

B2i Engineering et Technologies

Co-development and new solutions for RT-Lab environment



REAL TIME 2008

1st Annual Opal-RT
International Users Conference



A company of the Viveris group

- **Distribution of Opal-RT products by B2i**
- **New solutions available for RT-Lab environment**
 - API : RT-Lab.OPCServer
 - Drivers : support of Applicom, Pickering, SSI
 - Hardware : 6 slots PCI to PCIExpress High bandwidth bridge
- **On-going project**
 - Software : TPM-Suite (Test Process Management) project



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B2i specializes in engineering technology, our services cover the entire product development cycle

- ☐ **Consulting & Engineering**
- ☐ **Products & Solutions**

B2i also markets its own products, and distributes those of its partners such as Opal-RT.



Produits B2i



Distribution of Opal-RT products by B2i

- Since 2005, B2i (groupe Viveris) has been Opal-RT's exclusive distributor in France, Spain, Bénélux
- Product sales, integration, front line support
- Co-developing solutions around Opal-RT products: drivers, API, software, hardware
- Development of partnerships with complementary organizations and research laboratories



DCNS – FREMM *HIL test bench*



Expert in naval systems. Prime contractor for integrated warships : surface ships, submarines,

- **FREMM propulsion command system verification&validation**
- Objective : immerse the FREMM command system in a simulated environment
- 2 real-time target, 4 cpu running in Real-Time
- Closed-loop testing at 400 μ s time step
- Bus-field modbus, profibus, ethernet s7



Volvo 3P – HIL bench

VOLVO

A first class truck integrators

- **HIL** bench unit to **simulate the complete physical environment** of an Air Product Management ECU to test its behavior.
- Objective : immerse the APM ECU in its whole environment
 - generate use cycles, replay recordings from BUS recordings
 - validate softwares, tune parameters & control strategies
 - check fault detection & fallback modes
 - automate test sequences



TECHNICAL FEATURES :

- | | | |
|------------------------|---|----------------|
| • PC under Windows XP | • MATLAB/Simulink 7.1 | • 2 CAN bus |
| • HILBox under QNX 6.3 | • Labview 7.1 | • Digital I/O |
| • RT-LAB 8.1 | • Programmable Resistor Card from PICKERING | • Analogic I/O |



S2M (SKF group) – HIL test bench



World's biggest producer of magnetic bearings and pm high speed motors

- **HIL testing of a new control system for active magnetic bearings**
- **Replacement of physical testing, for the validation of a complex system : flexible modes taken into account, vibratory control, response to disturbance during ramping up of speed**



« Control laws, power conversion, mechatronics, ...
MATLAB/Simulink & RT-Lab environment helps
contributes the homogenization of the design flow »

Lakdar Sadi-Haddad, R&D Engineer, S2M (SKF group)

G2Elab (formerly known as LEG) – eMEGAsim 8CPU



Grenoble Electrical Engineering laboratory (UMR 5269 INPG-UJF-CNRS)

- MIL (computation acceleration), HIL and Power HIL applications
- Cutting-edge projects in the field of electrical engineering, especially on research activities relative to electrical power grids, protection systems, wind and sea energy production, FACTS, and micro-grids.



« The excellent results achieved during an evaluation period of 6 months have to choose the RT-LAB environment for its research projects. »

Yves Maréchal
G2Elab Head Director

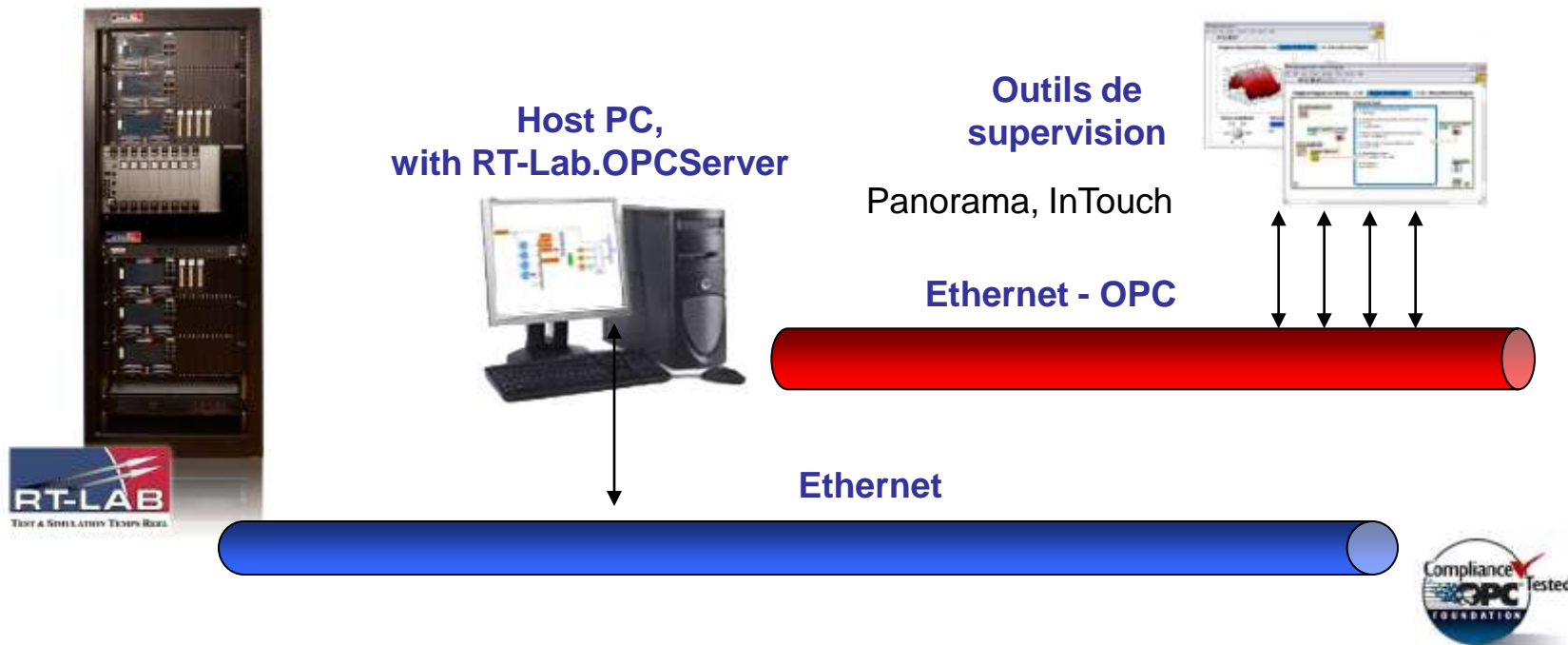


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New API : RT-Lab.OPCServer

- OPC Server for RT-Lab
- Visualisation compatible avec la majorité des outils de supervision du marché



Hardware : High bandwidth PCIExpress-to-PCI slots bridge

For a client project, development of a 19" 2U, integrating two removable card-cages supporting up to three PCI cards each (6 PCI cards total).

Functionality :

- Potential to use PCI 5V or 3.3V cards
- Potential to use 33 or 66Mhz cards
- Passive (1m cable) or active (7m cable) interface for PC
- Forced air flow on PCI cards
- Front leds panel for state monitoring

Options :

- Safety / redundant ATX power sources
- Monitoring of all voltages



New Drivers : Pickering Programmable Resistance

(Pickering 50-295-021)



○ Card characteristics

- PCI format Programmable Resistance Card, up to 18 resistor
- 0 to 16 Mohms, 1 ohm resolution, $P=0,5W$

○ B2i achievements

- Development of QNX drivers + MATLAB / SIMULINK library

○ Project

- HIL bench for Volvo
- Generate 4 signals from $-10mV$ to $+25mV$ with $0.1 mV$ resolution
- Driving 4 programmable resistance in Wheaston bridge



New Drivers (2) : applicom® Ethernet PCU2000ETH

- Simultaneous multi-protocols and multi
- Certified with more 50 major SCADA/HMI packages
- Covers more than 40 protocols among a wide choice of industrial networks and fieldbuses:



applicom®

Ethernet TCP/IP	<ul style="list-style-type: none"> Allen Bradley - EtherNet/IP (ControlLogix, PLC-5 & SLC 500 Series) Alstom - SRTP (Alspa C80-35 and C80-75) Altus - Alnet II (AL2000 and WebGate Series) GE Fanuc - SRTP (90-30 and 90-70 Series) Mitsubishi - Melsec (A and Q Series) Omron - FINS (C, CV and CS Series) Schneider - Open Modbus TCP (TSX Premium, TSX Micro, etc) Schneider - Uni-TE (TSX Premium, TSX Micro, etc) Send/Receive on UDP (dev. free messaging on UDP) Siemens - Industrial Ethernet (S5, S7 and TI-505 Series) Development toolkit for TCP and UDP protocols in client/server modes
Ethernet	<ul style="list-style-type: none"> Schneider - Ethway (TSX Premium, TSX Micro, etc) Siemens - Industrial Ethernet ISO (S5, S7, TF and TI Series)
Profibus	<ul style="list-style-type: none"> Profibus-DP V0 Master Class-1 & Class-2 - All DP slaves devices FDL for S5 Master - Siemens S5 S7 / MPI Master - Siemens S7-300, S7-400 Send/Rec on FDL - Dev. your free messaging on Profibus-FDL FMS Client/Server - All FMS devices (on request)
Serial	3964/3964R, AS511, DataLink, DF1, Modbus, PPI/PPI+, Saia-BUS, SNP-X, SucomA, Sysmac-Way, TI-Direct, Uni-Telway, and dev. toolkit for Serial protocols.

Compatible with



MITSUBISHI ELECTRIC
AUTOMATION, INC.



New Drivers (3) : ERMA Serial Synchrone Interface

○ Card characteristics

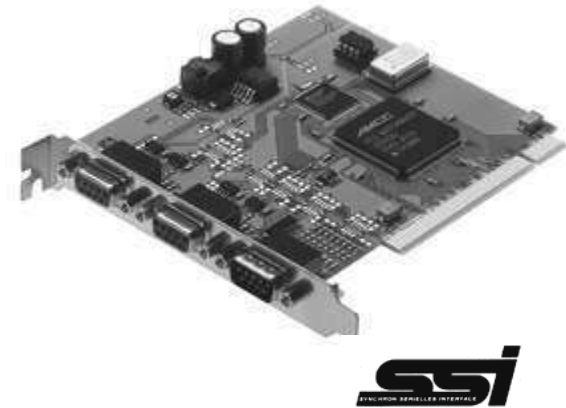
- 2 Synchron-Serial-Interfaces, max. 44 Bit, 5Mhz, Master- / Slave-Mode
- Timed Data Recording
- Trigger And Zero Setting Input Channels

○ B2i achievements

- Development of QNX drivers + MATLAB / SIMULINK library

○ Projects

- Use of resolver on SSI bus,
- Measurement at 50µs period. Works at 6µs.
- External trigger allow to precisely synchronize datalogging, with precise timer from NI or Opal-RT.



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Project TPM suite

(Test Process Management)



CQ9407_007.A00



TPM Suite Project

- B2i was asked to provide complete HIL solution for ECU testing, including automated test environnement.
- Development of specific solution for several customers, with associated drawbacks: costs, delays, and non-reusability.

Automated test solution for RT-LAB :

- Deterministic, hard-real-time
 - Off-the-shelf
 - Integrated but still open to specific requierements
- ... to compete with standards of the market



TPM Suite project (v1)

Test Process Management

Configuration management

Test management

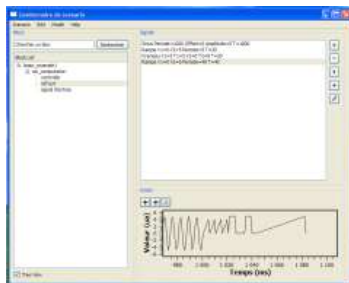
TPM Suite Main Interface

ScenManager

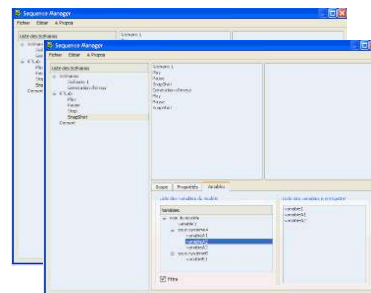
SequenceManager

ViewManager

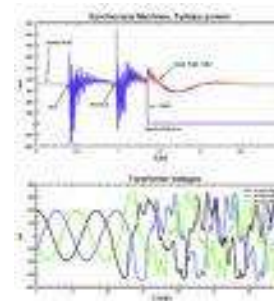
ReportBuilder



Scenario Editor



Test Sequencer



**Visualization GUI
Online/Offline**

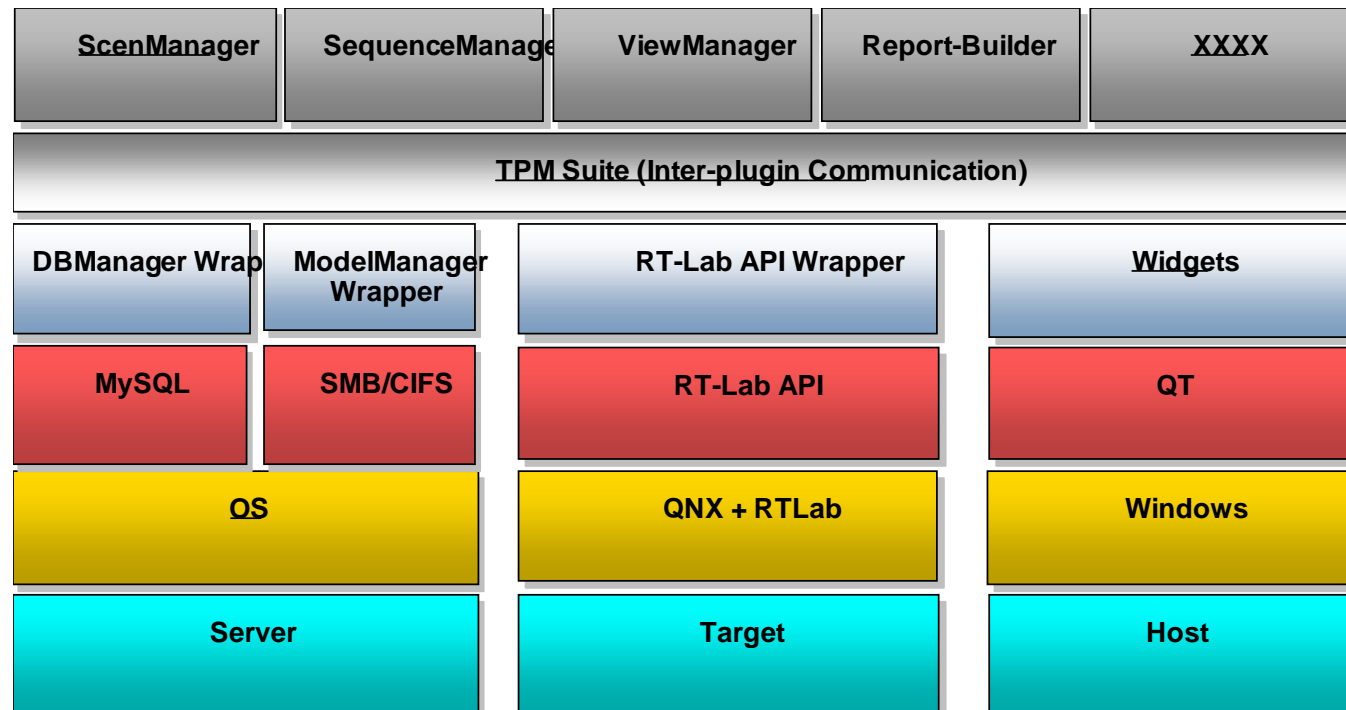


**Automatic Report
Generation Tools**

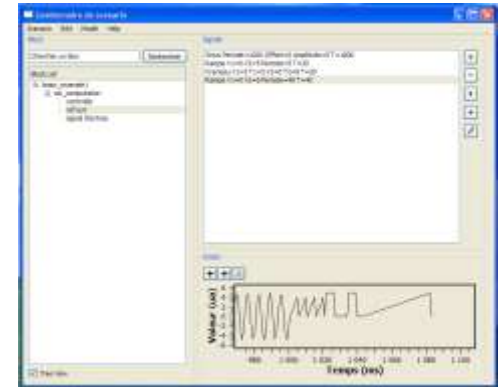


Architecture

- Integrated solution
- Open & modular architecture
- Multi-user support
- Based on Eclipse, centralized mySQL database, abstraction layer: API RT-Lab C <-> C++



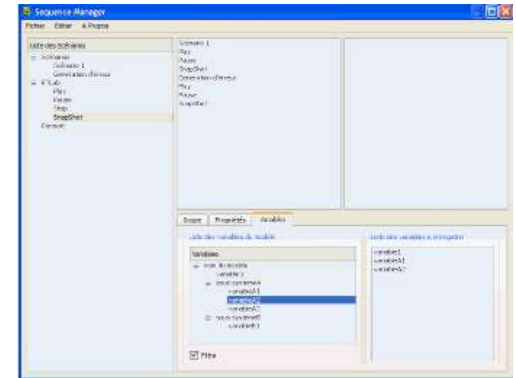
ScenManager



- **Graphical environnement to assign several kind of signals : sine, square, ramp, vector (v2), ...**
- **Main features :**
 - **User-friendly interface, making it possible to quickly edit scenarios, with pre-visualization**
 - **Synchronize execution profiles between each other**
 - **Test management (registration, modification)**



SequenceManager



- **Creation and management of test sequences, automated execution, conditional tests based on previous results (v2)**
- **Main features :**
 - Define test sequences by drag&drop
 - Conditional tests (loop, conditionnal branch)
 - Regression tests
 - Acceptation criteria definition (>,<,<=)
 - On-target datalogging, definition of acquisition windows, and decimation parameters (v2)

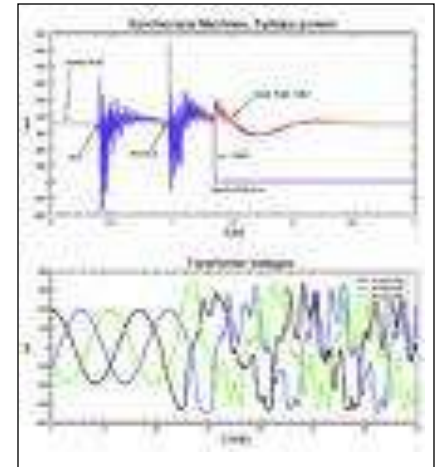


ViewManager

➤ On-line/off-line visualization

➤ Main features :

- Create user configurable graphics & recordings, thru drag and drop
- Numerical and graphical visualization
- All model signals can be displayed
- Zoom - Autoscale (dynamic) - Cursor



ReportBuilder

➤ Automatic Report Generator

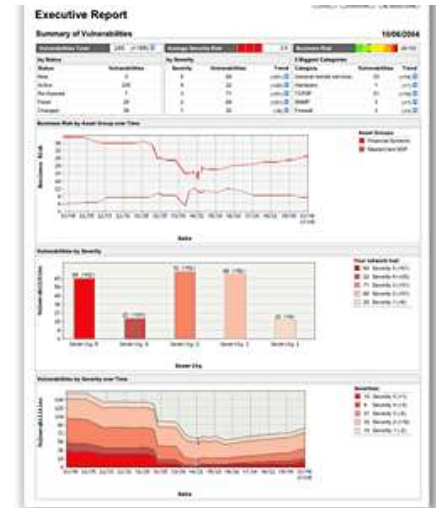
➤ Mean features :

○ Automatic Report Generation

- Data summary, configuration
- Sequence results, test results
- Automated data comparison
- ...

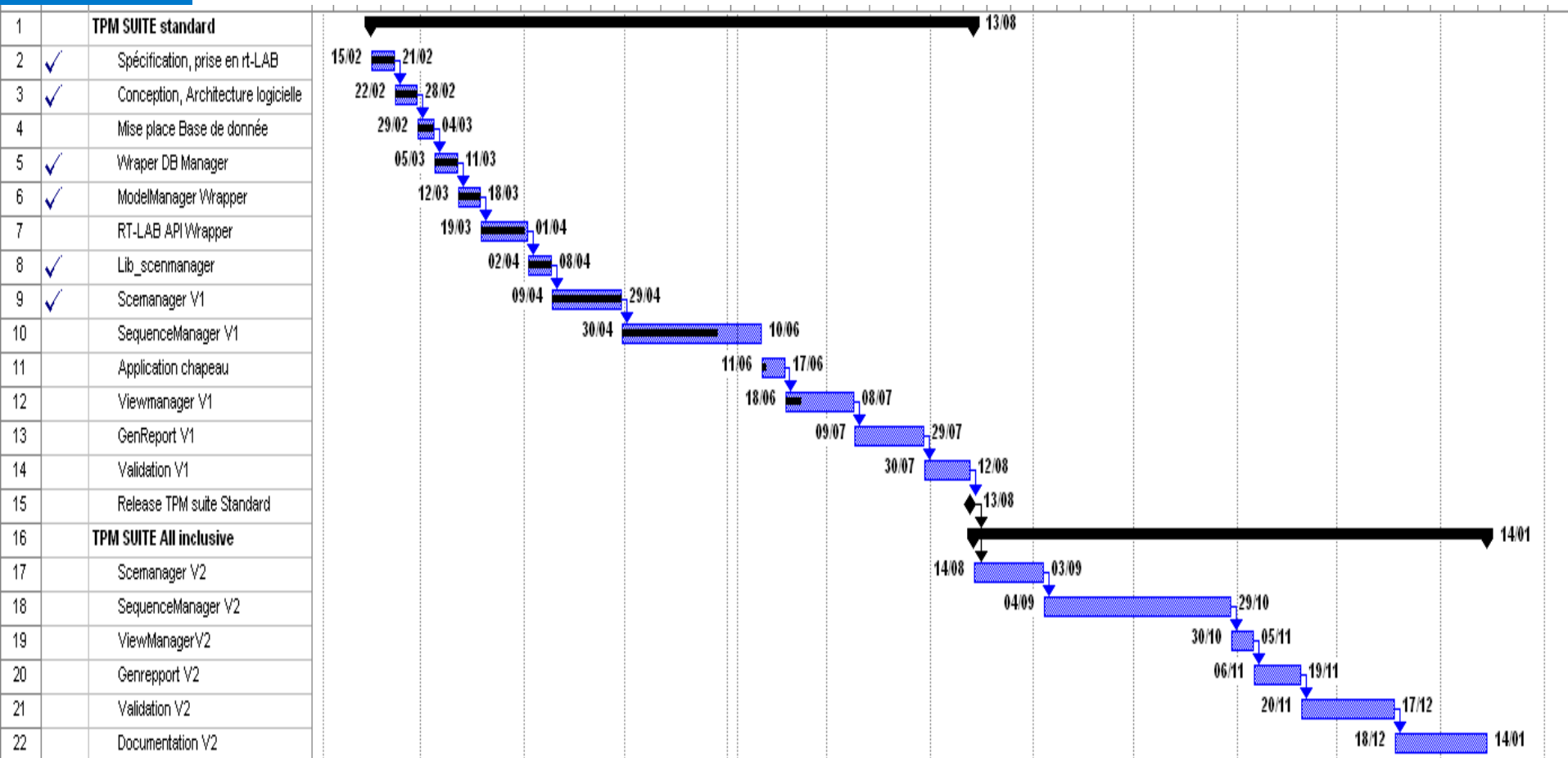
○ Use customizable formatting (HTML formatting with CSS)

○ HTML report format (CSS), pdf, word (rtf)



Projet TPM Suite : Road Map

september



TPM Suite project :

- ✓ **First release at the Q4 of this year.**
- ✓ **Specification are still being tuned, so we are interested to have your feedback**

A call to RT-Lab users, developers, and partners :

- ⇒ **Share with us your feedback on presented elements and related issues**
(similar solution already developed, features request, etc.)

Please visit B2i on table-top.



Questions

