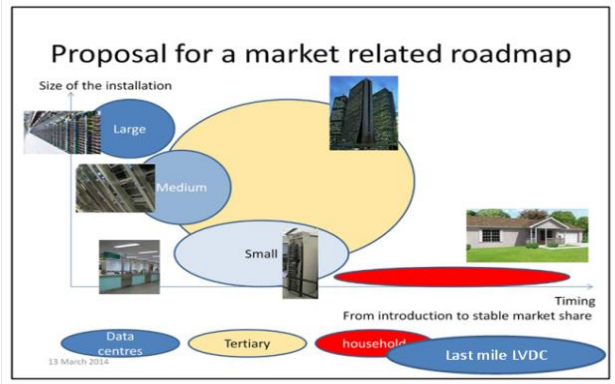
IEC SMB SG4

- Set up in 2009
- Title:
  LVDC distribution systems up to 1500V DC
- The objective

Code of Practice
for
LOW AND EXTRA LOW VOLTAGE
DIRECT CURRENT
POWER DISTRIBUTION IN BUILDINGS

Version 11 : 3/10/2014
Editorial Notes

- Presented last mile LVDC work in Milan 16-17/April/2014
- Issues with existing IEC61660 (reported in the minutes)
- Last mile LVDC has been added to the SG4 LVDC roadmap
- More companies joined DCFORWARD



The agreed potential roadmap between the IEC SMB SG4 and the DCFORWARD consortium (IEC SG4 meeting April2014 Milan)

- Joined the IET TC2.4 on LVDC power systems
- Supporting the new IET LVDC CoP, available at www.theiet.org/dc-cop for public consultation

Industrial engagement

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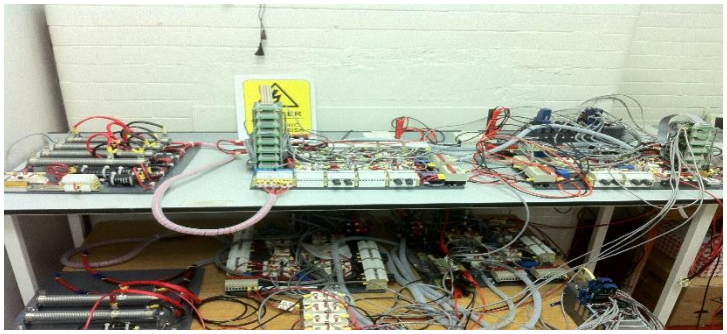
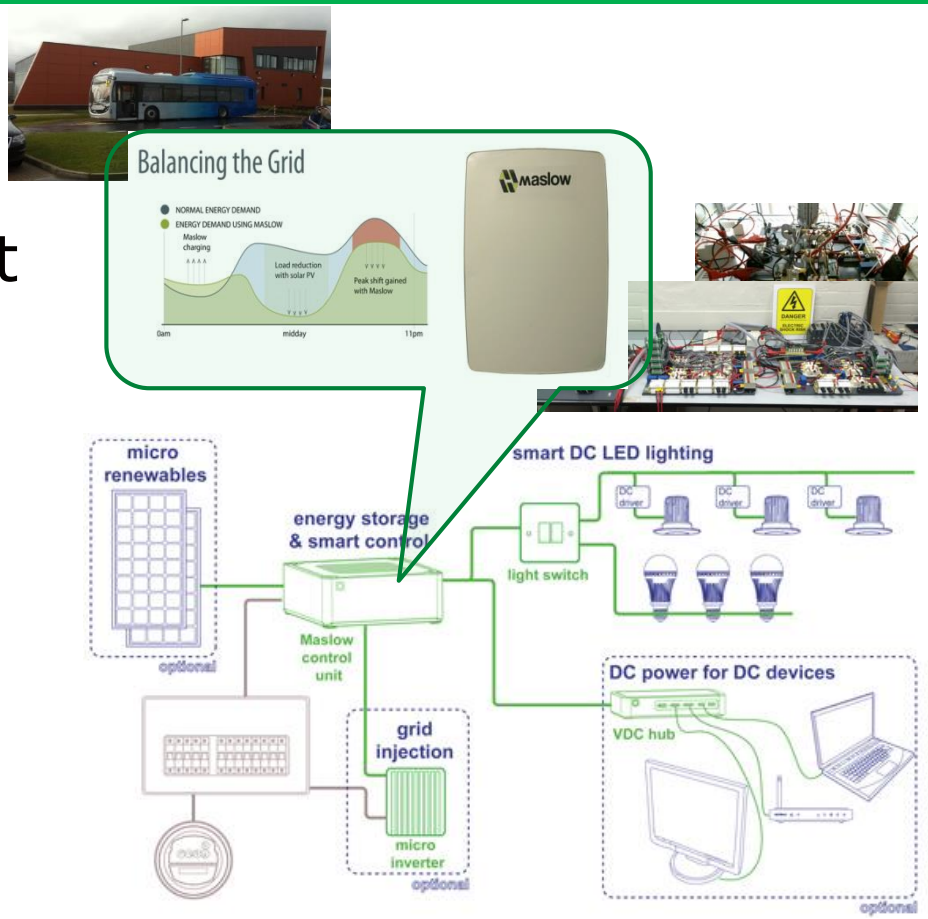
- New company engagement
  - Collaboration with Moixa Technology (testing DC RCD <500mA on the rig)
- Winning other EPSRC fund





http://www.moixatechnology.com/

Moixa Battery-LVDC sub-systems: MASLOW

Conclusions

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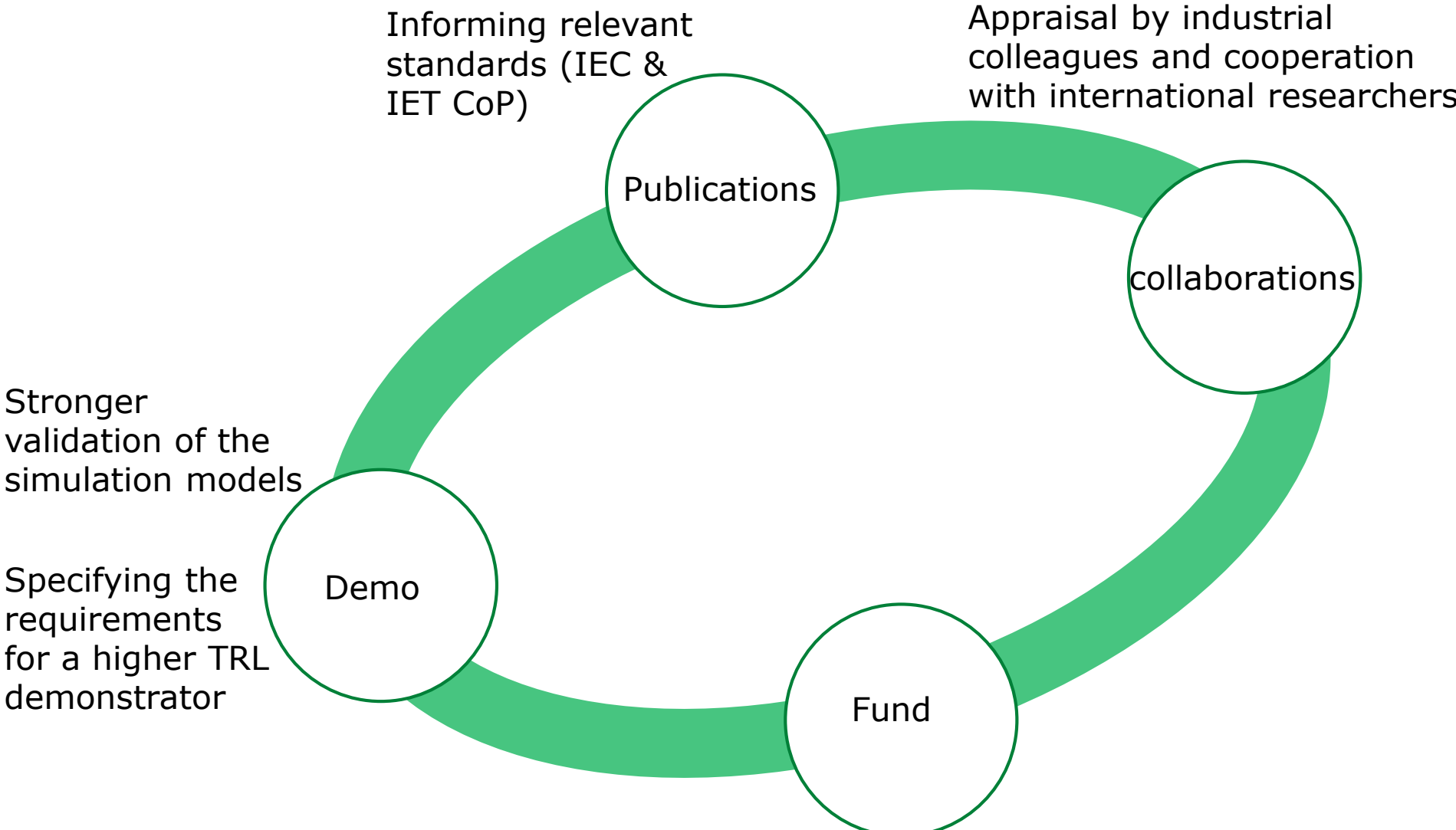
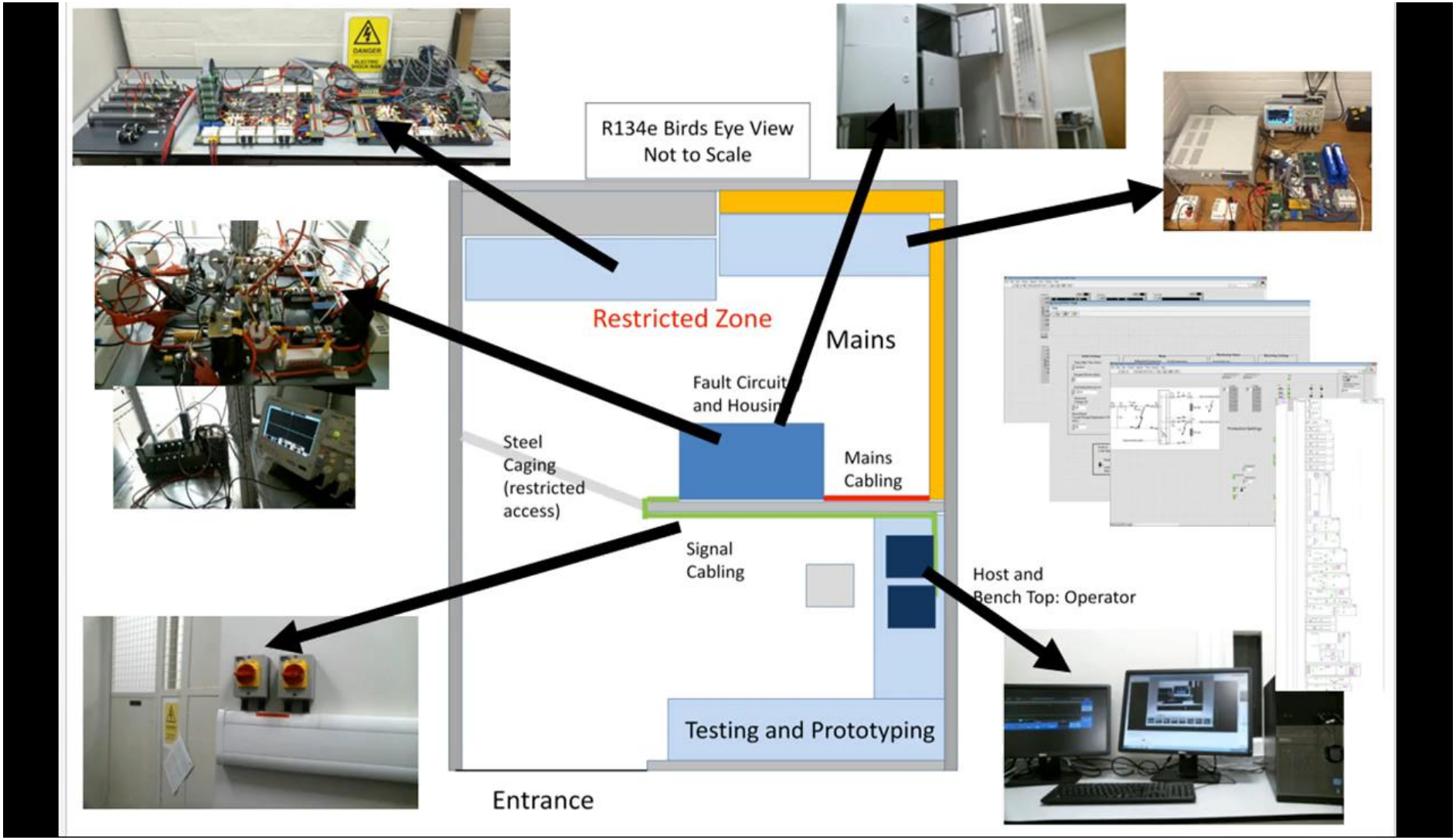
What has the Top and Tail demo used for?



LVDC testing facilities



Thank you
& any Q?