



SMART CITY RAJKOT
HACKATHON
STEP TOWARD DIGITAL RAJKOT

Rajkot Smart City Hackathon - 2017 Problem Solving Kit

Organized By



Knowledge Partner



Hello Friends,

Greetings from Darshan Institute of Engineering & Technology, Rajkot!! First of all congratulations to all of you for getting selected to the live Hackathon program of “Rajkot Smart City Hackathon 2017”. Darshan Institute of Engineering & Technology is the official knowledge partner of Rajkot Smart City Hackathon 2017. We are specializes in providing learning tools and problem solving solutions to students.

With this kit we're attaching a problem solving tool for you- “Problem Space Canvas”. Till now you might have worked on developing Technology for a specific problem. But looking at a problem in silos don't make sense in modern day world. Nor do they make great solutions or business proposals. Dealing with one problem helps you build a great technological idea (Great man named Steve Wozniak) but looking at an entire problem space and building business around it helps you sell better (Great Man named Steve Jobs). The tool would just help you improve the ability to sell your product to the Rajkot Municipal Corporation.

The tool would help you do 2 main things

- a. *Zoom out of the problem.* The solution you are building could actually be solving a bigger problem. The Solution might actually be looking at a completely different form of problem too. The solution might be replicable in any other industry. Let's explore the possibilities. Relate the Technological problem with real world troubles that people are facing and how would your solution play an important role.
- b. *Zoom in to the problem.* A problem might have been composed of multiple smaller problems. Looking at each such smaller problem helps you set a context on what form of solution would be the best and are we eventually achieving what we set out to achieve in the first place?

Along with this kit we are sharing with you few examples of the kind of thought process you can put up, a set of tool usage examples and examples of depth of questions we asked ourselves while we were building a solution for the same.

Just as nobody is perfect, nor are these problem space canvases. There can be add-ons. There can be removals. Play with your problem and build a problem space canvas that you believe your team would be solving.

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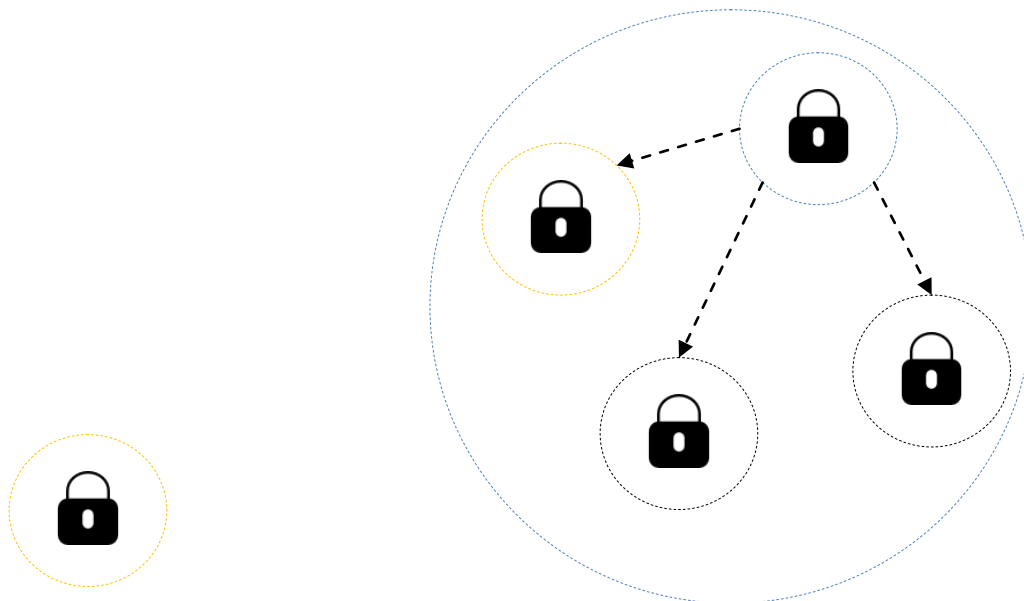
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Redefining Problems & Problem Spaces

“Automatic fare collection system for city bus services”

Design a solution, such that passenger need not have to wait for getting his ticket while travelling.

The concept of **Problem Spaces** is used to explore more problems around this core problem that are unsolved and maybe worth solving. In problem spaces we don't look at problems as stand-alone problems but as a space of many connected problems.



Problems Vs. Problem Spaces

At present, fare collection is done on bus. Fare collection is manual process and due to large number of peoples travelling by bus, it is very difficult for a single ticket issuer to collect fare from all the passengers. There is need for solution which can ensure 100% ticket issuing and fare collection. The solution should be such that fare gets collected automatically and each passengers are issued ticket.

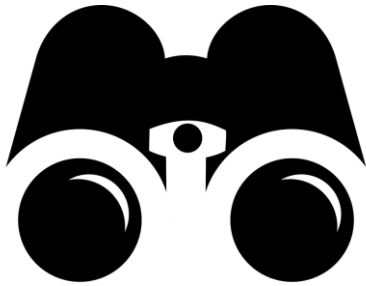
Problem Redefined:

Relooking at the problem

Can the system work with the way current fare collection system is working? Can Fare Collection for unissued tickets be done by an automated system? Making small changes in the Design of the current fare collection helps in the way that it can be automated?

Or is it really a problem of redesigning in the way fares are collected, or the kind of content present on the tickets? Ticket redesign could probably be a part of the solution.

Problem Zoom-Out



We will do a zoom-out on the problem - Zooming out is like looking at the problem in broad perspective. This helps us in building our problem space and then we can choose any problem in the space related to the original problem that interests us.

So when we're automating the fare collection public transport. What else can we automate about fare collection?

What other activities are done in regards to fare collection? What else do automated fare collection can provide? Public transport also gives a sense of security. Can using public transport also enhance the function of providing security? Perhaps.

People often need to change the bus for long distance journey, as there may be the case that direct route is not available. So can we provide solution in that case by collecting the fare one time for the entire journey?

Some people regularly commute via public transport. They may prefer pass system to not indulge in buying ticket on daily basis. Does our system provide a solution for such peoples? Can we make it flexible enough to cover those peoples?

Also if the type of system required may differ based on the location - there is also a need for a system that is smart and reconfigurable so that it serves all the different types of location configurations. So how to build a smart reconfigurable fare collection system?

What kind of smart software can power a smart configurable fare collection system?

A number of software and hardware solutions in the market are system agnostic. These are generic Internet of Things (IoT) module which are designed to connect devices to internet and control them through cloud software. The generic modules allow lower cost of development and very robust IoT systems.

Is there already one or a generic automation (with or without IoT) module for fare collection system needs to be built? This dynamic system for fare collection system should be built in a way that it can automate many other systems also in the environment they are installed. For example, providing ability to automate fare collection for other systems - such as public parks, amusement parks, etc.

Can the solution work on redesigned form of fare collection?

If we look at the entire process

1. Where the fare should be collected?

- a. Should there be multiple checks? Entering the bus stop, boarding a bus, leaving a bus and leaving the bus stop. There might be different people with different requirements. At which point should fare collection commence and at what point should be stopped.
- 2. How to track the distance travelled by the passenger?**
 - a. It is a punishable offence to take a ticket of shorter distance and travel for a longer distance. How does your solution detect such cases? Could the system detect GPS and find out the amount of travel done by the passenger. If fare collection is automated system, could there be a way by which it can be detected how much has the passengers travelled on the ticket?
- 3. How to find people not paying fare at all?**
 - a. It is evident that the most important aspect of this solution would be finding people who haven't paid fare. Point 1 would play an important role in finding the people travelling without fare paid. What mode of communication would your solution use with the traveler? Not all travelers of bus carry mobile phones. Can the Solution differ for monthly pass traveller? If the solution is at a location, how can we identify who are the passengers who paid for single ticket and multiple people travelled by it?
- 4. Notification system**
 - a. Who should be notified when a ticket offender is found? Should the next station in charge be reported? What details should be sent to prevent offences in the form of fare paid or boarding a bus for more than specified ticket journey.
 - b. What form of Details should be sent when a ticket offender is found? Could there be a mechanism to notify the passenger of his/her upcoming station and that he/she would be requested to deboard the bus at that specific stop.
 - c. For offenders without tickets what form of data should be identified and how should the data be transferred to the respected personals. If the person has not paid fare, there is no way of identifying him/her. How does your solution sell correct data about such offenders to the respective personnel such that action could be taken on them.
- 5. Should there be a loop for exceptions are created?**
 - a. Public transport could be used in special cases for free. Should the system give away such loopholes?
 - b. What are the suggestions your ticket checking system give to the system redesigning the ticket designing system.
 - c. Would it be necessary for ticket design system to provide a card or a hardware device with RFID on it to be able to identify the journey of each ticket bearer?

PROBLEM SPACE

Starting Point - Initial Problem Statement

Think where else the problem that you're solving can be faced? Can this be a new problem statement

Redefining how fare collection is done during journey. Redefining how fare collection is done at other transport systems



Think about the problem by multiplying your subject. If car was your problem subject, think of a car fleet, home vs. a colony, email vs. email server.



Keep broadening the scope of problem you're facing. From solving fare collection problem, look at solving the travelling problem itself

Redefining how fare is collected during journey



Zooming-out on a problem: We look at how the problem statement can be made more generic, broader. Say if fare collection is your problem than how about looking travelling as a problem



Zoom-in - Think of the problem on micro-level



Checking end-to-end Travel journey
Checking that an pays fare which is not for a station lesser than his travel



By Zooming-in on a problem, we dig into the problem. If this problem was to be solved, what sub-problems would you face?



Where to check for paying fare? At stop, on the bus, while boarding or deboarding



How to identify people who have boarded bus without paying fare?



Who to notify about people boarding bus illegally? What should the notification be?



Redefining Problems & Problem Spaces

“Automatic Parking Management Systems”

Design a solution such that a person does not have to search for parking space, and whether it is vacant or not.

1-2km before the available parking space, a notification should be received on the mobile phone of the nearby parking spot and amount to be paid in the pay and park area. Payment can be facilitated through mobile wallets and credit cards payment integration. An electronic receipt be generated, with bar code/QR code which can be shown at the parking spot. A list for all the available parking spot be made available in the app. There is a need for solution which can ensure 100% automated parking management system. The solution should be such that citizen does not have to search for the available vacant parking spot.

Problem Redefined:

Relooking at the problem

Automated Parking Systems is being tried by a lot of companies. This can be implemented as a b2c project in the future.

What are the points to think about?

1. Detection of Parking Space

As you all must have figured out till now the most important section is detection of vacant parking space. The system should be capable enough to identify the amount of space for the incoming vehicle and send notification there by. If it detects space that is enough for a two wheeler than it should show that only two wheeler can be parked in a particular area. The system should work differently for all forms of vehicles.

2. Building a common platform for money transfer from multiple banks.

Would the technology you produce integrate multiple banks or multiple payment gateways, managing of charges for all the transactions happening across the payment gateways? There is a possibility of certain banks not being integrated with any of the payment gateways of online payment transfer software. How would your technology deal with such situations?

3. Coping up with internet issues across the city

How would the solution you build cope up with the fact that the users of vehicles from villages and they might not have phones which are data capable. Would the technology require data capability to be enabled for it to communicate with the back end system?

4. Detection of people who does not pay and park the vehicle

One of the major loophole of pay and park with human monitored system is the fact that people run away from the parking slot without paying. Can this be avoided by taking measures of the people who does that? And fine ticket be issued in that case to the vehicle owner.

5. Building acceptance amongst audience

If the solution requires formation of an app, how would the app work with people who are not connected to any form of data at specific locations? What form of interface would work the best

with such an audience? How would the app be more understandable for the audience? What meta facilities will the solution be providing which will be helpful in terms of the business.

PROBLEM SPACE

Starting Point - Initial Problem Statement

Think where else the problem that you're solving can be faced? Can this be a new problem statement

Redefining how parking system will be implemented. Redefining how fare collection will be done for all types of vehicles



Think about the problem by multiplying your subject. If car was your problem subject, think of a car fleet, home vs. a colony, email vs. email server.



Keep broadening the scope of problem you're facing. From solving parking problem, look at solving the travelling problem itself

Redefining how parking for the vehicles will be managed



Zooming-out on a problem: We look at how the problem statement can be made more generic, broader. Say if parking the vehicles and finding space is the problem and then look as entire journey as a problem.



Zoom-in - Think of the problem on micro-level



Checking the duration of the vehicle parked

Checking that fare is paid for the duration vehicle is parked and no lesser than that



By Zooming-in on a problem, we dig into the problem. If this problem was to be solved, what subproblems would you face?



Where and when to check for parking space? During journey, while reaching the parking slot, etc.



How to identify people who has parked the vehicle and issue ticket if fare not paid?



Who to notify about people not paying fare for parking done? What should the notification be?