Get your bearings and unlock the full potential of smart grids with this insightful presentation by Alexander Wendt, Mario Faschang, Thomas Leber, and Tobias Deutsch. The software design of the test facility for an intelligent low voltage grid is discussed, focusing on system functionality and results.

**Problem Statement**
- **Challenge:** To stay within the voltage bandwidth limits as voltage volatility is increased due to distributed energy sources and e-mobility.
- **Test development:** Control concepts in small scale within an emulation system.
- **3-phase substation emulated by transformers (STT800).**
- **4 households (2 with PV) emulated by transformers (STT800) and current sinks IS100.**
- **Task:** Build a flexible software architecture for executing use cases.

**System Design**
- **Datapoint:**
  - Main communication mean of values, setpoints and commands
  - Physical datapoint – client specific, device specific
  - Logical datapoint – client independent, can be subscribed

- **Communication with the JRPCService:**
  - Integration style: Remote Procedure Calls
  - Based on the service concept of Google Protobuf
  - Bi-directional communication on a single socket

- **Datapoint Server:**
  - A Router with extended capability
  - Handles the mapping of logical and physical datapoints
  - Possibility to subscribe datapoints
  - Offers service-pairs:
    - request-respond and publisher-subscriber pattern in one
    - pull and push model implementable

- **Clients:**
  - Device Clients: connection to STT800 and IS100 through USB, connection to Smart Meters through Ethernet
  - Processing Clients: profile generator, tap changer algorithm and tap changer controller
  - Representation Clients: human-machine-interface
  - Manager Client: server control and monitoring

**Results and Conclusion**
- **Results:**
  - JRPCService robust, extendable and fast
  - Architecture easily extendable and adaptable

- **Lessons learned:**
  - Reduce system complexity, write several simple, independent clients
  - No business logic in the user interface component