EasyChair Preprint

№ 3089

Building Innovation Skills for Young Engineers through Tech Hackathons

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April 1, 2020

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Abstract

Mahindra & Mahindra Hires top engineering talent from premier engineering institutes across the country and all the fresh hires are trained at Mahindra Technical Academy for three months before they get deployed to the various engineering departments. We observed that most of the students have good conceptual knowledge (this is ensured by the rigorous technical interview that we conduct during campus placement) - but they lack systematic Innovation Skills. Though they have fresh ideas, they lack a systematic approach to shape those ideas into impactful innovations. We wanted to train our fresh hires on (a) Ideation (b) Collaboration (c) Prototyping - in a quick and cost-effective manner.

We decided to start our technical training program with a big bang through a technology hackathon.

Our intent was to help teams of young engineers to shape up their ideas by building prototypes and demonstrate their technical feasibility. We faced three big challenges (a) team members were not familiar with automotive or farm domain (b) only 48 hours to build prototype (c) team members were distributed across country. We chose socially relevant problems that all team members could easily relate to. We used low-cost communication tools like (WhatsApp and skype) for driving remote collaborative Ideation. We provided teams with IoT based kits for

fast prototyping. We also assigned technical mentors who reviewed their progress through skype meetings. We used a creative theme - Game of Throne-(GoT) for forming the teams. As a result of implementing these ideas , a cross functional team of 15 engineers could collaborate and demonstrate working prototypes of their ideas in just 48 hours. We could create this training at one-fifth the cost and the time for prototyping was shrunk to one-twentieth of our previous version. We are very excited by the power of this approach.

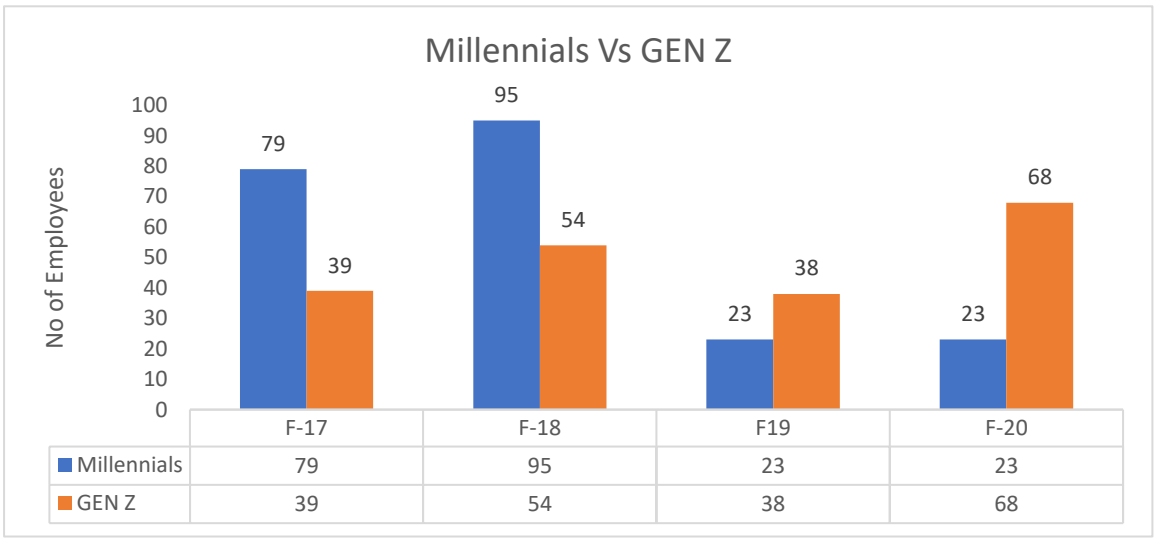
In our Paper, we will share the key learnings from our experiment of using tech hackathons to build innovation skills. Our model is easily scalable and adaptable for other domains beyond engineering.

Keywords:

Technology Hackathon, Innovation Skills, Collaboration, Creativity, Challenge, T Profile, TRIZ, Productive Function, Providing Function, Corrective Function.

Introduction

Mahindra and Mahindra hires top engineering talents Graduates and Postgraduates from premier engineering college across India, these top engineering are categorized under group of Millennials (who have born between 1983 and 1994)and GEN Z (who have born between 1995 and 2010),these top talented engineers enter industry with high aspirations, enthusiasm, and filled with rich knowledge, in the below mentioned table we present the number of Millennials vs GEN Z joined Mahindra and Mahindra over four years.



	F-17	F-18	F19	F-20
Millennials	79	95	23	23
GEN Z	39	54	38	68

Exhibit-1 *Source: M&M Employee Data Base*

Over the Four Years of technical training for a mixed group Millennials and Gen Z, we observed that it was Gen Z preferred hand on activity over classroom lectures. And in the Year F20 Proportion of Gen Z was much higher as compared to other, We Conducted a Technology Hackathon for the batch of engineers who joined our Product Development Organisation. We quickly restructured the training program for the fresh engineers who undergo their technical induction program for three months in academy before they get deployed to the respective engineering departments.

Building Innovation Skills

In today's dynamic market innovation has been recognized as mandatory mantra for achieving competitive and feasible solutions for the problems of industry, one of most valued assets of an organization which results in increase in **efficiency** and **economic value** of product or service provided.

Innovation skills refer to the talent who is in search of new ideas for the resolving and achieving social or economic value, Innovative skills are usually a combination of one's ability to think creatively, problem-solving , functional and technical knowledge for arriving to a feasible solution for a specific context. An employee with an innovative skill is easily distinguished with his visionary thinking to face challenge and one's ability to shape the organisation or individuals' ideas with commitment. Innovation Skills could be improved in the organisation through a) creative work environment fostering innovation b) focusing on changing behaviour c) Hiring Right people with right characteristics

Big bang Technology Hackathon

We at looked at the above mentioned data of millennials and GEN Z, who are joining industry with rich technical knowledge from various background filled with high aspirations and enthusiastic to arrive at the solution for the specific context.

To address this, we introduced technology hackathon for our engineers through six socially relevant problem addressing a) Last Mile Connectivity b) Safe commute while shared mobility c) Stuck without connectivity during Adventure Trip d) Effective Utilization of Natural resources in fields e) Polluted Seas with Plastics Litter f) Building Smart City for Senior Citizen. The Technology Hackathon had a theme of popular HBO series from Game of throne (GoT).

Our intent was to build a systematic innovation among the engineers through (a) Ideation (b) Collaboration (c) Prototyping. While we introduced these problem statement to the engineers, we also had to connect the engineers located across different states in India, and make them work as one coherent team. with this intent in mind we framed **3 C** framework, were the first **C** represents as **Collaboration**, second **C** as **Challenge** and eventually the last **C** as **Creativity**.

Fig 1.0 3 ***C***

Collaboration- There were 6 teams and each team had ~15 members as each of the team member were in different state across India, keeping this in mind we gave each team a detailed instruction through a Skype call and briefed the entire team about the process and the timeline to be factored to carry out the activity and also ensure that they are a team - no score for individual brilliance and one should encourage each other's activity to make the team win. However, all the Team members were using the free tools such as WhatsApp, Skype, Google Hangouts and Microsoft Teams to connect among them for their contribution of Individual Goal for solving the Socially relevant problem for their Team.

Challenge- As the Word Challenge itself is self-explainer, we as team also faced the Challenging Situation, we as team faced two major challenges a) Guided Mentorship for each an individual team for handholding them for arriving at feasible solution without any conflicts among the team members, second challenge was b) Transportation of Kits for Prototyping – this was the major challenge as the team members were not stationed in one particular location ,each one of them were located in different parts of the state, however we were able to arrive at a solution for this through this methodology called as "**T**" profile.

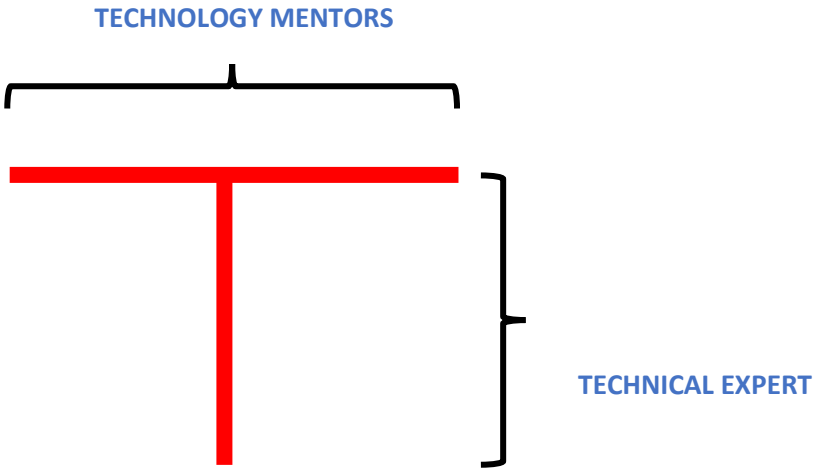


Fig 1.1 T Profile

with this we were able to address this challenge the situation a) Roped in Technology Mentors form our Engineering Division , where the Vertical portion of "T" profile is taken care as an Mahindra Employee each one the 6 mentors were assisting the respective teams, and were able to help the team to arrive at a feasible solution and without hurting any another individuals idea or methodology to solve the problem, Now the horizontal portion of "**T**" profile the next most important challenge building the prototype for addressing the socially relevant problem ,to address this we roped in our functional expert they were called as technical expert , who in turn were introduced to the group once they submitted their idea to the mentors and each team were

given a budget for building the working prototype , now with the mentor and with the functional expert who were called as Technical Expert helped these the engineers to build their working prototype. While addressing this we also faced a challenge related to time for carrying out the activity

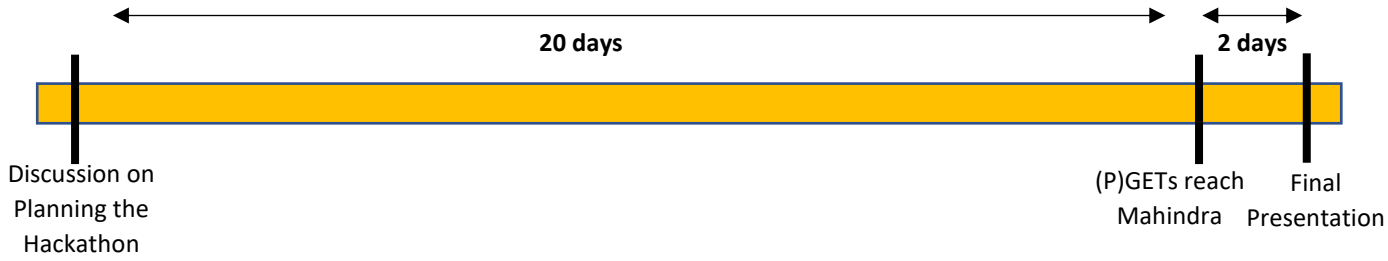


Fig 1.2- Time Line

Once we addressed this challenge b) Transportation of Kits for Prototyping by roping in the Technical experts for helping the individual team to build the prototype the challenge of transportation of kits was resolved, from the fig 1.2 we were able to arrive at two philosophy of the Mahindra rise– "**Accepting No Limits**" and "**Alternative Thinking** ".

Creativity – When the Big bang Technology Hackathon was formulated we had kept in our mind that each team should be collaborative among the team members and be able to address the challenges faced and should be as creative as much as possible, while we were executing this technology hackathon we faced a challenge of transportation of kits which we mentioned in the challenge section in order to execute that part very effectively we applied **TRIZ** to address the situation

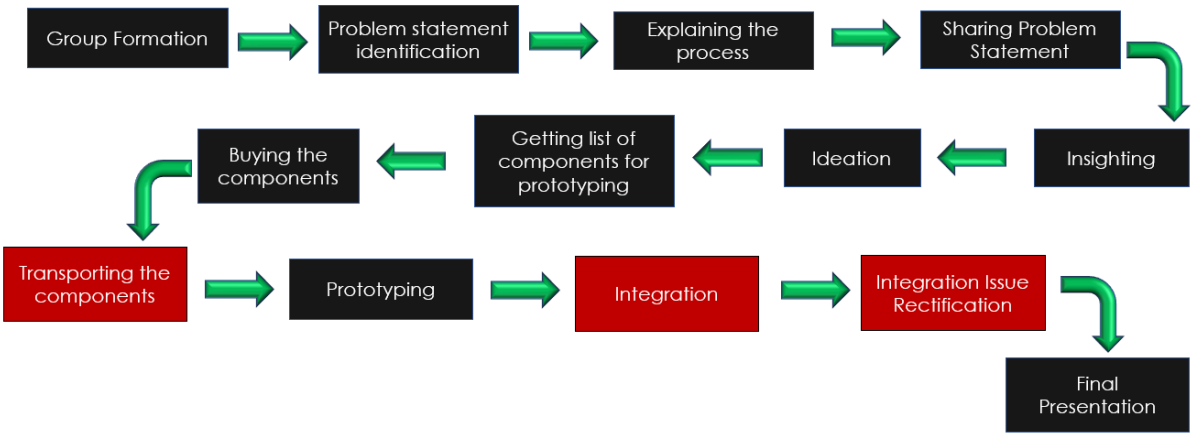


Fig-1.3 Process Flow

The box highlighted in the red indicates the most critical and the time-consuming activity in the process to address this we roped in technical experts, due to their presence and the collaboration among the participants were able to make a working prototype ready for their final presentation.

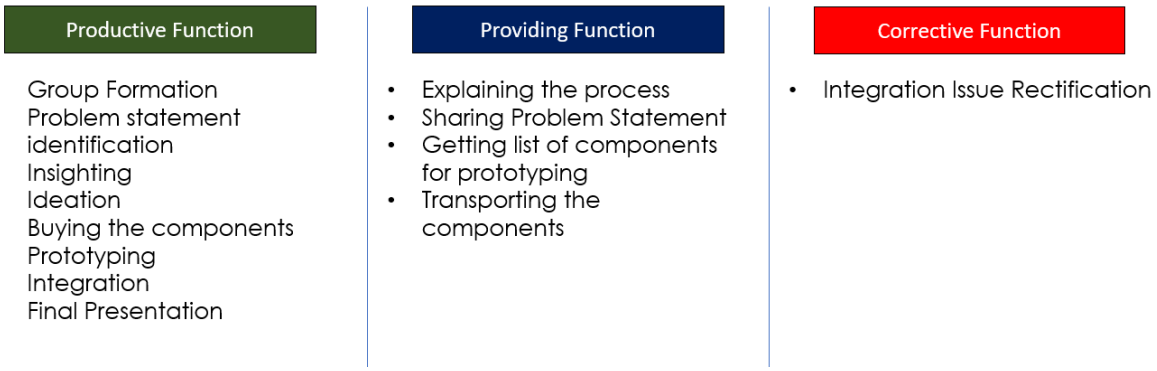


Fig 1.4 Categorizing Operations Based on Functions

When we applied TRIZ on Function Type Modelling categorized the operation in three major parameters such as a) Productive function b) providing function and c) corrective function and we observed that the corrective function is high in value and time when we plotted in the chart

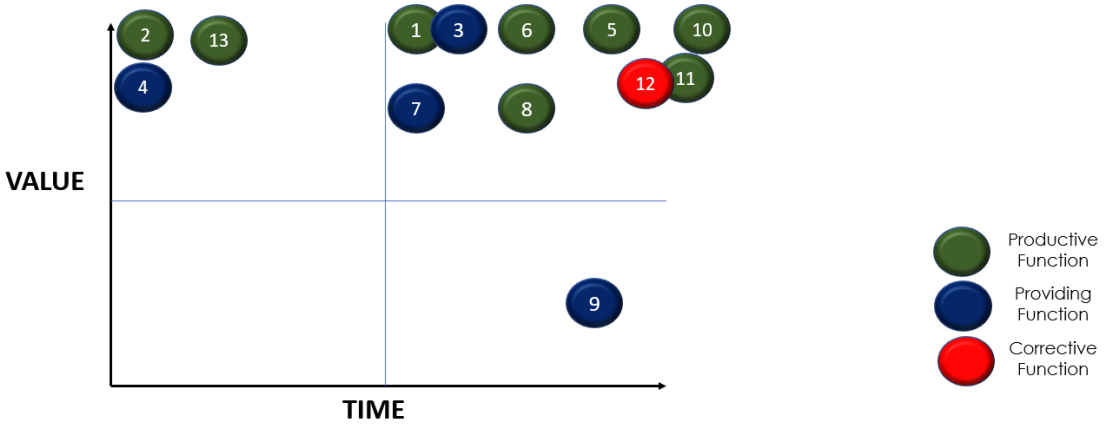


Fig 1.5 Value Vs Time

When we applied **Rule F** of TRIZ functional model Transfer the **Corrective function** from the **current Operation** to the **Operation generating** the defect

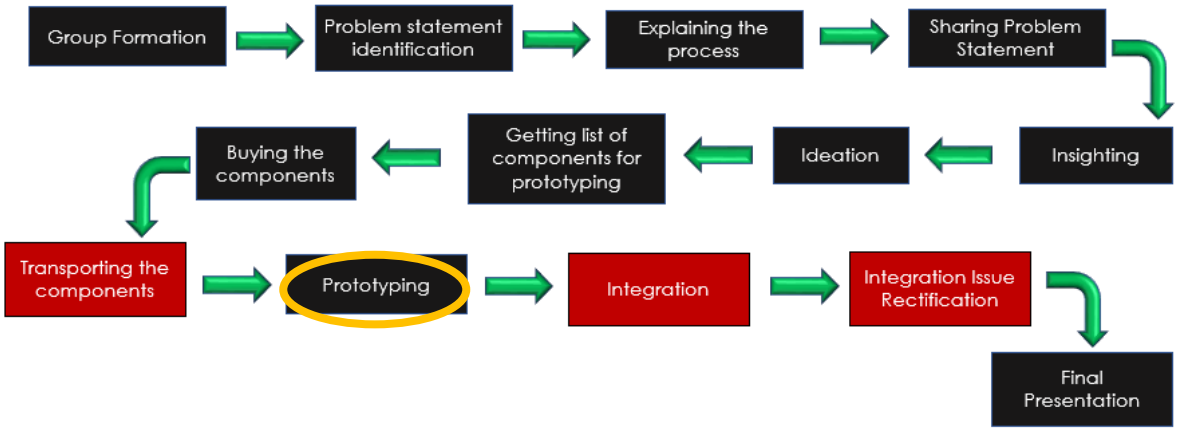


Fig 1.6 Reduction in Time with corrective action

We observed that after applying the Rule F we were able to reduce the time by Prototyping with the help of Technical Expert by avoiding and logistic movement of components which was low in value and time, is show through this chart in the fig1.7.

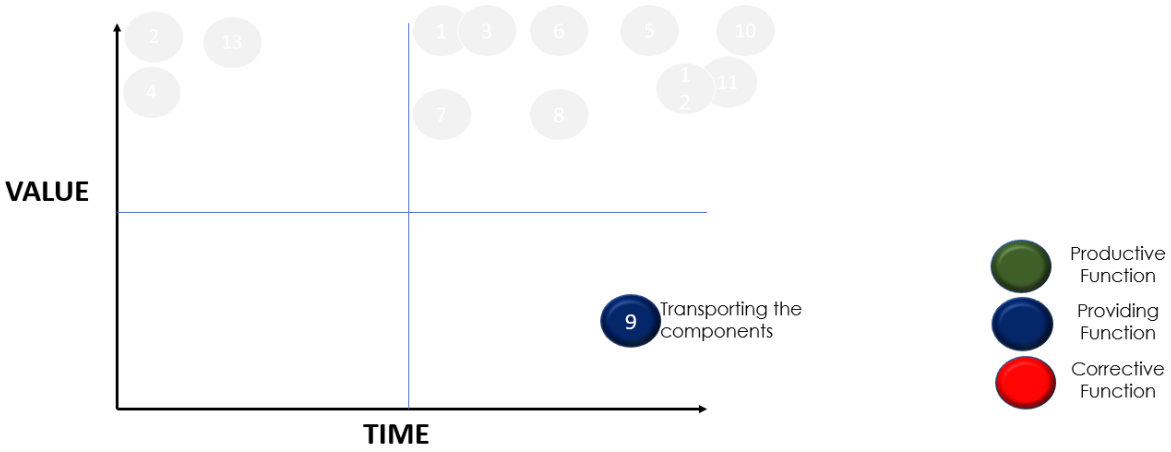


Fig 1.7 Value vs Time - Providing Function

Only 48 Hours to Prototype

These Fresh engineers had only 48 hours to prototype their working model along with the help of technical experts, were some of the team were facing integration issues with the components and few other teams were carving out their creativity to enhance the feature provided with the kit**.**

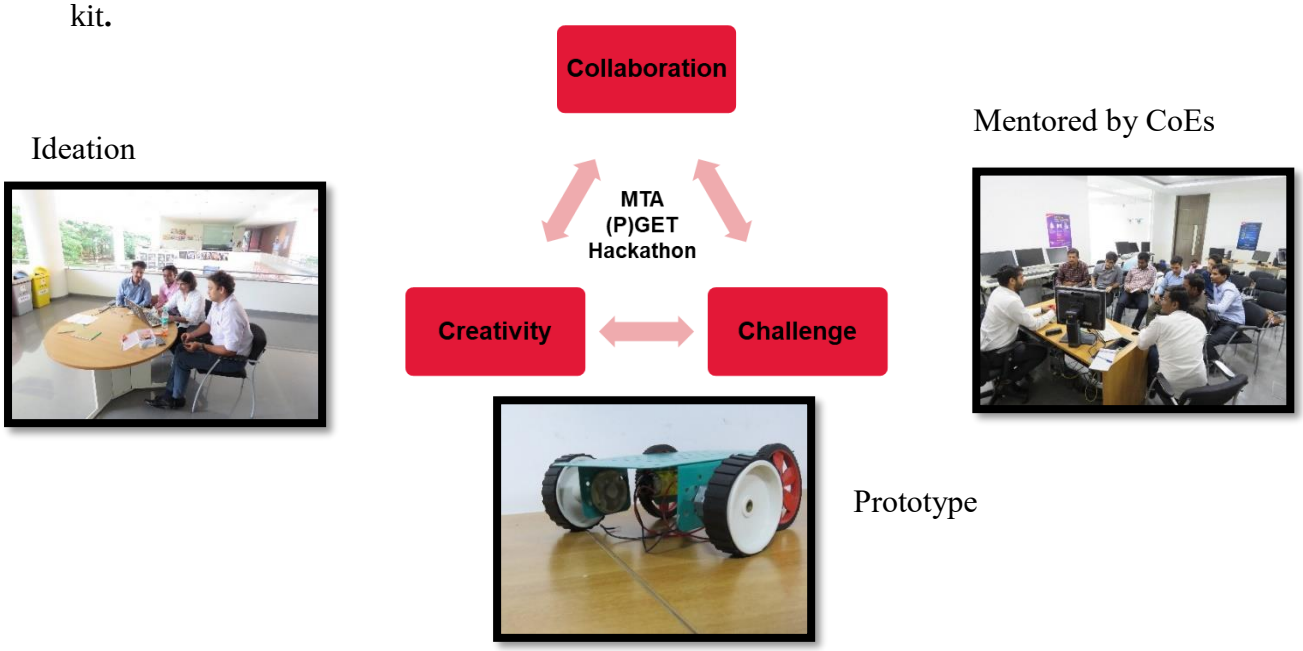


Fig 1.8 Technology Hackathon

As per our intent of conducting a technology hackathon we had ensured that they collaborate with each other accept the challenge and with their creativity provide a feasible and sustainable solution for the Socially Relevant Problem, while building innovation skill the engineers had present their solution to senior management, and they were able to pitch their solution developed through prototype effectively. We could create this training at one-fifth the cost and the time for prototyping was shrunk to one-twentieth of our previous version. We are very excited by the power of this approach.

Fig 1.9 Presenting to Managing Director -Mahindra & Mahindra

Exhibit

1- M&M Employee Data Base -4years

Annexure

Reference

1- *Deloitte 2019 Millennial Survey* https://www2.deloitte.com/global/en/pages/about-deloitte/articles/millennialsurvey.html

2- *TRIZ*

3- *HBO -Series -Game of throne*

4- *Innovation Skills*