Fieldbus Foundation

20th Anniversary

Fieldbus Foundation

20 years
1994 – 2014
Fieldbus Foundation has reached many major milestones over the last 20 years

- FOUNDATION™ fieldbus has an accelerating rate of global adoption
- Major installations are found in the oil & gas, petrochemical, power, paper, pharmaceutical and consumer goods industries
- Sales of fieldbus-based products are a growing portion of automation industry business
• Controls manufacturers, end users, academic institutions and others collaborated on an international, interoperable fieldbus standard
  • Open digital communication protocol for field devices was needed to replace competing, proprietary solutions
  • Fieldbus Foundation was established in 1994, leading to unprecedented levels of system and device interoperability for process automation
Today – the largest refinery in the world utilizes FOUNDATION fieldbus - Reliance Industries, Jamnagar, India
Field Device Registration circa 1999

- 21 Communication Stacks Registered
- 55 Devices Registered
- 60 Devices in Development
- 0 Hosts Registered
Field Device Registration - Today

- 158 Communication Stacks Registered
- 900 Devices Registered
- 19 Registered Hosts
HSE Extends Capabilities of FOUNDATION Fieldbus

- **Fixed Algorithm and I/O**
- **Flexible Algorithm and I/O**

**100 Mbit/s HSE**

**31.25 Kbit/s H1**

**Basic Process Control**
- Basic Function Blocks
  - Analog Input
  - Analog Output
  - Bias & Gain
  - Control Selector
  - Discrete Input
  - Discrete Output
  - Manual Loader
  - PD Control
  - PID Control
  - Ratio Control

- Advanced Function Blocks
  - Analog Alarm
  - Arithmetic
  - Deadtime
  - Device Control
  - Input Selector
  - Integrator
  - Lead/Lag
  - Setpoint Ramp Generator
  - Signal Characterizer
  - Splitter
  - Timer

**Advanced Process Control**
- Flexible Function Blocks
  - Multiple Input/Output - 8 Channel I/O
    - Basic I/O Interfacing
  - Application Specific (IEC 61131)
    - Coordinated Drives
    - Supervisory Data Acquisition
    - Batch Sequencing
    - Burner Management
    - Advanced I/O Interfacing

**Hybrid/Discrete Control**
EDDL Cooperation Phase 1
Founded 26 Sept 2011
Three year lifetime
FDI Specifications
IEC Standardization

Common FDI Tools
- EDD Engine
- UI Engine
- Integrated Development Environment
- Field Device Test Tools
- Host System Test Tools
FOUNDATION for Safety Instrumented Functions (SIF) Development Team


Not in photo: Richard Dunn/DuPont, Hemendra Dassanayake/Rotork, Peter Eigenraam/Shell
Using the power of FOUNDATION fieldbus, and considering NAMUR requirements, the new standard diagnostic profile aims to:

- **Standardize the integration of diagnostic information**
- **Guarantee valuable information to the user**
## Tool Development

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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</thead>
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<tr>
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<td>4Q</td>
<td>1Q</td>
<td>2Q</td>
</tr>
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<td>2008</td>
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<tr>
<td>2009</td>
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<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

- **2008**
  - ITK 5.1 Released
  - Field Diagnostics Optional

- **2009**
  - ITK 6.0 Profile Requirements Released
  - Host Test Kit 2.0
  - Field Diagnostics Test Device

- **2010**
  - ITK 6.0 Field Diagnostics Mandatory for New Registrations (*)
  - First Devices Registered Implementing Field Diagnostics

(*) denotes new registrations.
Wireless and Remote I/O

(WIO)
Large Point Count Device
- Multi-channel I/O
- Wired HART Block

Conventional I/O
- H1
- Wired HART

HSE Remote I/O
- HSE-RIO Team

Fieldbus Foundation – ISA Cooperation
- ISA100.15 Working Group

Wireless HSE Backhaul

Wireless Sensor Integration Team
- WirelessHART
- ISA100.11a
• About 2 million field devices sold

• About 20,000 systems installed worldwide, small to very large

• Total market for fieldbus field devices and systems is over $1.3 billion in 2011, and growing faster than the overall process automation market (13.3 percent).

• Total installed base is around $12 billion in systems and instruments, including infrastructure equipment and engineering services provided by MAC suppliers (does not include engineering services provided by EPCs, Systems Integrators).
Market Growth

History and Forecast for FOUNDATION Fieldbus Compatible DCSs and Field Devices

Very Large Capital Projects Scheduled
FOUNDATION Accounted for Roughly 70 Percent of the Total Process Fieldbus Market in 2006

Total Fieldbus Market by Technology Type (Percent of Dollars)
FOUNDATION Accounted for Roughly 74 Percent of the Total Process Fieldbus Market in 2011

Total Shipments of Fieldbus Solutions for Process Industries by Communication Protocol

2011 = 1,344.4 Millions of US Dollars

Total Fieldbus Market by Technology Type (Percent of Dollars)
FOUNDATION technology has become the all-digital standard for major Greenfield and modernization projects

- Reliance Jamnagar Refinery
- Shanghai SECCO Refinery
- CSPC Nanhai Refinery
- NAM Groningen Gas Field
- Shell Pearl GTL
- Drax Power Plant
- Reliance Life Sciences
- Molson Coors
- Duke Power
- Novo Nordisk
- Motiva
- Chevron
- BR Whiting Refinery
Why Field Device Integration?

Process automation end users are asking for a single solution

- Current FDT and EDDL technologies with partial overlap cause competitive positioning
- Current situation is confusing because of conflicting messages

Suppliers face expensive development

- Most suppliers are simultaneously part of ECT organization and FDT.
- They must invest in parallel developments for EDDT and FDT.
FDI Device Package Standard

- Device Definition (Parameters)
- Business logic (Rules)
- User Interface (Structure)

- User Interface Plugin
- Device Applications

- Product Manuals
- Images
- Electronic Certifications
- Protocol specific Files (CFF)

EDD (mandatory)

UIP (optional)

Attachments (optional)

Electronic Device Description Language (EDDL)

Microsoft .NET/WPF for Workstation Platform

Integrity
Authenticity
Specifications Available

Core FDI Specifications 0.9
available from
http://fdi-cooperation.com

FOUNDATION fieldbus
FDI DD Profile (FF-900 6.0)
available in latest specification release

http://forums.fieldbus.org
Fieldbus Foundation Tool Migration

DD Services

FDI Engine
- EDD Engine Built on DD Services
- Includes UI Engine components
- Supports legacy DD formats

FDI DD IDE
- Licensed per technology
- Based on Eclipse
- Supports legacy DD formats
- Package Builder
- Integrated Package Test Tool

First Beta Test available April 2014

Field Device Integration

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H1 Usability

ITK 7 Development
Usability Project

• Make digital fieldbus solutions easier to use than conventional analog systems
• Enable plant owners to focus on what technology can do for them and their business, versus how it is managed
• Simplify development of new fieldbus-based products and applications
H1 Usability Improvement Areas

- PV Device Interchangeability
- Automated Device Replacement
- Template-based Device Setup
Make FOUNDATION Fieldbus H1 easier than 4-20mA (PVs)

- Get the PV without the DD
- PV replacement without controller downloads
- Interchangeable PV
- Interoperable device management
Like Device Replacement

123456/ABCD/0101

Manufacture ID: 123456
Device Type: ABCD
Device Revision: 01

MANUFAC_ID: 123456
DEV_TYPE: ABCD
DEV_REV: 02
COMPATIBILITY_REV: 01

No new files to install!

Download existing offline configuration!
# Device Templates

## Template 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Temperature Measurement</td>
<td>This template permits ….</td>
</tr>
<tr>
<td>L&gt;Type</td>
<td></td>
</tr>
<tr>
<td>Channel</td>
<td></td>
</tr>
<tr>
<td>CONFIG1</td>
<td></td>
</tr>
<tr>
<td>CONFIG2</td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
</tr>
</tbody>
</table>

## Template 2

<table>
<thead>
<tr>
<th>Label</th>
<th>Single Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help</td>
<td>This template permits ….</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Block</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI [1]</td>
<td>L_TYPE</td>
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</tr>
<tr>
<td>AI [1]</td>
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<td>CONFIG1</td>
<td>2</td>
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<tr>
<td>TB1</td>
<td>CONFIG2</td>
<td></td>
</tr>
<tr>
<td>...</td>
<td>...</td>
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</table>

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## Availability

<table>
<thead>
<tr>
<th>Activity</th>
<th>Device</th>
<th>Host</th>
</tr>
</thead>
<tbody>
<tr>
<td>Like Device Replacement</td>
<td>ITK 6.1</td>
<td>Profile C</td>
</tr>
<tr>
<td>DD Templates *</td>
<td>ITK 6.2</td>
<td>Profile C</td>
</tr>
<tr>
<td>PV Interchangeability</td>
<td>ITK 7</td>
<td>Profile D</td>
</tr>
</tbody>
</table>

* DD Tools in beta!
HART Communication Foundation and Fieldbus Foundation Study Merger Potential

Greater Support for the Automation Industry

- Fieldbus Foundation and HART Communication Foundation have entered into discussions on a potential merger
- Single industry foundation would meet the needs of intelligent device communications in the world of process automation
- Combined resources would provide significant benefits to both automation end users and suppliers
Leading Industrial Communication Foundations Discuss Potential Merger

Single industry foundation would be dedicated to needs of intelligent device communications in the world of process automation

AUSTIN, Texas, Sept. 25, 2013 — The Fieldbus Foundation and the HART Communication Foundation announced today that they have entered into discussions on the potential for merging the two organizations into a single industry foundation dedicated to the needs of intelligent device communications in the world of process automation.

The chairman of the two organizations—Dr. Gunther Kegel of the Fieldbus Foundation and Mr. Mark Schranzacher of the HART Communication Foundation—issued the following statement on behalf of their Boards of Directors: “We believe combining the resources and capabilities of each foundation into a single organization will provide significant benefits to both end users and suppliers. For end users, a single organization that combines the power of both Fieldbus Foundation and HART Communication Foundation would provide a full solution that addresses every conceivable aspect of field communications and intelligent device management for the process industries. For suppliers, a single organization would create efficiencies in resource utilization, consistency of processes and procedures, and would deliver significant improvements in member services and support.”

The Fieldbus Foundation and HART Communication Foundation have worked extensively together in the past and have a long history of cooperation. For example, the two organizations worked together on the development of common international standards such as Electronic Device Description Language (EDDL) and, most recently, the development of the Field Device Integration (FDI) specification. The merger offers significant potential to harmonize many aspects of the two protocols, making it easier for end users and suppliers to implement the technology and obtain the full benefits of each technology in plant operations and maintenance.

In preliminary discussions, the presidents of the two organizations, Richard J. Timoney of the Fieldbus Foundation and Ted Masters of the HART Communication Foundation, added that many synergies already exist and closed by commenting: “We are both confident that today’s decision to investigate the merger of these two organizations provides momentum for a major step forward in the evolution of intelligent devices and the world of industrial communications.”

For more information, download our Frequently Asked Questions document, or contact the Fieldbus Foundation at 512.794.8890 or info@fieldbus.org.

About HART Communication Foundation

The HART Communication Foundation is the technology owner and standards organization for the HART Communication Protocol. Founded in 1993, the Foundation is an independent, not-for-profit, membership organization providing support for the HART Communication technology and standards worldwide. The Foundation is supported by a global membership of more than 265 companies. For more information, visit their web site at www.hartcomm.org.

About the Fieldbus Foundation

The Fieldbus Foundation is a global not-for-profit corporation consisting of leading process end users and automation companies. Within the Fieldbus Foundation, end users, manufacturers, universities and research organizations work together to develop an automation infrastructure that allows you to view your process in high definition; manage information effectively; and optimize people, processes and technology. For more information, visit their web site at www.fieldbus.org.
Purpose

Both HART and Fieldbus Foundation are mature technologies with large installed bases that must be maintained throughout a plant lifecycle of 15, 20, and even 25 years. It is our goal to launch a “New Foundation” that will incorporate the necessary and essential processes, procedures, intellectual property, assets and people from the two existing organizations – Fieldbus Foundation and HART Communication Foundation.

Mission

Provide maintenance and sustainability to both digital communication protocols and to become the organizational base for FDI; the future device integration technology that is shared by both communication protocols.
A Starting Point

- Single technical solution for Process Control, Monitoring and Safety
- Harmonization of Testing and Registration Processes and Procedures
- Single integration strategy for system wide interoperability - FDI
- A single point of contact for technology services and support
- Single strategy for the advancement of Intelligent Device Communication
- Reduced overall participation cost and overhead for Members.
- Simplified and single access to IP Portfolio
- 2 great protocols developed, maintained, delivered and supported by one organization
Investigation : What is happening today – Evaluate and Analyze

- Potential Benefits
  - Technologies
  - People
  - Assets
  - Structure
  - Policies
  - Procedures
  - Membership
  - Finance
  - Intellectual Property
  - Synergies

- Possible Structures
  - Organization
  - Location
  - Integration

- Due Diligence
  - Financial
  - Intellectual Property

- Recommendation
- Approval of Boards
- Member Vote
Fieldbus Foundation Booth

JEMIMA Exhibition 2013 Tokyo
F-ROM Host System and Wireless Devices

Host System

Wireless Terminal

Wireless Gateway

ISA100 Wireless Devices

WirelessHART Devices
Remote IO and Valves

Remote IO
- P+F
- R Stahl

Valves (L to R)
- Motor Valve (HART)
- Motor Valve (FF H1)
- Control Valve (FF H1)
- Control Valve (FF H1)

HSE Linking Device
Thank You

Questions?