



Standardizing Functional Test Systems
based on LXI Instrumentation
Savings Potential and Benefits

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- Design and integration of functional test systems
 - Based on standard platforms such as *LXinstruments* OTP, Agilent 54xx Automotive or GS8000 Mobile Communications platform
 - Custom solutions according to customer requirements (preferably based on LXI)
 - Temperature screening, endurance test and data acquisition solutions
- Turnkey solutions including DUT transport, automated connection, marking & identification as well as integration with database systems
- Application development (fixturing & test software)
- Onsite Installation and Maintenance

- Consulting
 - Formulation of test strategies and requirement specifications
 - Feasibility studies
 - Support services
- Customer training
 - System related training courses
 - Training courses with customer specific content
 - VEE / TestExec SL / .net Environment & Agilent instruments
 - TestStand / LabView + Agilent instruments
- Service contracts for LXinstruments solutions
 - Onsite repair & calibration, delivered in cooperation with Agilent Technologies
 - Max. response time <48h in GE / CH / A

LXinstruments orchestrates instruments and software to build functional test systems that feature:

- True openness and expandability based on industry standards
- A modular test software architecture
- Measurement performance combined with reliability and longevity
- Cost efficiency
- Tailoring to the specific customer needs

LXinstruments combines the strengths of global leaders in instrumentation with the flexibility and experience of a midsize quality system integrator

- **Reduce:**

- Overall cost of the functional test solution by eliminating engineering effort
- Time to integrate a given system

- **Maintain:**

- Flexibility to adopt to application and customer needs

- **Increase:**

- System quality and reliability
- Supportability and protection of investment
- Return on Investment

Potential for Standardization

Infrastructure

Test software

Signal
switching

App. specific
instruments

DUT specific
application
& fixture

Fixture interface

Instruments

Communication
interfaces



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Objectives:

- Foundation on industry standards (LXI, GPIB for legacy instruments)
- The use of one I/O library (VISA)
- Independence from computer backplanes
- Remote support & debugging
- Definition of a core set of Instruments
- Additional instruments are added depending on application



Switching Standardization

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Communication
interfaces

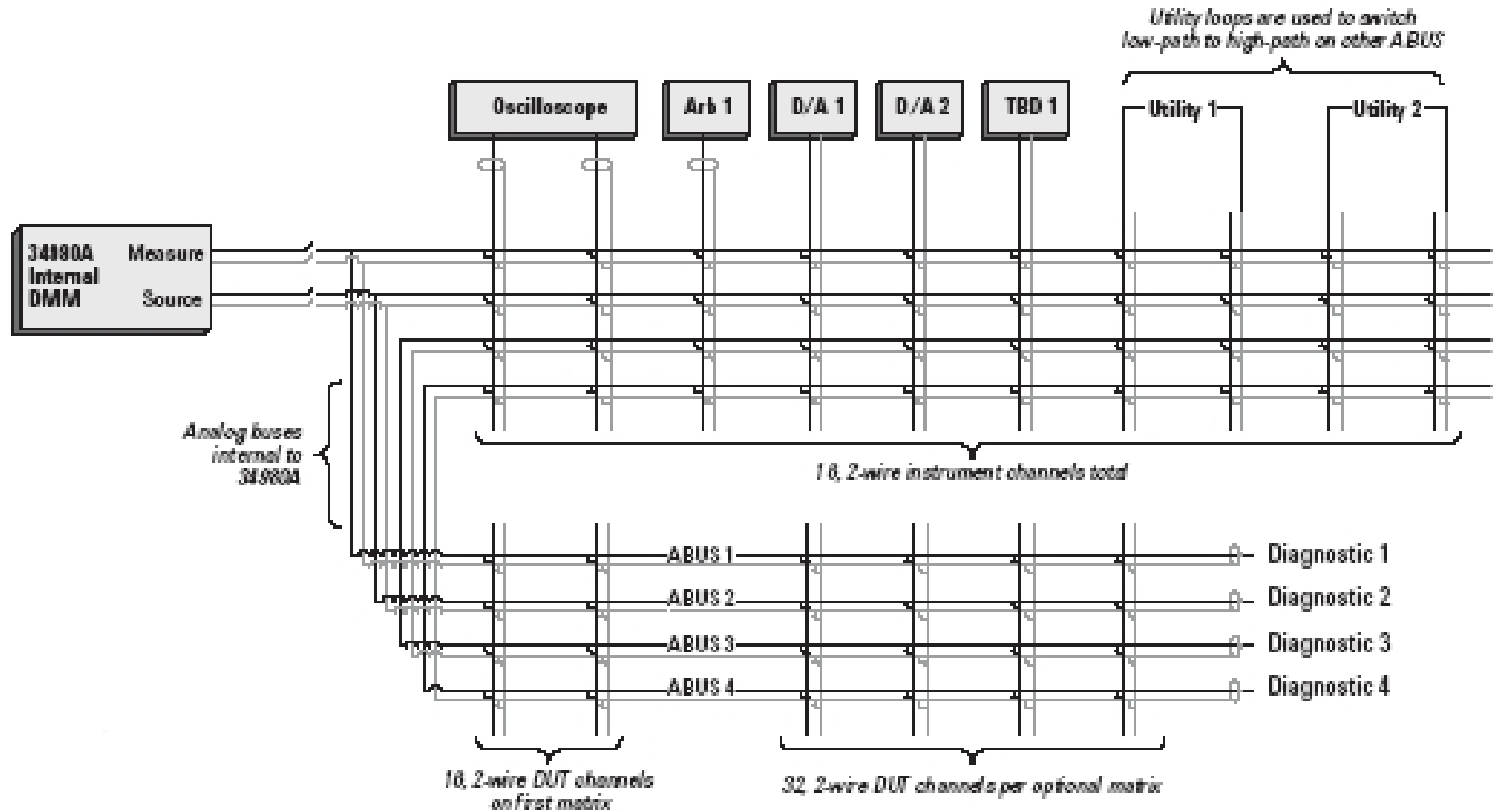


The Agilent 34980A as a modular LXI foundation for switching subsystems provides:

- Switch matrices and multiplexers
- Form-C switches
- Microwave switch drivers
- Digital I/O and relay drivers
- Breadboard cards for customization
- D-Sub connectors and terminal blocks as standard interfaces
- Optional internal DMM



Standard Matrix Architecture



Fixture Interface Standardization



Infrastructure

Test software

Signal switching

App. specific instruments

DUT specific application & fixture

Fixture interface

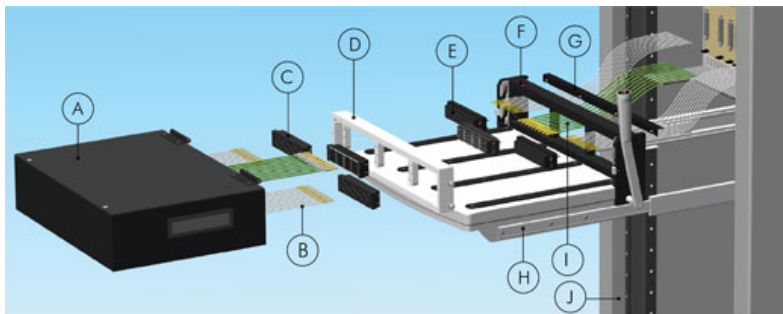
Instruments

Communication interfaces



Standardization on a modular fixture interface allows for the definition of standard cables between instruments and DUT. Properties of a quality fixture interface are:

- Reliability and longevity with >20.000 mating cycles
- Modular design with a variety of receivers
- Support of a wide variety of signal types including low frequency, power, RF and pneumatic connectors



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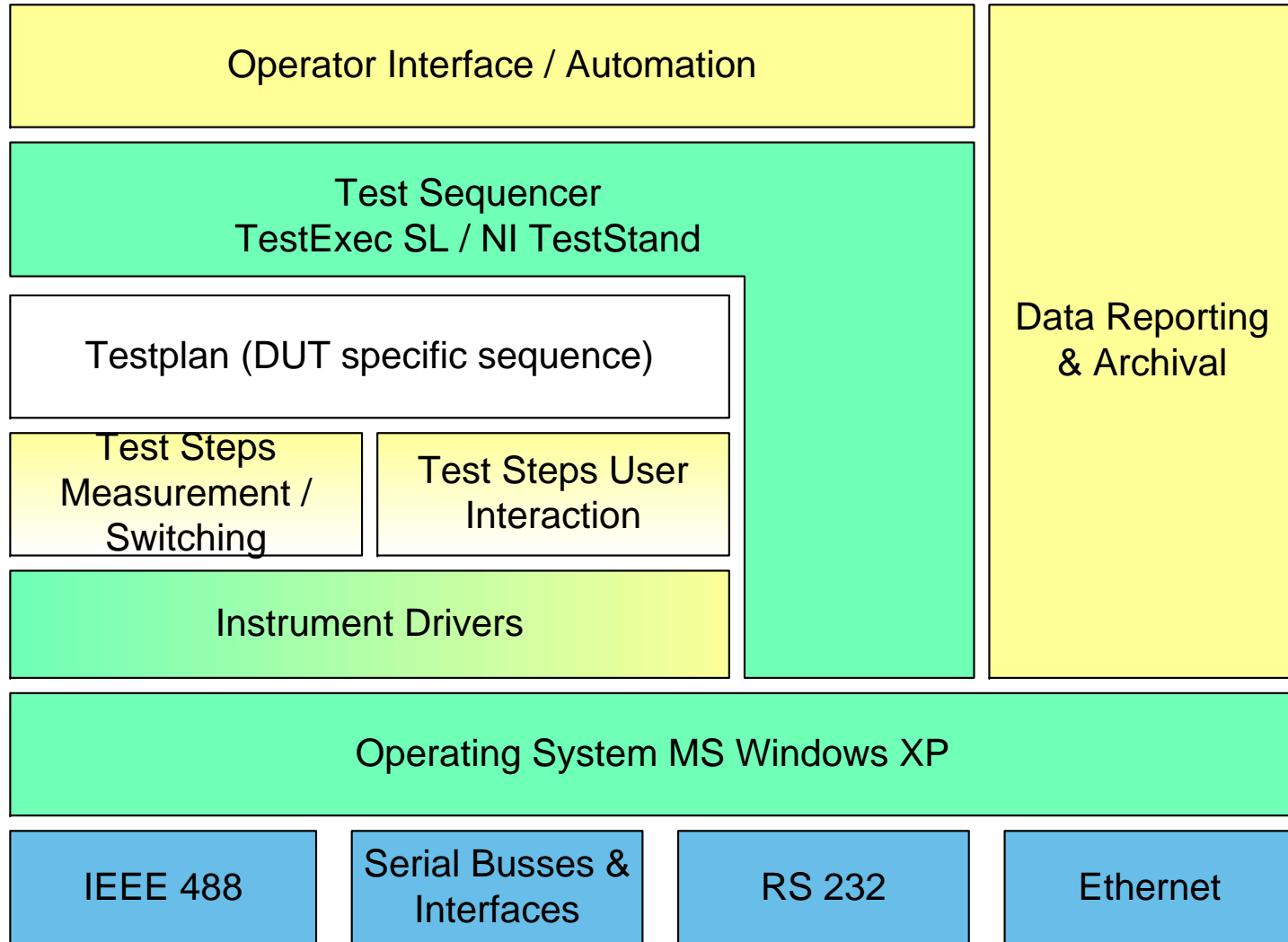


Software easily totals up to $>50\%$ of the engineering efforts needed to implement a system

- Software reuse is key to the reduction of engineering efforts
- A modular architecture is needed to separate DUT specific SW from instrument specific SW and infrastructure
- Commercial SW should be used wherever possible

Agilent TestExec SL and NI TestStand are the two mainstream test executives on the market, both supported by LXinstruments

Modular Software Concept



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The following areas provide potential for standardization

- Rack Supplier and rack format
- Power distribution unit
 - Use standardized fixed voltage power supplies to provide utility voltages
 - Standardize internal circuitry
 - Emergency shut-off as an option
- Control of pneumatic valves
- Automation interface
- Standard Industrial PC, consider:
 - Longterm availability of model, you do not want every PC to be unique
 - Longterm availability of spares
 - Minimum number of plug in cards

The LX Instruments **Open Test Platform** addresses the opportunities for standardization discussed previously.

The use of the open industry standard LXI and the built in flexibility of the architecture allow for tailoring according to the specific test requirements of a given customer

Goal: Implement 70% of a total solution based on the OTP approach and achieve 100% compliance through customization and extension with customer specific hard- and software

OTP Compact

- 1.2m rack
- 34980A Switch Mainframe
- Standard instruments include Agilent 33220A, 34411A, 53131A and others
- N6700B and N57xx power supplies
- Standardized cabling and software platform (Agilent / NI)
- Optional serial interfaces (EIB, Profibus, CAN, Lin...)
- Virginia Panel Fixture Interface



OTP RF Stimulus Response



- 2m rack
- 34980A switch mainframe with 2 LXinstruments RF switch sets
- Agilent 33220A arbitrary function generator
- Agilent E4402B spectrum analyzer (GPIB)
- Agilent ENA-L network analyzer
- Rohde&Schwarz SML03 RF signal generator (GPIB)
- N6700B power supply
- Virginia Panel fixture interface



OTP GSM Wireless Test

- 2m rack with 1 phase PDU
- Rohde&Schwarz GSM test set (provided by customer)
- Agilent MXG RF signal generator
- Agilent 34980A switch mainframe with DMM and switch matrix
- Agilent E364xA power supplies (GPIB)
- Agilent RF drawer fixture with >60dB RF isolation and integrated antennas
- Software based on NI TestStand and LabView



OTP Automotive QA



- 2m rack
- 34980A switch mainframe with LX Instruments resistor decades
- 4 Agilent 33220A AWGs with amplifiers
- Agilent 6000 series oscilloscope
- Dual CAN & diagnostic interfaces
- Virginia Panel fixture interface
- N6700B and N57xx power supplies

