BANGALORE TECHNOLOGY CENTER (D&IS)
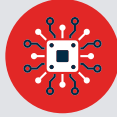## Tech Forum - Quarterly Newsletter
· April 2022 ·

ALSTOM
· mobility by nature ·

Technology Innovation	Embedded Software	Cyber Security	Application Software	Verification & Validation	Program Management

FOREWORD

"Tech Forum is launched at Bangalore Technology Centre with a focus on six areas- Technology Innovation, Application SW, Embedded SW, Verification & Validation, Program Management, and Cyber Security. We have seen some tractions in few focus areas and others are picking the momentum. On top of these focus areas, there is a need to give attention to safety awareness and culture to build a Product Safety Competence team at BLR D&IS. This Tech Forum is for every TC team member and each one of you has the responsibility to come out with Innovation ideas to build next-gen products with desired safety integrity level and improve the performance of existing programs/work packages you are currently working on.

There is a need to leverage the interaction among Tech Forum Leaders to post the open technical problems and challenges to address them through collective experience and expertise. I count on each one of you for your active participation and contribution to this transversal initiative, which is a major step towards the transformational growth of BLR TC to the next level in alignment with AiM 2025."

- Ajay Krishna KOPPAM

EDITORIAL

"In order to make a strong contribution towards Global D&IS R&D strategy, BLR Technology center vision is revived in March '22, Technology forum with all 6 focus areas are key drivers. We have seen great momentum post tech day event in Oct '21, Let's continue to utilize tech forum platform to collaborate and to make BLR TC vision reality."

- Jignesh R. DESAI

LEADERS VIEW

"Establishment of a Technology Forum at Bangalore Technology Centre is a good step. It will further strengthen the collaboration of BLR TC with other sites and external communities to cross leverage Domain & Technology Expertise, who are working on various Innovation topics and next-gen technology initiatives. Having the Tech Forum Organization in place can channelize the people network to connect and collaborate."

- Vincent DE BOVIS

KEY PRIORITIES

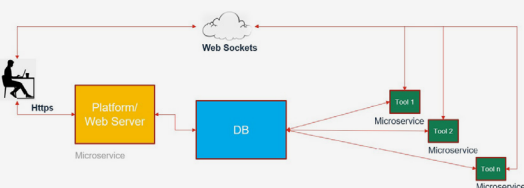| Setting up focus groups to drive initiatives	Innovation and competency building as round the year activities	Agile and Shift Left Way of Working	Software Test Automation platform	Create cyber awareness and culture

HIGHLIGHTS

TEST AUTOMATION FRAMEWORK
Online platform to host automation tools for all V&V processes

BUSINESS IMPACT

- Automation of multiple repetitive manual tasks, result to reduction in effort spend
- Avoid manual mistakes and improvement of productivity
- Systematic process adherence
- Sharing of best practices
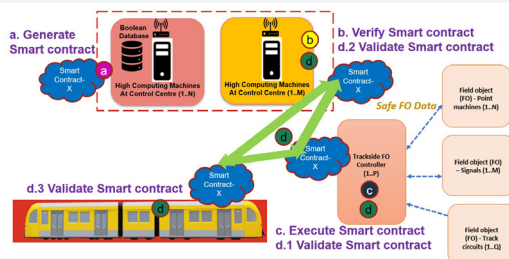- Version control management

STATUS

The automation platform is deployed and accessible globally on the network. Few tools have been integrated into platform & the rest are in pipeline for development.

Reach out to **Aftab DAR**, Group Manager - V&V, for more details

INTERLOCKING BLOCKCHAIN
SW CCN funded Blockchain technology exploration

BUSINESS IMPACT

- Single source of trusted Blockchain data-efficient deployment, operation and analytics
- Distributed computing architecture leads to low computing processors on wayside systems
- Future-ready for Blockchain technology adaptation

STATUS

- PoC is completed for BigchainDB
- White paper is completed for Interlocking Blockchain
- Next step - Possible exploration of Interlocking PoC with Blockchain platforms

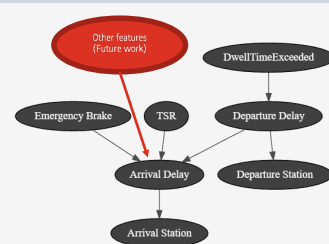Reach out to **M. GANESAN**, WCE Senior Expert & Principal Architect, for more details

AI-BASED TRAIN DELAY PREDICTION AND CAUSE ANALYSIS
A Probabilistic Graphical Model based decision support system that learns from historical train operations data to predict potential delays and to assist in delay cause identification

BUSINESS IMPACT

- Potential delay prediction enables taking proactive steps to avoid delays
- Cost-efficient delay root cause analysis
- Enhanced customer satisfaction

STATUS

- Proof of concept demonstrated considering five features (Source and Destination stations, TSR, Emergency Brake, DwellTime, Departure, and Arrival delays).
- Next step - Enhance the model by incorporating an elaborate list of features that cause train delays.
- Discuss with projects to gather input datasets.

Reach out to **Pavan Kumar SAMMETA**, WCE Senior Expert & Product Architect, for more details

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JAN 22 NEWSLETTER QUIZ WINNERS

Madhu MOHAN

Shratha

Balla Shiva KUMAR

I NOVE YOU 2022 - TOP 5 FROM BLR TC, QUALIFIED @APAC LEVEL, IN COLLABORATION WITH MULTI-SITE

Hardware as a service MooN platform
by

Satish KARI
Rakesh KUMAR
Vinod KUMAR-VERMA
M Sujeethnanda
Anoop JOSE

ICC Urban Conflict Detection System
by

Guillaume DAUNES
Amit GUPTA

Control Centre Framework
by

Tirumaleshwar RAO
Guillaume DAUNES
Pavan-Kumar SAMMETA
Viswanath BV
Stephane POETE

T20-RMR
by

Prashanth R
Sesha SAI
Radhakrishnan KUMAR
Deepak SIDDAPPA
Louis DECUP
Rama-Krishna P

RailSketch
by

Rajesh RAJENDRAN
Sesha SAI

WCE - 2022-23

Newly appointed WCE Senior Experts:

Harish BASAVARAJ KOTUR

Vijin ULLANCHODAN VEEDU

Pavan Kumar E. N. V. RAPARLA

Pran SHEOKAND

Rakesh KUMAR

SECURED COMMUNICATION WITH OPC UA - PORTABLE ARCHITECTURE WITH SIMPLIFIED EXTERNAL INTEGRATION

OPC Direct Access (OPC DA) is implemented based on COM. There is not much security on COM interfaces and it's difficult to manage security on DCOM interfaces. By design it is not platform independent, hence it's highly recommended to move to OPC UA (Unified Architecture).

OPC UA has been widely touted as a secure industrial communications technology for Industrial Internet of Things (IIoT) and Industry 4.0 applications. OPC UA enables data encryption at the data source, ensuring secure transmission without relying on network security (example: firewalls). Following are the key advantages of OPC UA:

| Platform Independence | Unified Access | Security | Flexible Data Types | Open to All |

Alstom's Cyber guidelines are recommending programs or projects, to move to OPC UA for secured communications. Following are the minimum recommended security configurations for an OPC UA Client connecting with an OPC UA Server.

Security Mode: Sign & Encrypt
Security Policy: Basic256Sha256
**User Identity:**   X509IdentityToken

Latest versions of ATS solutions (U400 & U500) are moved to Secured OPC UA communication and OPC DA is deprecated. A reusable Alstom OPC UA Library (supports cross platforms) is implemented by ATS. It's easy to plug-in this library for OPC UA Client or Server implementations. ATS is also planning to implement Pub/Sub model for next generation OPC UA communication.

Reach out to **Nagu Babu POTHURAJU** for more details.

CONTROL CENTRE FRAMEWORK (CCF) SOLUTION FOR ICC URBAN - SIMPLIFIED ARCHITECTURE (AiM 2025 GROWTH)

The control center framework is distributed architecture-based ideology and a collection of smart services that empower sub-system developers to accomplish scalable, reliable, highly available, and easy to integrate Control Center software that can be deployed both on-premises or on the cloud. CCF leverages state-of-the-art technologies like **Containers, Kubernetes, Tanzu, EFK stack**, etc. to overcome COM-based obsolescence limitations of existing solutions.

The CCF will be deployed for upcoming Alstom projects like SGP L18 (Full-scale ICC) & Torino.

CCF (Bird's eye view)
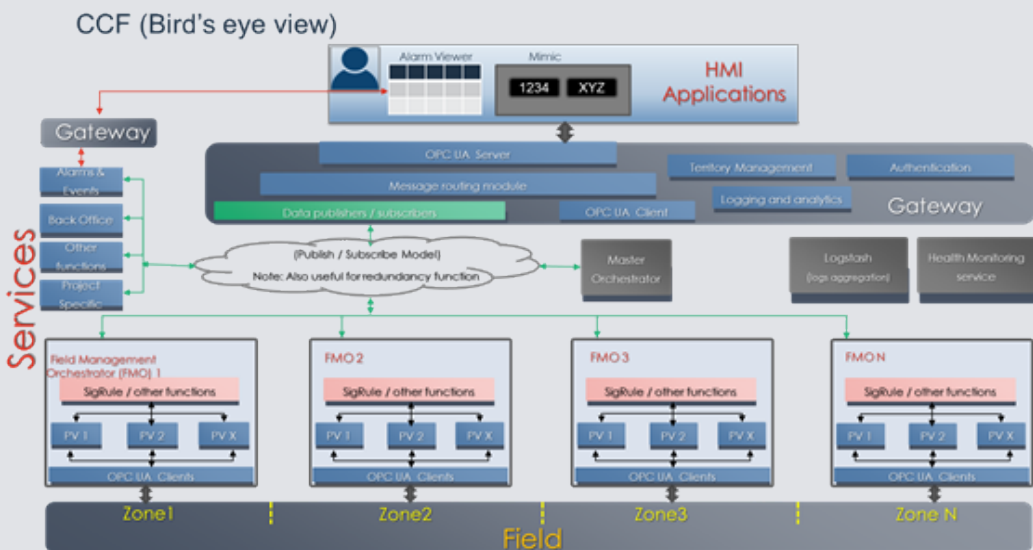
Reach out to **Tirumaleshwar RAO** for more details.

TRAFFIC MANAGEMENT SYSTEM (TMS) - HELPING ENERGY SAVING (AiM 2025 GREEN INITIATIVE)

When it comes to Energy Saving, ICONIS (Alstom solution for TMS) have the simplest strategy: to avoid unexpected stops. It can appear obvious, but in case of disruptions involving several trains it could not always be easy, also by an experienced user to decide which trains to stop to improve the situation.

In this case, with the balanced management of several needs, TMS deploys the best optimization strategy to achieve the same. In a study done several years ago by Alstom in the context of Merlin EC Program project, a simulation of an unexpected stop of a rolling stock TGV Duplex with braking energy recovery was showing a degradation between 3% and 4% in the energy consumption with respect to the nominal timetable. The same simulation was showing that if the stop was avoided by slowing down the train it was possible to have an improvement in energy consumption between 4% and 5% with respect of the nominal timetable.

To conclude, the Traffic Management Systems can have a big role in saving energy consumption without asking strong investments in the infrastructure or rolling stock. By simply putting in place adequate software algorithm, a modern TMS like ICONIS Mainline can reduce the energy consumption by 20-30% in case of disruption but also can support the optimization of a planned timetable with an eye to the energy saving.

Reach out to **Ravindran RAMARAJ** for more details.

? Requesting all the readers to participate in this **quiz**.
The quiz answers are implicit in this newsletter. Those who answer correctly will be recognized & rewarded.
The quiz is open for the responses till 20th May 2022.

UPCOMING EVENTS ●

Tech Talk on Automation Platform
Introduction, Working of Platform, Example of a Tool, and Demo

Tech Talk on Secured Communication with Open Platform Communications Unified Architecture (OPC UA)

Patent talk on 'Functional based xml data validator and automatic report generator'

Prasanth KARUTHEDATH
Senior Expert – Integrated Control Centers/
Product Specification

Expertise Summary

- ATS Core Framework Urban Operation Specification In-charge
- Wayside Control Center – Component Object Model Module Based Design In-charge
- Mentor for WCE expertise aspirants

Key Achievements

- Proposed an innovation on ATS Fork Management which is now used by multiple projects such as Lusail, REM, TEL AVIV
- Specified complex functionalities such as Automatic Depot Management, train reformation, etc. that are used for multiple projects such as TEL, Lyon, Taichung, etc.
- Completed TRL6 for WCC Component Object Model Module Based Design

Future Vision

To expertise in ATS tender technical analysis

M. GANESAN, Ph.D.
Senior Expert – Software/Signalling
System Engineering

Expertise Summary

- Design Authority & Technical Referent for Signaling (Urbalis, ERTMS, PTC) tools, RSC-Traction tool, and Model-Based Algorithm Design/Development
- Technical Referent for Multi-Sensor Data Fusion using Kalman filter
- Mentor for BLR TC WCE expertise aspirants and RSC engineers on software/algorithms

Key Achievements

- Resolution of Driver Machine Interface (DMI) - 8D - SBB issues and Reims Tram HVAC software issues
- TCMS Kalman filter algorithms for Train Distance and Energy Estimation - approved by RSC projects
- Achieved 2nd highest number of invention disclosures at Alstom level during 2018-19 as a Site Patent Manager

Future Vision

To leverage Blockchain Technology for Interlocking & inculcate innovation culture at BLR TC

Pavan Kumar SAMMETA
Senior Expert –
Software

Expertise Summary

- Design Authority for BLR ATS (Urban)
- Technical Referent for S2K
- Design of Alarms and Events function for ATS as microservices

Key Achievements

- ATS modernization roadmap - Together with other architects proposed CCF (a microservices architecture) and now leading these activities
- A message-bus based geographical redundancy (business continuity) design for S2K
- Resolved several blocking issues for projects like TEL, TGL, Lyon

Future Vision

To leverage AI/ML to solve problems in ATS

SUCCESS STORIES - PROJECTS/PROGRAMS

### Shenzhen line 20 - Fluence is in revenue service!

The first train-to-train signaling system in the world is now in revenue service! Yes, the Fluence solution is successfully deployed on Shenzhen line 20 and opened for revenue service on time! This is the first driverless line in Shenzhen with train-to-train technology.

This is an immense success for Shenzhen metro, Casco, and Alstom.

BLR TC has a significant contribution to this success in the form of Software testing, Sub-System V&V, Data Design, Data Verification, and SW Development. We have owned full scope in Software testing, Data Design, and Data Verification in this milestone.

Now, BLR TC is extending its contribution to Lille, Torino, and Grand Paris with the same commitment and looking forward to contributing more to future projects.

Congratulations to the entire team for this fantastic achievement!
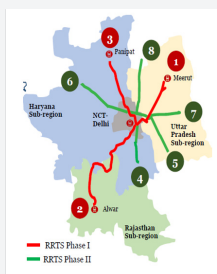
National Capital Region Transport Corporation (NCRTC) - TMS CGR-A for Stage 1 is GO!

Alstom is proud to be at the forefront of Make In India initiatives and the chosen partner of the National Capital Region Transport Corporation (NCRTC) for India's first Regional Rapid Transit System (RRTS) project which is the first in India to adopt the European Train Control System (ETCS) hybrid level 2 signaling system. Alstom BLR team from across multiple subsystems on both engineering and TC have made major contributions towards this project. In BLR TC, the major contributions come from Traffic Management System (TMS) -Engineering, product gaps and the European Train Control System (ETCS) subsystems - specific baselines, RBC gateways, etc.

Recently TMS Sub-System CGR-A (Critical Gate Review-Application) project gate review for stage 1 and declared it as a GO. This milestone is considered as one of the notable achievements with respect to the given project context. With the anticipation of various acceptance tests lining up in the upcoming months for the NCRTC project, all the team members are geared up to face challenges.

Congratulations to the entire team for this fantastic achievement!