

Comprehensive and Cost-effective Automated Testing of Vehicle Communication Networks

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The Presentation

- Introduction to Movimento
- The Seamless Tool Chain Philosophy
- Pantera and Puma – A Comprehensive Test System
- Conclusions, Questions and Answers



About Movimento



- Focused on Vehicle Networking and Diagnostics Solutions
- Global Customers, OEM, Tier 1 & 2
- Corporate Headquarters Gothenburg, Sweden
- North American Headquarters Plymouth, Michigan, USA
- Global Reach through Partners

Member of International Standards Bodies

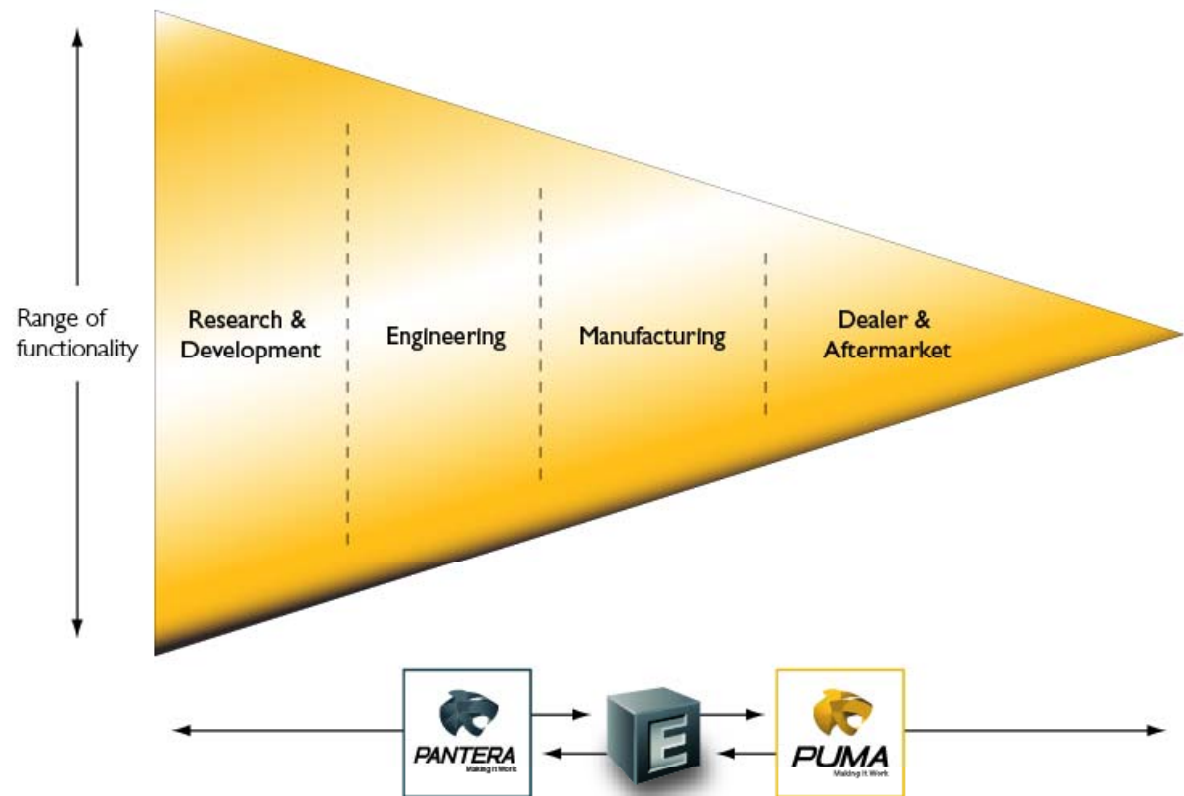


Seamless Tool Chain Philosophy

- Wide applications range
- High range of functionality

Leads to

- Increased quality
- Reduced time
- Reduced costs



E-script joins Movimento's software and hardware to a platform providing solutions throughout all phases

Industry Ready For Automated Testing?

- Non clear requirements
- Requirements in different formats, Word and Excel are dominant and XML structures are coming
- Customers legacy needs to be integrated in test suites



Movimento's Solution

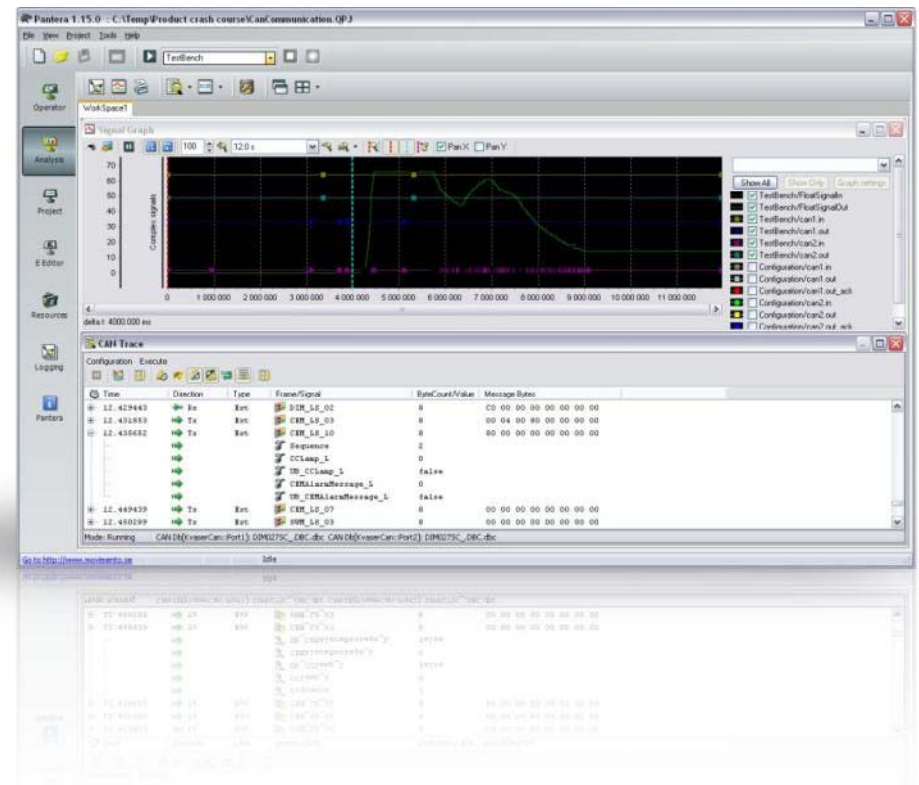
- Work with DLL importers with flexible tools,
- Scripting language for real time in windows environment
- Open standards support



Movimento Pantera – Target Users

Seamless and Automated
Electrical System Testing for

- Research & Development
- Engineering
(customer example)
- Manufacturing
- Dealership & Aftermarket



Movimento Pantera – Technologies

- Networking Communications
- Simulation & Test of Analogue and Digital Signals
- Test systems utilize liberal hardware approach, supporting Vector, Kvaser, NI and others
- Interaction with other software with scripting environment , supporting OptoLyzer, CANalyzer, NI, Word, Excel, ODX and others



Movimento Puma – Technologies

iVCI – intelligent Vehicle Communications Interface

- Support for major vehicle networks & protocols
 - CAN, LIN, MOST, J1708, J1939, K-line and more...
- Analogue and digital I/O
- Wired (USB) or wireless communication (802.11b/g)



Movimento Puma – Applications

Single core product architecture with multiple applications

- Pass through diagnostics (RP1210 and J2534/-2)
- Stand alone flight recorder
- Stand alone software download
 - Update embedded software without PC
 - Ideal for reflash campaigns
- Network gateway
- Node simulation



Case Study – Introduction

- WHO – Heavy Equipment Manufacturer
- NEED – Automate the complete vehicle electrical system test and validation process
- SOLUTION – Pantera implemented as a wrapper over existing Test Execution Environment



Case Study – Environment

- Support for network (CAN) and physical signals (analogue, digital, electrical faults)
- Actual ECUs used if possible, or ECU simulated by Pantera and Puma
- Verification of compliance to specifications
 - System performance, message timing, functionality, protocols and diagnostics
- Remote test and support via TCP/IP to central hardware server



Case Study – Outcome

- Improved quality
- Reduced validation costs
- New level of specifications and report management
- Significantly shorter test process cycle times
 - Before \approx 4 weeks
 - After \approx 3 to 4 days



Case Study – Automated Testing

1 Import of Test Specifications

- Markers assigned to key Test Specification parameters (Word or similar)
- Pantera imports key Test Specifications for Test Execution



2 Test Execution

- Fully automated test execution, '1-button' testing
- Pantera Software works simultaneous with customer ECUs, Puma Hardware and NI Hardware (or other 3rd party hardware)
- Pantera coordinates test execution and prepares test results

3 Automatic Report Generation and Data Storage

- Key test result information (Pass / Fail, comments) presented via customer defined report
- Full test results stored in customer defined database

Case Study – Test Specifications

1 Brakes

1.1 Parking Brake

1.1.1 Parking brake

This functions purpose is to inform the driver that he/she needs to apply the parking brake if he/she attempts to leave the machine while running and the parking brake isn't applied.

1.1.1.1 Normal function

SS_A = Seat Sensor Alarm [ON, OFF]
 RPM = Engine Speed [rpm]
 PB_S = Switches, Electric Parking Brake [ON, OFF]
 PB_A = Parking Brake Applied [ON, OFF]
 A_{SQ} = Alarm Sequence [NoSequence, Sequence 1-7, ActiveVehicleMsg]
 A_P = Displayed Warning [...WarningPBrakeNotApplied, ...]
 T_C = The Time Before the result is checked [ms].

Don't set the parameters in initial state, changes in parameters values are made before initial state in test sequences. Parameters values stated below is a "default" parameters setting.

1.1.1.1.1 Normal Activation

This test includes test case 1

Moment	Input	Check
VI	ATs_Brakes_ParkBrakeAlarm_All.vi	
1	PB _S = ON PB _A = ON SS _A = OFF RPM = 0	T _C = 4000 A _{SQ} = 0 // NoSequence A _P = 173 // WarningPBrakeNotApplied
2	RPM = 900	T _C = 4000
3	SS _A = ON	T _C = 4000
4	SS _A = OFF	T _C = 4000
5	PB _S = ON PB _A = OFF	T _C = 2500 A _{SQ} = 7 // Sequence 7

Case Study – Test Report

1 Test Report - ParkingBrakeNormalFunction

Test Report: ParkingBrakeNormalFunction
Test Time: Thu Feb 25 14:27:30 2007
Test Description: This functions purpose is to inform the driver that he/she needs to apply the parking brake if he/she attempts to leave the machine while running and the parking brake isn't applied.

1.1 Result

1.1.1 Test Result

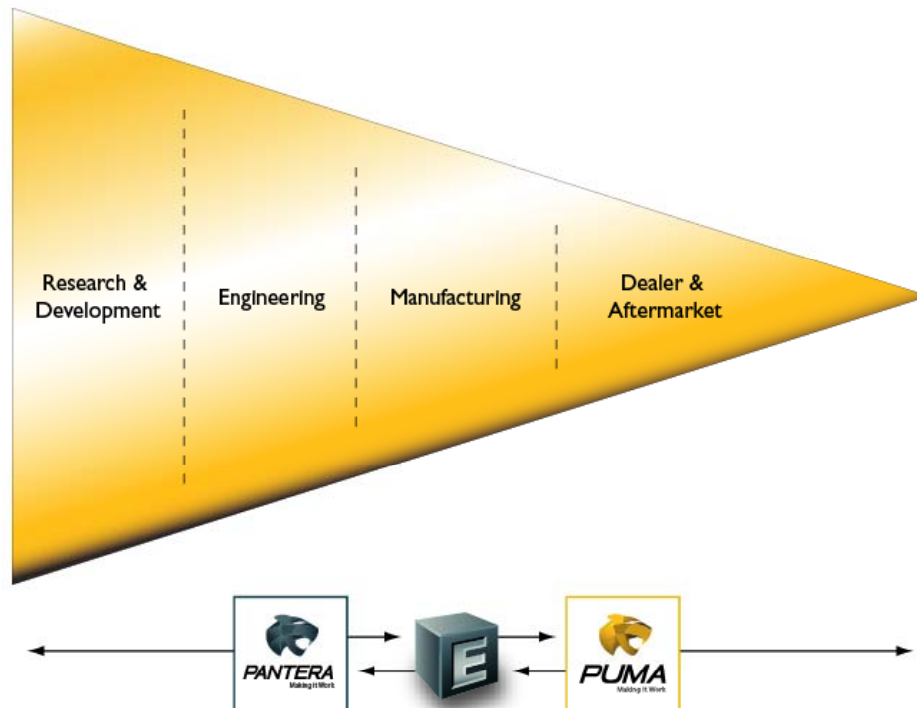
Test Result: PASSED
Test Comment: The test was successfully executed without errors

1.1.2 Test Moment Results

Test Moment	Result	Comment
1	PASSED	
2	PASSED	
3	PASSED	All InData booleans true
4	PASSED	
5	PASSED	The check time is 2500 here
6	PASSED	

Conclusion, Questions and Answers

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