One of my biggest and very recent achievement that I would like to highlight today is - strengthening Automation practices and solutions for CICTCD in Bosch across division.

Being part of central unit in Bosch Germany for Mobility sector, my division drives and enable SW innovations and initiatives in an urge to make Bosch a SW or IoT company.

As we are evolving in vehicle E/E architecture and moving towards centralized Vehicle computer platforms, importance of SW in mobility has become inevitable. The future looks like all connected with integrated cloud and edge technologies and disrupted marked demands swiftness – all in all this demands for a Continuous development and deployment.

My case study revolves around the same, when we as a team bought management attention towards CICTCD in SW and product life cycle but as we progressed, there were major roadblocks. I then took up a challenge of one of such roadblock and finally created a big opportunity out of it.

Let me take you through my Journey in Autonomous program. And this is the case study I would like to present today as my achievement which not only demonstrates just one success but it’s an amalgamation of successes at each level using most imp levers called collaboration and co-creation.

I have structured the case study in such a way where I would take you through what were the initial problems, how I structured those problems and provided a strategic direction. How the gaps were assessed and how I laid down the foundation of Automation platform not by just creating new solutions but mainly by xxxx seed of Re-usability - Proof of Scale rather than Proof of Concept. I would also show how this framework has already started benefitting organizations amidst all the challenges related to Team, Stakholders, Interest & Motivation.

Entire journey started as I used the process metrics to find out ‘what does fast & automated’ processes means to projects/products. Where are we are and how fast we are.

This model of process gaps was an eye opener for me. I used this and pilot it in some projects but overall analysis remains more or less same – Even though processing time is 10 days, lead time is 70+ day for any feature. Various reasons but boiling down to the same problem – too much of waiting time, many manual steps, late feedbacks, release cycles not in sync, and even if Automation solutions are available they are not catering to the need of value chain.

As a result, I volunteered myself to enhance the Automation in overall SW life cycle and after getting heck of the real time processes and gaps from the divisions, I came up with high level timeline plan, taking due consideration on Change management, Communication Management and stakeholder management. I did not jump into technical automation solutions which ofcourse was the key, rather I segmented it into Vision, Landscape, Light House projects and Collaboration.

I will be briefly covering all the segments just to give a glimpse on how I executed the entire plan.

I created a vision of Autonomous Testing to cover breadth and the depth, transformation to Autonomous by 2025 . Took required buy-ins, approvals and budget from Stakholders consisting Unit heads, which had it’s own challenge. Once I had green signal to convert this idea to full fledge program, I approached delivery leads to lend me the SME’s who had shown interest & trust in Autonomous concept.

And there I was welcomed with another challenge of non-availability of some of imp SMEs. As I did some trade offs to get the attention of Delivery leads for their support and get their experts available for this program. In-parallel I was lucky to get Student support from Germany who was allocated to me as part of mentoring program. Together with her, I created questionnaire to access the maturity of Automation in Continuous Integration, Delivery and Deployment categorizing in 5 areas of Build, Testing, culture, deployment, and release.

This questionnaire is now a full fledge tool which is being used to assess the maturity of automation in CX pipeline. This came as small but very encouraging achievement. I would be honest, even this process underwent it’s own challenges as penetrating such practice of filling 100+ questions to just know the status – for developers, leads as we expected, it was merely a waste of time.

Let me move to next swim line of Solution Landscape wherein I gathered Product champions (one per Product line) and created a repository of available solutions. The numbers that came from this collection exercise was surprising but alarming. This was a risk which was already been identified earlier and as part of mitigation plan, kind of qualification gate was already ready. This was another small deliverable from our collaboration activities with Product champion and together criteria’s were identified to evaluate the solutions.

To summarize, this entire exercise gave me three, infact four targets to look at under Automation & AI solution,

1. Proof of scale – Stop re0inventing the wheel and re-use with mimimal customization.
2. Integration of solutions – Check the possibility of integrating some solutions and optimize the value chain.
3. New solutions – Gaps in covering the breadth and adding AI flavor to it. Make it more intelligent.
4. Outside-in perspective – Make vs Buy options.

Next few slides would present some of the technical solutions I was referring to :

1. This is a logical approach for an intelligent Defect Management process. Where using Binary class prediction and source code, anomalies are predicted in the code. A great tool for developers to ensure built-in quality.

Feature Selection based on Correlation analysis, Voting Selector & K-best Features

Addressing Class Imbalance using SMOTE, ADASYN & ROS , GAN

1. Irregularities found in code can be a signal for error-prone feature/requirement which indicates strategy for risk based testing. This would enable early feedback to developers.
2. Using deep learning algorithm (& ML based representation), defects resolution approach can be localized in the source code and the same can be prescribed for quick fixes.

Quick glimpse on machine based code reviews & static analysis.

Left side solution is in house-built and identify source code change impact from daily builds and provides early feedback for developers to adjust their code. Right side is from deepcode.AI. rather than developing all on our own, we also plan to take some built-in expertise from outside. This is one of the example – the tool which is different from SonarQube, QAC and is a textual analyzer, doesn’t build the code. It can be integrated with bitbucket pull request workflow.

This technical flow demonstrates how two silo solutions if integrate together can do wonders. This is one solution which is implemented in one of the IoT project from BSH area and reaping good benefits.

Using MQTT, the integration flow is made with HMI which helps and as soon as Mobile apps are ready, it can be integrated and validated using message protocol. Similarly, with ever growing need of third party interface - automation framework was created to test voice enabled devices and business flow.

Before I move to next segment – which shows the successful implementation of this framework. I would also like to share some changes in this roller coaster journey, which indeed turned out to be greatest learning & experience.

Carrying a strong experience as a Line manager with direct reports, but this experience of managing dotted line wasn’t quite different, this has it’s own rewarding challenges . It becomes even tough if allocation is on volunteer basis especially for senior experts or if the allocation is not 100%. I had taken the feel of all such scenarios.

Another big challenge was ‘fear’ of losing ownership, porting project data to new tools, management fear of demotivating team by introducing automation & AI.

However the underlying issue is change management as this framework has an impact on all levels and their way of working.

Moving to next segment – the framework of entire assessment, analysis, consult & implementation was then piloted in 2 product lines – I picked one from BBM and other Non-BBM.

I would like to take a pause and shout out for another achievement of this program. This program was the trigger out of growing SW need in Mobility, though it was never restricted to Mobility sector. But it was not even getting promoting to Non-BBM

When we started this program, it was never meant for Non\_BBM. However it was not even restricted to only BBM. Thanks to wide Stakeholder list and the nomination for the implementation was received from home appliance division of Bosch. Process gaps I have shown in my first few slides was for this connected product with Lead time of 70+ days.

One of the major reason being release cycles not in sync with each other but on the other hand, with many silos, the overall release cycle was way too long. Manufacturing of the appliances were taken care by I4.0 and was best in class. Mobile application was from other division of Bosch. Cloud for data processing happens in AToS and for scaling AWS is being used.

As we worked together, our focus was on end to end connectivity where the major issues were found. As part of Autonomous strategy for connected devices, we extended defect prediction with inputs from Market Data, Crowd data, Support tickets.

We used our integrated solutions i.e MQTT to get message protocol from hardware. All-in all we tried to break the silos and shorten the entire process cycle resulting in reducting of lead time from 73 days to 28 days.

This resulted in fast to market and turned out to be the biggest achievement as Bosch home appliance were in high demand in 2020 and this division was able to successfully satisfy the market need.

I would like to conclude here with stressing upon my own 3C model that I used for this transformation. Collaboration, Co-innovation and Competency.

Collaborated with multi-functional and domain teams for bringing synergies and agreements on common technological solutions, and closely collaborated with other on-going initiatives like Hosting platform so that we just take benefit of utilizing the expert’s craftsmanship.

Co-innovated solutions through tribe of experts in creating domain agnostic solutions.

Competency enhancement by providing right platform for many many aspired people who wants to break their mechanical routine and wants to learn new-age technologies. Educatin programs were crafted to make strategists, IoT and AI experts.

And I think this framework and program has already given due benefits not only to me as I had multiplied my leadership and technical skills but also to organization as it helped in reducing process cycle and thus enabling fast-go-to market,

Built-in Quality has definitely improved due to activation of various fast & constant feedback mechanisms.

re-usability has been increased, that means development cost of new solutions are not required. Also, that means maintenance of existing tools/solutions are not needed. This way there is huge saving of cost is realized. A factor of it was shown in earlier slide representing piloting.

I would like to end here with my envision for this program with two cents -

1. Moving from Talyristic approach to Full stack SW Team.

Each handover from one team to another team is errorprone. Even when everything is implemented precisely according to the specification, there is a significant risk that the whole feature chain does not work as intended\*.

On other side Full stack team which I also refer as jack of all trades. Within the boundaries of its domain specific expertise, a Full Stack SW Team is capable to develop a shippable increment including V-model artefacts with little or no support from other teams.

* Projects split in E2E feature teams indicate high CX maturity
* Teams work with a clear definition of done on the whole V
* Competence for the left and right part of the V in the team becomes important

1. Having a Automation den.

Given a authority, money and approval – I would like to take this program one level above and create a suite with marketplace or app store kind of feature. Users who are consumers i.e developers should be able to search the needed automation solutions and create their own workflow. I would like to promote social coding culture and re-usability to its best.

Additional thing sometime

Why do I take extra work – by motivating them off them opp and exposure, learnings, apperecition in various forums, they have received accolades.

Showing business case and success story

Guaranteed year on year return

We take ownership of centrally managing tool.

Power central challenge.

India vs Germany