# Report on "MoveHack 2018" Global Mobility Hackathon

**pwc**

# *Contents*

# *MoveHack 2018*

## *Introduction to MoveHack 2018 Hackathon*

NITI Aayog has launched a global mobility hackathon 'MoveHack 2018' on 1st August 2018 to crowdsource solutions aimed at the future of mobility in India. The hackathon was launched to gather the global innovator-entrepreneur-researcher community, to solve the mobility problems for India and the world.

Transportation and mobility are emerging as potential drivers of innovation and economic growth of the 21st century. Rapidly evolving technologies and business models for delivering mobility services have dramatic potential to transform the global transportation sector in the times to come.

Participating teams were required to submit their ideas/ solutions against ten identified problem statements under two broad themes - Just Code It and Just Solve It. In the 'Just Code It' challenge, the participating teams were required to present a working prototype of a code/working model. In the 'Just Solve It' challenge, participants were required to propose a business solution that when implemented addresses the problems stipulated in problem statement.

## *Context*

**Two Themes of MoveHack**

The hackathon was broadly divided into two themes, comprising ten problem statements:

1. *Just Code It (JCI)* - Solve some of the most challenging problems in mobility through innovations in software development and data analysis based on available data sets. This theme contains six problem statements.
2. *Just Solve It (JSI)* - Develop an inventive business idea or sustainable solution to transform India's transport infrastructure through technology. This theme contains four problem statements.

**Problem Statements[1]**

Just Code It: The six problem statements under this theme are

1. Multimodal Commuter Mobility in Cities
2. Multi-modal Freight handling and Transportation
3. Future of Mobility
4. Road Safety
5. Artificial Intelligence for Indian Transport Infrastructure
6. Drones and Unmanned Aerial Vehicles (UAVs) in India

Just Solve It: The four problem statements under this theme are

1. Alternative Energy
2. Solutions for Electric Revolution
3. Urban Aerial Mobility
4. Technology for Pune Smart City Mobility Challenges

---

[1] Description of each problem statement has been provided in Annex A.

**First Level Screening and Evaluation**

NITI Aayog identified evaluators from across the industry, mobility sector and other subject matter experts, to form the right panel for evaluating each of the submissions under the problem statements of both themes. A comprehensive and thorough evaluation exercise was undertaken by 200+ evaluators using an online form based on the evaluation framework created by PwC in consultation with NITI Aayog. The Evaluation framework as agreed by NITI Aayog is placed at Annexure B of this report. Each evaluator was given a set of submissions to evaluate based on his/her subject/domain expertise.

Following six criteria form part of the evaluation framework for 'Just Code It'. The evaluators evaluated and scored each submission assigned to them on a scale of zero to five (0-5)[2]:

1. Scalability
2. Viability
3. Patent/Intellectual Property
4. Contextual Relevance
5. Technological Feasibility
6. Innovation Quotient

Submissions under the 'Just Solve It' challenge were evaluated using the below mentioned five criteria. Evaluators evaluated and scored each submission assigned to them on a scale of zero to five (0-5).

1. Scalability
2. Viability
3. Contextual Relevance
4. Technological Feasibility
5. Innovation Quotient

Upon receiving the scores from each evaluator on the submissions assigned to them, the scores for each submission under each category/criteria were compiled.

In order to determine the weights which would be used to calculate the final score, Principal Component Analysis (PCA) was used. The rationale behind using PCA - since the scores were evaluated under different criteria, it was required to determine the weights for each criterion based on their importance.
Once the weighted scores were calculated, the average score was then calculated for each submission. The final weighted scores were calculated, the entries were sorted in decreasing order to determine the Top 30 teams in total from both challenges.

There were total of 10 different types of Problem Statements. Given that there were six problem statements in JCI and four problem statements in JSI, on the basis of ratio JCI: JSI = 60:40, 60% and 40% of Top 30 under each challenge i.e. JCI and JSI respectively were considered, which resulted in 18 submissions from JCI and remaining 12 submissions from JSI challenge in the list of Top 30.

---

[2] '0' being lowest and '5' being highest score

# *Mentor Sessions and Team Preparation*

**Mentor Sessions and Panel Discussions, 5th September 2018**

The mentoring day on the 5th September commenced with a welcome note to all the top 30 teams, by Ms. Anna Roy, Adviser, NITI Aayog. Ms. Roy gave an overview of the agenda for the day and further welcomed the mentors to guide the teams to prepare for their pitches to the Jury and Super Jury.

The marquee event of the day was the keynote speech by Mr. Amitabh Kant, CEO, NITI Aayog, who in his address to the top 30 teams and mentors, encouraged them to take opportunity of this platform, discuss their ideas/solutions with industry experts, and prepare better for the following rounds of evaluation.
The keynote speech was followed by a short networking break, where all teams met the mentors and experts and discussed their ideas and plan of actions for the next round of evaluation. NITI Aayog provided this innovative platform to the teams to engage with mentors with earmarked areas in the networking zone of venue.
In addition to the dedicated mentor-team discussions, expert talks and panel discussions were also arranged for the teams to enhance their ideas/solutions from the learning of experts. Following the networking break, the day began with the first panel discussion 'Session on Smart Cities', with eminent panelists Mr. Kunal Kumar, JS, Smart Cities Mission, Ministry of Urban Development, Government of India, Manojit Bose, CEO, Pune Smart City, Swayandipta Pal Chaudhuri, CEO, Panaji Smart City and Nirav Shah, Partner, PwC. Tanay Mahindru, NITI Aayog, moderated the panel discussion. This panel discussion provided the plans of smart cities CEOs which they wish to implement to solve the mobility problems in their respective cities.

The panel discussion was followed by second panel discussion of the day, on 'Executing and Scaling Up', with panelists including Amit Gupta, CEO, Yulu, Prashant Tandon, CEO, 1mg, Abhishek Bansal, CEO, Shadowfax, Deepanshu Malviya, Co-founder Shuttl. Punit Shukla, NITI Aayog moderated the panel discussion. This panel discussion provided vision and thoughts of experts on the new age technologies they envisage should be implemented to solve mobility problems at large.
Followed by short tea break, the participants gathered for another exciting panel discussion on 'Artificial Intelligence, Cloud and mobile' with Ajay Agrawal, CTO, Chargepoint, Simon See, Director, Nvidia, Murali Talasila, Partner, PwC as the panelists. Aalekh Sharan, NITI Aayog moderated the panel discussion. The final panel discussion of the day was on 'Fund Raising and Capital Allocation' with panelists like Umakant Soni, Partner , Pi Ventures, Vignesh Nandkumar, Partner, Aspada Investments and Anna Roy, Adviser, NITI Aayog. Arnab Kumar, NITI Aayog moderated the panel discussion. The panel discussions provided teams and participants with broad solutions which can be leveraged in the Indian context to solve multiple mobility problems faced by society.

The day ended with a technical workshop for participating teams/individuals on cloud technologies by Microsoft.

# *Jury Evaluation*

As a next step to this hackathon, top 30 teams and their ideas/solutions were to be evaluated by an identified jury panel to select the top 10 submissions across JCI and JSI. Jury was invited on 6th September to undertake this evaluation. With the jury members reaching the venue by 9.30 A.M., the day started with a briefing session for them. Jury members were briefed on the process followed till this stage to identify the top 30 submissions and the next steps to be taken by the jury to further shortlist the top 10 submissions. The jurors were divided into two groups, each group having a similar level of expertise in all the required fields to evaluate the top 30 submissions.

**Evaluation Framework for Jury Evaluation**

An evaluation framework was designed in discussion and agreement with NITI Aayog, and has been used to evaluate the top 30 submissions under 'Just Code It' and 'Just Solve It' challenges[3]. The Jurors evaluated and scored each submission on a scale of zero to five (0-5)[4] considering the weighted criteria of Evaluation Framework:

| Just Code It | | Just Solve It | |
|---|---|---|---|
| **Criterion** | **Weightage** | **Criterion** | **Weightage** |
| Scalability | 20 | Scalability | 20 |
| Feasibility | 30 | Feasibility | 30 |
| Innovation | 20 | Innovation | 20 |
| Demonstration | 20 | Questions and Answers | 30 |
| Questions and Answers | 10 | -- | -- |

**Identifying the Top 10**

Jury undertook the evaluation of the top 30 submissions as per the evaluation framework and scored each submission. As per the evaluation framework scores were collated for each team/individual and sorted in descending order. In order to identify the top 10 submissions, similar approach of 60:40 (JCI:JSI) ratio was adopted and final list of top 10 submission across JCI and JSI challenges was announced.

---

[3] Evaluation framework has been provided in Annex B
[4] '0' being lowest and '5' being highest score

# *Super Jury Evaluation*

The evaluation by Jury for selecting the top 10 submissions was followed by an intense evaluation by the super jury to select the top 3 submissions from the top 10. Super Jury was briefed on the process adopted by the jury to select the top 10 submissions and was further suggested with an evaluation framework which they may adopt for the evaluation of the 10 submissions. In addition to the evaluation and selecting top 3 submission, an important task which was assigned to the Super Jury was to assess and define the grand prize money for the top 3 submissions.

**Super Jury Panel Members**

The Super Jury consisted of the following eminent personalities and industry experts:
1. Nandan Nilekani, Co-founder and Non-executive Chairman of Infosys
2. Simon See, Nvidia
3. Debjani Ghosh, Nasscom
4. Nivruti Rai, Intel
5. Prashant Tandon, 1mg
6. Amory Lovins, RMI
7. Gautam Sinha, Times Internet
8. Sameer Garde, Cisco
9. Ajay Agarwal, ChargePoint
10. Ashish Kashyap, Goibibo

**Evaluation Framework for Super Jury Evaluation**

An evaluation framework was used to evaluate the top 10 submissions under 'Just Code It' and 'Just Solve It' challenges. The Evaluation framework was prepared and agreed with NITI Aayog and the same can be referred in the Annexure B of this report. The Jurors evaluated and scored each submission on a scale of zero to five (0-5)[5] considering the below mentioned weighted criteria:

| Just Code It | | Just Solve It | |
|---|---|---|---|
| **Criterion** | **Weightage** | **Criterion** | **Weightage** |
| Scalability | 20 | Scalability | 20 |
| Feasibility | 20 | Feasibility | 20 |
| Innovation | 20 | Innovation | 20 |
| Demonstration | 20 | Questions and Answers | 40 |
| Questions and Answers | 20 | -- | -- |

---

[5] '0' being lowest and '5' being highest score

**Selection of Top 3**

At the end of an intense evaluation exercise by the Super Jury of all the top 10 submissions, the Super Jury discussed and based on the evaluation framework and their judgement, ranked the top 3 submissions. The jury based on the solution/idea as part of the top 3 submissions, decided the grand prizes which the submissions deserve. Finally, the evaluation by the super jury concluded by defining INR 15 Lakh, INR 10 Lakh and INR 5 Lakh as grand prize money which, the winning submission, 1st runners up submission and 2nd runners up submission respectively should receive over and above INR 10 Lakh each for the top 10 submissions.
Super Jury further decided that NITI Aayog should engage experts/institutions for finalizing the implementation milestones and monitoring the disbursement of prize money amounts basis the implementation progress by the top 3 teams.

Ms. Anna Roy, Advisor, NITI Aayog thanked the top 3 teams, the Super Jury members and other top 27 teams for their participation and marked the closure of the MoveHack 2018 Global Mobility Hackathon by inviting the top 3 teams to demonstrate their solutions in the MOVE Summit scheduled on 7th and 8th September 2018 in New Delhi.

**************************************End of Report**************************************

# Annexure A

## *Problem Statements*

**Just Code It**

| | |
|---|---|
| Multimodal Commuter Mobility in Cities | Design and build a common platform for the commuters of Delhi or any other large city in India which has multiple public transport modes for their entire multi-modal journey. For various combination of modes, one can make her choice based on the information available such as total cost, travel time and level of comfort (anticipated). Further, this platform should also provide a common ticketing system for entire door-to-door journey for selected combination of modes including the informal / formal last mile options (including private ride sharing options). The system should allow integrated and interoperable payment mechanism for the commuter to pay just one time for the entire journey. |
| Multi-modal Freight handling and Transportation | Design and build a common platform which helps in increasing the efficiency of ports and freight train terminals for loading, unloading and transportation of goods in order to increase handling capacity, reduce dwell time, increase throughput and provide multi-modal transport options in an efficient manner. |
| Future of Mobility | For the city of Delhi, develop a model/software for mapping out charging points and battery swapping stations for Electric Vehicles (two-wheelers, three-wheelers, 4-wheelers) depending on factors such as traffic, most used routes, time taken, route-wise peak times and range anxiety, vehicle charging patterns, malls, parking areas and conventional fuel stations. The model/solution should also specify details on the type of hardware to be installed at the charging/swapping stations, ways for inter-operable charging standards, monetization business models, and the ability to quickly and inexpensively replicate such a model for other major cities in India. |
| Road Safety | Develop a model/solution to rate driving behavior and predict accident hotspots (dynamic zones of errant driving behavior) using inputs such as impending collisions, breaking behavior, geo-coordinates, driving speed and acceleration, lane change behaviour, signs of fatigue etc. The solution should raise real-time alarms for the drivers as well as external stakeholders such as traffic enforcement authorities, medical emergency response teams. |
| Artificial Intelligence for Indian Transport Infrastructure | Develop a machine learning algorithm to identify objects and anomalies on Indian roads using India's traffic images and assess the quality of road infrastructure based on satellite imaging (e.g. potholes on roads, lane width, pedestrian space, cycling lanes and tracks, road encroachments etc). |
| Drones and Unmanned Aerial Vehicles (UAVs) in India | Develop a drone and UAV traffic management system to address detection of drones and UAVs, unlawful trespassing by drones (informing the drone operator and the traffic controller in real-time), collision avoidance and route monitoring. |

**Just Solve It**

| | |
|---|---|
| Alternative Energy | Identify and establish a sustainable business case for alternative sources of fuel and energy storage, with specific focus in public transport. Design and develop an efficient modal mix of transport options using already existing modes such as e-buses, bio-fuels, shared mobility options, hybrid cars while envisioning emerging technological breakthroughs across the globe. |
| Solutions for Electric Revolution | Design and develop ideas and solutions that will enable practical deployment of electric vehicles and the electric ecosystem. |
| Urban Aerial Mobility | Design a solution for a low-cost infrastructure to enable the deployment of 'air taxis' in India using an innovative model that helps achieve a significant reduction in the cost of urban logistics. |
| Technology for Pune Smart City Mobility Challenges | Pune is categorized as a Smart City by Government of India. With mobility being identified as #1 challenge in Pune, other priority areas identified within the transportation theme as reflected from citizen inputs are: improved and more available public transport, reducing commute times, improvement in traffic discipline, enhanced parking facilities, greater share of NMT (Non-motorized transport) and pedestrian friendly roads. Design and develop ideas on how technology can solve mobility related challenges to make Pune and other large cities more mobile and livable. |

# Annexure B

# *Evaluation Framework for Online Evaluation*

| Criteria/Score | 5 | 4 | 3 |
|---|---|---|---|
| Scalability | Highly scalable model. Cost effective, requires minimal resources and sustainable | Highly scalable but resource intensive | Scalable but difficult to maintain over time |
| Viability | Highly viable - both financially, and in terms of sustainability. Would sustain with minimal investment | Highly viable but not as sustainable | Moderately viable - at a high cost |
| [Only for JCI] Patent/Intellectual Property | Proposed solution has been patented/ IPR exist with the participant | Partial solution has been patented/ IPR | Prior literature exists and is being theoretically tested for probable patent/ IPR. The solution presented is a workable format of the same |
| Contextual Relevance | Highly relevant to the current scenario - scenario for which the solution has been designed. Not only addresses concerns in the as is situation, also optimizes future outcomes. Improves efficiency | Relevant in terms of improving the as is scenario and the commuter's experience. Futuristic in approach but not so much in implementation and impact | Moderately relevant in terms of improving the as is scenario. Improves efficiency of the system but does not help to improve the individual commuter's experience |
| Technological Feasibility | Extremely feasible, use of relevant technology keeping in mind the as is scenario. Technology used is cost effective as well | Technology used is feasible however the cost of deployment may be higher than optimum. | Technology used is feasible, however, the cost of deployment is higher than the best case scenario and the cost of maintenance is also substantially high - tending towards becoming a liability |
| Innovation Quotient | Highly innovative - makes use of emerging technology in a way that is fruitful and effective and solves genuine problems | Innovative approach but the technologies used are not very relevant to the as is scenario | Approach is ok however it does not make use of emerging technologies |

| Criteria/Score | 2 | 1 | 0 |
|---|---|---|---|
| Scalability | Scalable at the cost of deploying multiple resources and more investment - low return on investment | Very low on scalability. Not worth putting in additional investment to scale the model | Not scalable |
| Viability | Sustainable but at a high cost | Not cost effective and resource intensive | Not financially feasible - has a high cost but is not sustainable/viable |
| [Only for JCI] Patent/Intellectual Property | Solution has the potential and is eligible for patent/IPR | Solution along similar lines exists and has been adapted to become more relevant to the current scenario | Solution already exists in the public domain/a mix and match of solutions that exist in the public domain |
| Contextual Relevance | Low in relevance - neither does it improve the efficiency, nor does it improve the experience of the commuter | Not relevant - makes use of public transport challenging | No impact/not relevant in the current context or scenario |
| Technological Feasibility | Technology used is dated and not relevant to the as is scenario. Cost of deployment and cost of maintenance are both much higher than the ideal case scenario. Long term maintenance not feasible | Use of technology wthout really assessing the need for it. Technology used is not only dated and redundant, it is expensive as well | The technology used is not economically viable/used technology is not relevant to the as is scenario/redundant or forceful use of technology |
| Innovation Quotient | Thought process is in the correct direction however, it does not translate to effective integration. Technology used is not relevant | Ideas are not innovative, solution is very obvious - there is a gap between the thought process and the actual product | No innovation in the approach or in the nature of the technology used/redundant or forceful use of technology |

# *Evaluation Framework for Jury, 6th September*

| Criteria/Score | 5 | 4 | 3 |
|---|---|---|---|
| **How Scalable is the solution?** | Highly scalable Low investment required , both capital and operational | Highly scalable High investment, both capital and operational, to replicate the solution | Moderately scalable and replicable High investment, both capital and operational |
| **How feasible is the implementation of the solution?** | Highly feasible and sustainable, both socially and economically Addresses all the components of the problem statement Impact of implementation is measurable | Highly feasible with high investment; Addresses all the components of the problem statement; Impact of implementation is measurable | Feasible with high investment; Addresses only some of the components in the problem statement; Impact of implementation can be measured but with adjustments in proposal |
| **How innovative is the solution?** | Highly innovative and futuristic; Uses relevant technologies to effectively address all the components in problem statement | Innovative and futuristic; Addresses all components in the problem statement | Moderately innovative; Addresses only some of the components in the problem statement |
| **[Only for JCI] Demonstration of Solution** | Demonstration covers all components of proposed solution, effectively | Demonstration covers all components of proposed solution, not effectively | Demonstration does not covers all components of proposed solution But those covered are done effectively |

| Criteria/Score | 2 | 1 | 0 |
|---|---|---|---|
| **How Scalable is the solution?** | Low on scalability and replicability Low impact of investment | Very low on scalability and replicability No impact of investment | Not scalable Not replicable |
| **How feasible is the implementation of the solution?** | Feasibility of model is low; Needs high investments; Addresses only some of the components in the problem statement; Impact of implementation cannot be measured | Very low feasibility of model. Implementation does not solve problems. Impact of implementation cannot be measured | Implementation of solution is not feasible |
| **How innovative is the solution?** | Low on innovation as it replicates other available solutions; Addresses only some of the components of the problem statement | Replicates other available solutions to adjust to the requirement | Proposed solution has no innovation |
| **[Only for JCI] Demonstration of Solution** | Demonstration does not covers all components of proposed solution But those covered are not done effectively | Demonstration barely covers the proposed solution | No demonstration |