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**Title: 'Prashnottar'**

I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a mark of zero will be awarded.

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## 1. Introduction

In Nepal, there were about 35,222 elementary and secondary schools and 10 universities with more than 1400 colleges and campuses until 2016 (WENR, 2021). The number of students in Nepal has increased by 407 percent between 2000 and 2013, from 94,041 to 4,77,077 students in 2013. In 2016, there were 3,61,077 students (WENR, 2021). At present 2021, the correct number of students studying at the school level is not published, but we can estimate from the above data and growth tendencies that there could be more than one million students in Nepal with a population of almost 30 million.

I've mentioned the above statistics to show the potential in the education field where technology if invented for students to help in the study could be a great idea. It's sad to know that for the Nepali education system, there is no proper, thorough-focused, and well-defined education material present on the internet where students could go and solve their confusions regarding any particular subject module's topic just like a tuition teacher. For e.g: why does stem or root modification occur in plants? Why is a convex mirror used as a side mirror in vehicles? What is the converse of the Pythagoras theorem? Etc.

## 1.1 Problem Scenario

In Nepali education, homework is not submitted using computers. But, it is done in a notebook and submitted to the subject teacher physically to check and get feedback. Some of the problems that students could face are as follows:

in the same class. Let us discuss problems in point to understand in detail:

- i) Students forget 66 percent of what they studied in a day, so when trying to do homework at home, they face a serious problem.
- ii) Most of the students' parents do not have sufficient time to teach their children in their studies. Also, most of them are not able to solve the study problems of their children. E.g. math problems, science problems, literature questions, etc.
- iii) All students might not be able to afford tuition fees to take tuition classes.
- iv) Tuition facilities might not be available for most of the students might be because they could be far.
- v) In intuition centers also, there may be a crowd for which students might not get personal attention from the teacher.
- vi) Near exams or tests, students don't have a good revision notebook with quality answers to respective questions to prepare.
- vii) There are no competitive platforms for Nepali students, where they can sharpen their skills by solving others' study-related problems.

## 1.2 The project as a Solution

I would like to contribute a hybrid app, for both ios and android users from class 4 to 12 where they can choose their class, then subject, then chapter of which they are having confusion and not being able to solve a problem. There they can find answers, solutions, and explained notes given by another fellow student. For the best answers, it would be voted by thumbs up by other fellow students who have already studied so that it can come at the top for any other researching student.

By this, any student can contribute their knowledge with other fellow students, make friends and help or take help online. For further more features and functionality that the app has to offer, I will be discussing them in the 'Expected Outcome and Deliverables' section. The solutions to the above-mentioned problems are as follows:

- i) 'Prashnottar' (PT) will help students to revise any subject chapter-wise even if they forget after being taught in school.
- ii) PT will also help parents to understand the concept of their un-understood topics to teach their small children while teaching. E.g. I had one uncle who was not able to understand geometry to teach his 12-year daughter. With the help of PT, he will be able to understand himself and teach his daughter.
- iii) As PT is my FYP, so no one has to pay like tuition fee.
- iv) As everyone in the 21<sup>st</sup> century is internet access, they can use PT. So no need to travel far like for tuition centers.
- v) PT won't be crowded and noisy like tuition centers. It won't have advertisements, so no messy UI instead PT will have the best smooth, beautiful and satisfying UI/UX.
- vi) PT is like a school where friends are teachers because they will be learning from their friends.
- vii) With PT, the students of Nepal will become friendly competitive, and continuously engaged in study matter rather than being more engaged in social networking apps.

## 2. Aims and Objectives

### 2.1 Aims

The main aim is to help every student of Nepal by building them an app, 'Prashnottar' where they can take help, share knowledge and take notes of academic subjects like science, math, Optional math, English, Nepali, etc in case they are not able to understand in school or not able to get tuition classes for any reason.

### 2.2 Objectives

The ways I will be fulfilling aims are as follows:

- i) 'Prashnottar' PT will be built using the flutter framework and dart programming language available for both android and ios users.
- ii) PT will be free of cost, meaning it won't charge students to use.
- iii) PT will create an online platform like Quora for Nepali students for friendly competitions to answer the questions and push their ranking.
- iv) PT will increase awareness on taking help online using PT where they can also help other fellow students.
- v) Students can ask questions, answer any asked questions, bookmark their favorite answers in respective folders, create notes in the app, and many more, it'll help students to prepare awesome notebooks to look at exam times.



### 3. Expected Outcomes and Deliverables

This project is expected to develop a hybrid app. It'll work for those students who want to ask their specific unsolved question or do not understand the concept of any topic to google or any online platform.

**A general feature of Prashnottar (PT) are as follow:**

- I. Log in or sign up with a phone number or Gmail.
- II. At the top left corner, the user will have access to his account's settings like bookmarks and dark/light mode.
- III. On the bottom navigation bar, it'll have icons of home, following icon (here, user can see the answers of a person who he has followed), book icon (he'll be able to choose any particular subject, it is topic and answer to questions ), notification icon (he'll be able to get notifications about his answers liked or commented by other students), and finally search icon, where he'll be able to search for person or questions on PT.

**Features for the user (student):**

- I. After logging into the app with Gmail or phone number, he'll have a scrolling view of questions and answers asked or answered by other fellow students.
- II. If a student login with the details that he/she is a student currently studying in class 6 (let's say), he won't be seeing the questions of higher classes. He can either answer his or lower classes subject's questions.
- III. The student will be able to find questions of particular subjects (let's say science). After seeing asked questions, he can answer them. After answering a question he will get the bronze coin. If the answer is liked by others then he'll get the silver coin, but if his answer gets clapped (like in LinkedIn) he'll get gold.
- IV. Students will have friendly competition since students with the highest number of gold and silver will be put on the leader board with their rankings.
- V. Any student can ask the question by pressing the question mark icon which will be scrolling down with the user like in quora.

Above mentioned functions/features might not be clear, but I am sure it will be not easy to build and may require more days than what I've put in the Gantt chart. With

the suggestion from supervision and the need for time, I will be adding more features.

## 4. Project risks, threats, and contingency plans

I am not new to flutter, dart, or app development, since I am doing my internship in a flutter, but I have never made an app completely on myself which is as ready as to be pushed to an app/play store. This makes me think of risks and threats which can arise while on the way to building this app. Without pain there's no gain, similarly building this app, by tackling those bugs, errors, and problems I would be making my problem-solving skills and analytical thinking strong. For project risks, threats along with contingency plans, below is a brief table.

S.N.	Risks and threats	Probability	Contingency
1	Unable to learn Laravel for the backend to perfection.	Medium	I have already learned PHP and if I feel comfortable, then I have my friends who have done internships on Laravel, if face any problem I would ask for help.
2	Unable to create and implement a database using SQL.	Low	Since I have been learning databases from 1 <sup>st</sup> year so, doing online research and trying out myself would help.
3	Not able to create the best user interface for a better user experience.	Low	I have been coding in flutter already for 3 months, so using Adobe XD would help to build better UI/UX.
4	Unable to deal with long lines of code, might misplace or lose whole build code file.	Low	I have been using git since 2020, so I would continuously commit my codes and keep it up to date.
5	Laziness to work hard and put effort into the FYP module.	Medium	I will print out my Gantt chart and paste it in front of my study table, to realize my goals and remind my dreams.
6	Unable to deal with bugs and errors.	Medium	I would go to StackOverflow for bugs and try to fix errors, ask seniors and supervisors about bugs, and fix it.
7	Unable to carry out good researches due to load-shedding and slow internet.	High	Talk to ISP and fix problems, also try to get another power source, like solar or inverter for a router.

8	Fail to meet a weekly deadline or finish works according to the Gantt chart.	Medium	Work at least 3-4 hours daily on FYP modules, frequently ask for feedback and suggestions from friends and supervisors.
9	Unable to bear pressure while facing bugs and being not able to perform with Gantt chart.	High	Talk with friends, how they are handling pressure, and ask for mentorship from the supervisor.

*Table 1 Projects' risks, threats, and Contingencies.*

## 5. Methodology

Software development life cycles (SDLC), is a process used by software engineers to ensure the quality and correctness of the built software. It makes sure, the development is completed in the pre-defined time frame and cost. It tracks and controls different development phases of software development. With speed, it reduces project risks and enhances project management overall with a result of a happy client relationship. (Guru, 2021) Different phases of SDLC are as follows:

- Requirement Analysis
- Feasibility Study
- Design
- Coding
- Testing
- Install Deploy
- Maintenance

Popular SDLC models which I considered using, but was not familiar with some of them are:

- Waterfall Model -
- Prototype Model -
- Incremental Model
- V-Model -
- Spiral Model -
- Big Bang Model
- Rational Unified Process (RUP)

Let me explain a few of the above-mentioned methodologies.

### ❖ **Waterfall Model.**

The waterfall model is the earliest Process Model to be introduced. The development process is divided into separate phases. Each phase must be completed before the next phase can begin so there is no overlapping. The output of one phase will be acting as the input for the next phase sequentially. (Point, 2020)

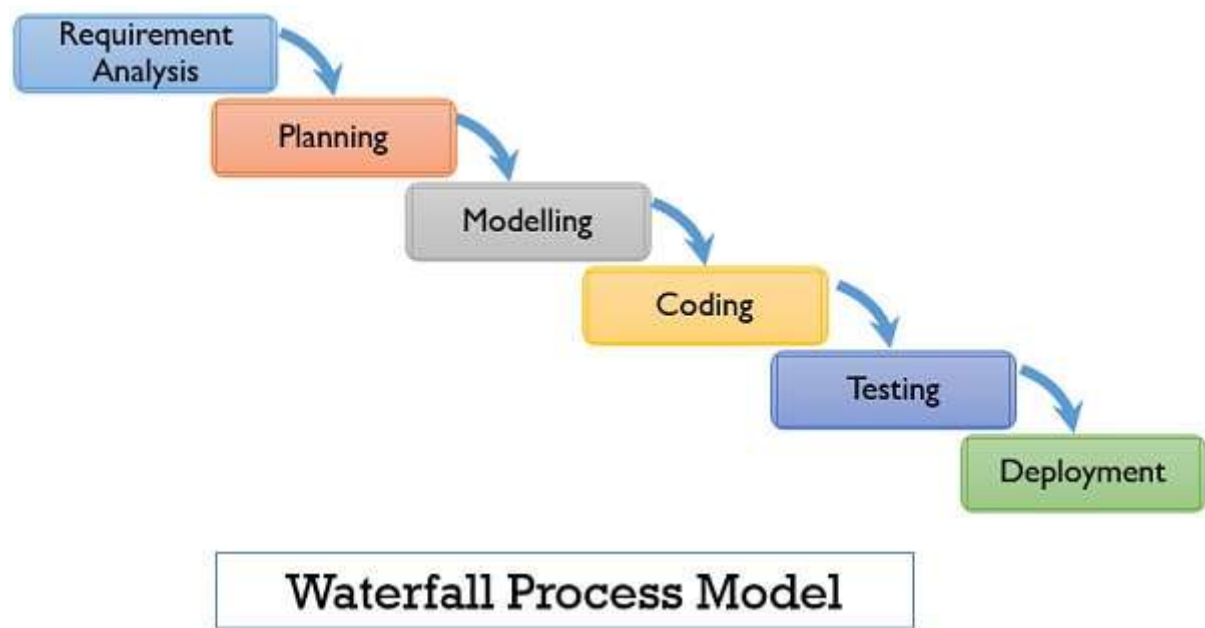


Figure 1 Waterfall model.

### Advantages of Waterfall Model

- It is quite simple and smooth to recognize and use.
- The requirement is thoroughly documented, clean, and fixed.
- Technology is thought and isn't always dynamic.
- There aren't any ambiguous requirements.
- Ample sources with required information are to be had to guide the product.
- The task is short. (Point, 2020)

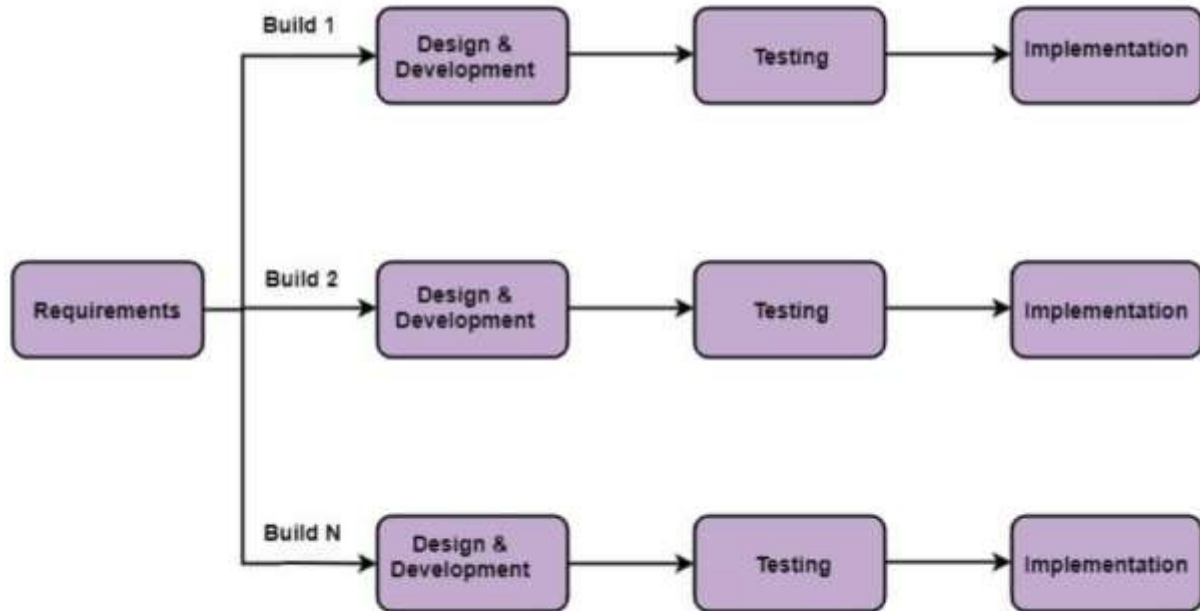
### Disadvantages of Waterfall Model

- Until late during the life cycle, no working software is produced.
- Too much risk and uncertainty.
- Bad for complex and object-oriented projects.
- Terrible for long and ongoing projects.
- Cannot assist change requirements. (Point, 2020)

### ❖ Incremental Model

Here, requirements are divided into multiple standalone modules of the development cycle. Each module must go through the requirements,

design, implementation, and testing phases. Succeeding the release of the module adds function to the previous release. The process is continued until the system is completed. (JavaTPoint, 2020)



**Fig: Incremental Model**

*Figure 3 Incremental model.*

#### **Advantages of Incremental Model.**

- Errors are easy to recognize.
- Testing and debugging are easy.
- It is more flexible.
- Risk can be managed simply.
- The client is important. (JavaTPoint, 2020)

#### **Disadvantages of Incremental Model.**

- Good planning is needed.
- The total cost is high.
- Good module interfaces are needed. (Point, 2020)

### ❖ V-Model

In this model, the execution of processes happens sequentially in a V-shape. Explicitly known as Verification and Validation model. (tutorialspoint, 2020)

It is the same as the waterfall model which is based on the association of a testing phase for each corresponding development stage. It means for every single phase in the development cycle, the testing phase is directly associated. This is a distinctly disciplined model and the next phase starts only after completion of the previous phase. (Point, 2020)

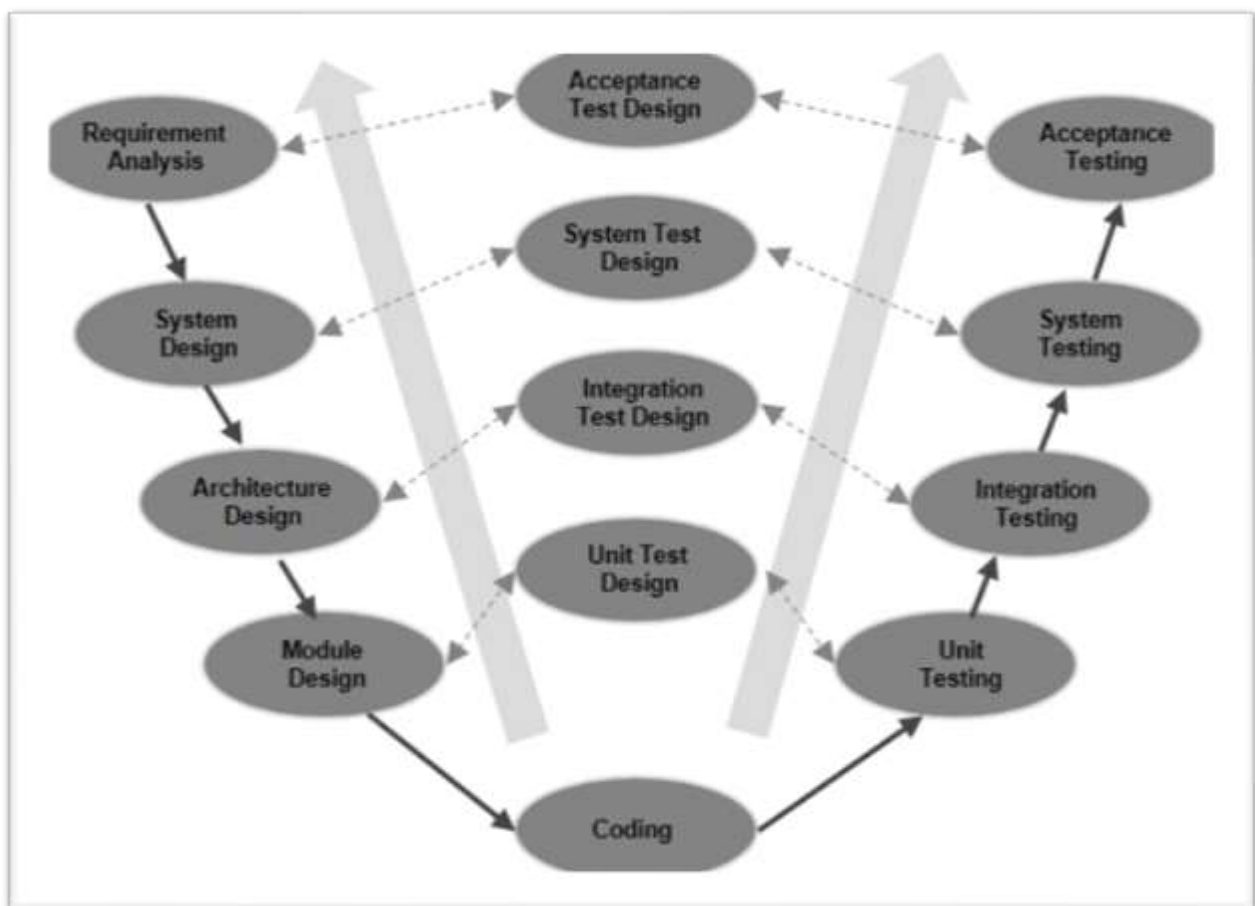


Figure 4 V-Model

### Advantages of V-Model

- Requirements are defined well defined.
- Product definition is stable.



- Since technology is not dynamic so it is well understood by the project team.
- It would work well for tiny projects where requirements are very well understood. (Point, 2020)

### Disadvantages of V-Model

- There is high risk and uncertainty.
- It is bad for complex and object-oriented projects.
- Cheap for long and ongoing projects.
- There isn't a working software produced until late during the life cycle. (Point, 2020)

### ❖ Spiral Model

This model combines the idea of iterative development with systematic, controlled aspects of the waterfall model. It allows incremental releases of the product through each iteration around the spiral. (tutorialspoint, 2021)

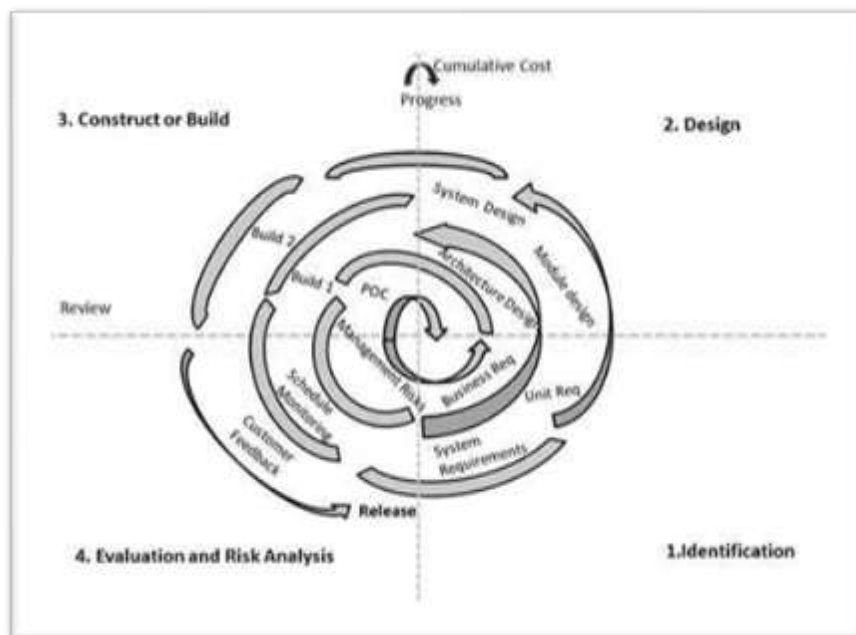


Figure 5 Spiral model.

### Advantages of the Spiral model:

- Requirements can be added as it needs a change.
- The explosive use of prototypes is allowed.
- Requirements are recorded precisely.
- Users can view the system early.

- The whole development can be divided into smaller parts.
- Risky parts can be developed earlier which helps in risk management. (tutorialspoint, 2021)

### **Disadvantages of V-Model**

- Management becomes more complex.
- The project end date cannot be known earlier.
- Spiral might not go as defined.
- Intermediate stages require excessive documentation. (tutorialspoint, 2021)

### **RUP(Chose Methodology):**

I have chosen Rational Unified Process (RUP) for the methodological roadmap to build 'Prashnottar'. It is based on Agile methodology which splits the project life cycle into four phases where on each phase, all six core development disciplines take place which is: business, modeling, requirements, analysis and design, implementation, testing, and deployment. (Study, 2021)

I have chosen RUP to create high-quality software with a predictable budget and time frame. The most beautiful thing about RUP is, each of the life cycle phases can be repeated, if needed. Let us discuss the 4 phases of RUP in detail:

#### **Inception**

- I. Scheduling Resources
- II. Cost and Time Estimation
- III. Planning
- IV. Risk Management
- V. Prototypes and Development

In the Inception phase, we will have a general vision for the project initiative with multiple parameters. We will get the project scope. (Master, 2020)

#### **Elaboration**

- I. Analysis of problem domain
- II. Use Case Diagram Development

### III. System Architecture Development

In the Elaboration phase, we will get functional and non-functional parameters. We will understand the full Software Architecture Description. We might be able to justify whether to prove the project plan or not. We will fully have the result of actual resource cost versus planned resource. (Master, 2020)

### Construction

- I. System Build
- II. System Operational Manual
- III. User Manual
- IV. Test Cases

In the construction phase, we will be ready to develop all components and features and integrate them into the product. We will fully focus on managing resources to optimize costs, schedules, and quality. The software will be designed, written, and tested successfully. (Master, 2020)

### Transition

- I. Training
- II. Beta Testing
- III. Analysis of User's Review
- IV. Supporting & maintaining product

In the Transition phase, the last phase is the phase where the product is finally finished, released, and delivered to the customer. In this phase, bugs will be fixed, correct the problems and finish the features which were postponed. This is the phase of deployment after successful beta testing. (Master, 2020)

### Strong reasons why I chose RUP:

- It helps to change requirements in the project whether they are coming from customers or from the project itself.
- It welcomes change at any time.

- It provides proper documentation of the software product.
- It helps to find issues early in the process life cycle.
- It reduces development costs and improves process control and risk management.

### **Cons of RUP**

- Individuals must be experts and professionals in their respective fields to develop.
- The integration in the development process might hurt some more fundamental activities such as testing.
- Multiple stages of the workflow might be complex.
- It is challenging for organizations to implement which has small teams or projects. (Master, 2020)

### **Why didn't choose Scrum?**

- A scrum master is needed, also he/she has to be experienced and very committed.
- An inexperienced Scrum master will ruin the development process. (Techvera, 2020)

### **Why I didn't choose Kanban?**

- An up-to-date Kanban board is needed. Since I have to study other modules also so it can be very difficult for me to keep them up to date.
- Why I didn't choose Extreme Programming?
- Customers must participate in the process.
- Large time is invested.

Some specialists say that EP is more focused on the code rather than on design, but for me 'Prashnottar' must have great UI/UX. (Kukhnavets, 2018).

## 6. Resource Requirements

Even to make a simple omelet, we need different materials like egg, salt, oil, pan, and fire. So we can imagine how many things we might need to build out the app 'Prashnottar'. Well, below are a few I would like to mention:

- PC/Laptop with at least 8 GB RAM and SSD ( 256 GB if possible).
- IDE: Android Studio and Visual Studio Code
- Flutter framework
- Dart programming language
- PPT Laravel for backend
- MySql for database
- Draw.io for making UML and other figures.
- MS Word for documentation

## 7. Work breakdown structure

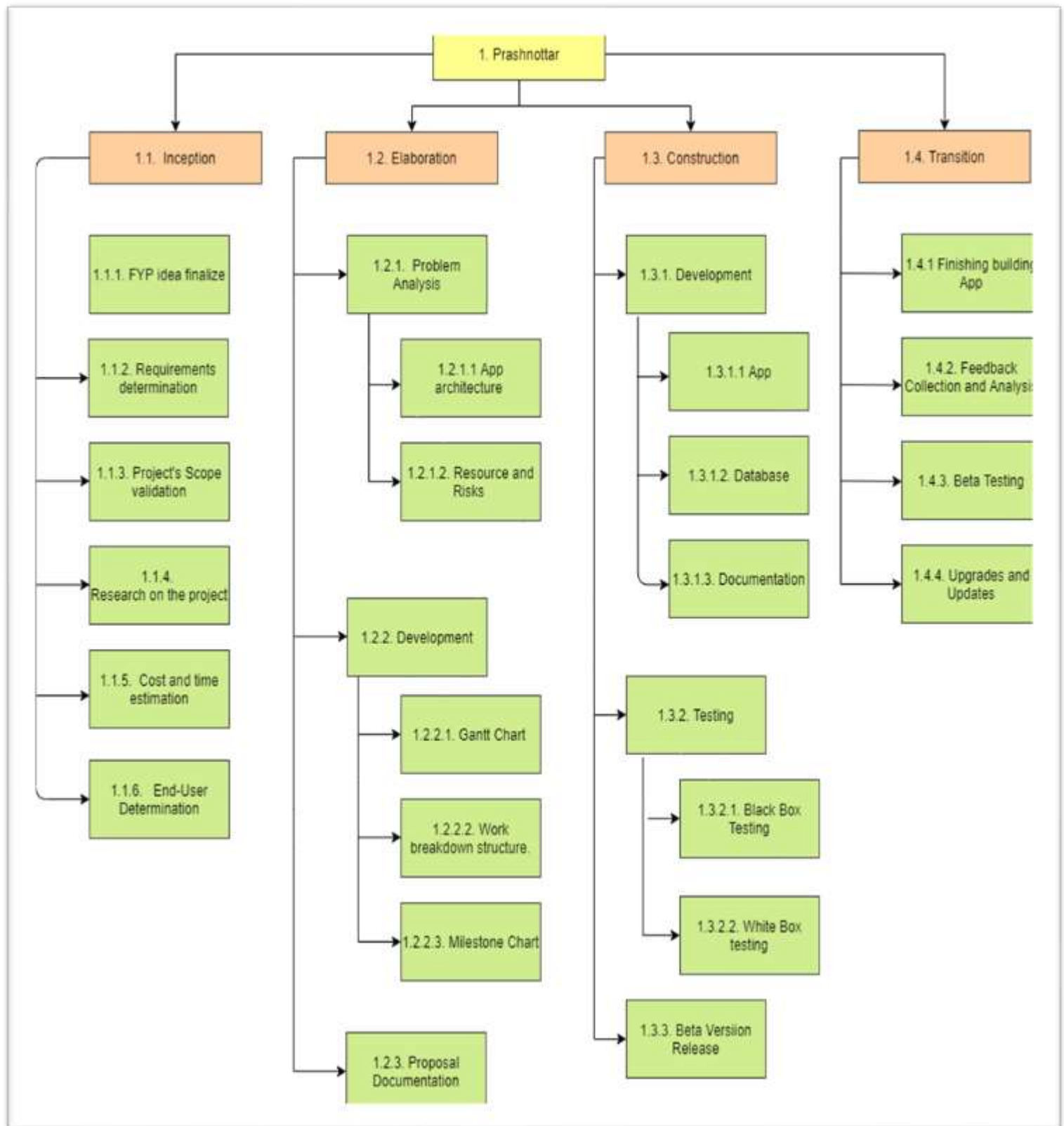


Figure 6 Work breakdown structure.

## 8. Milestones

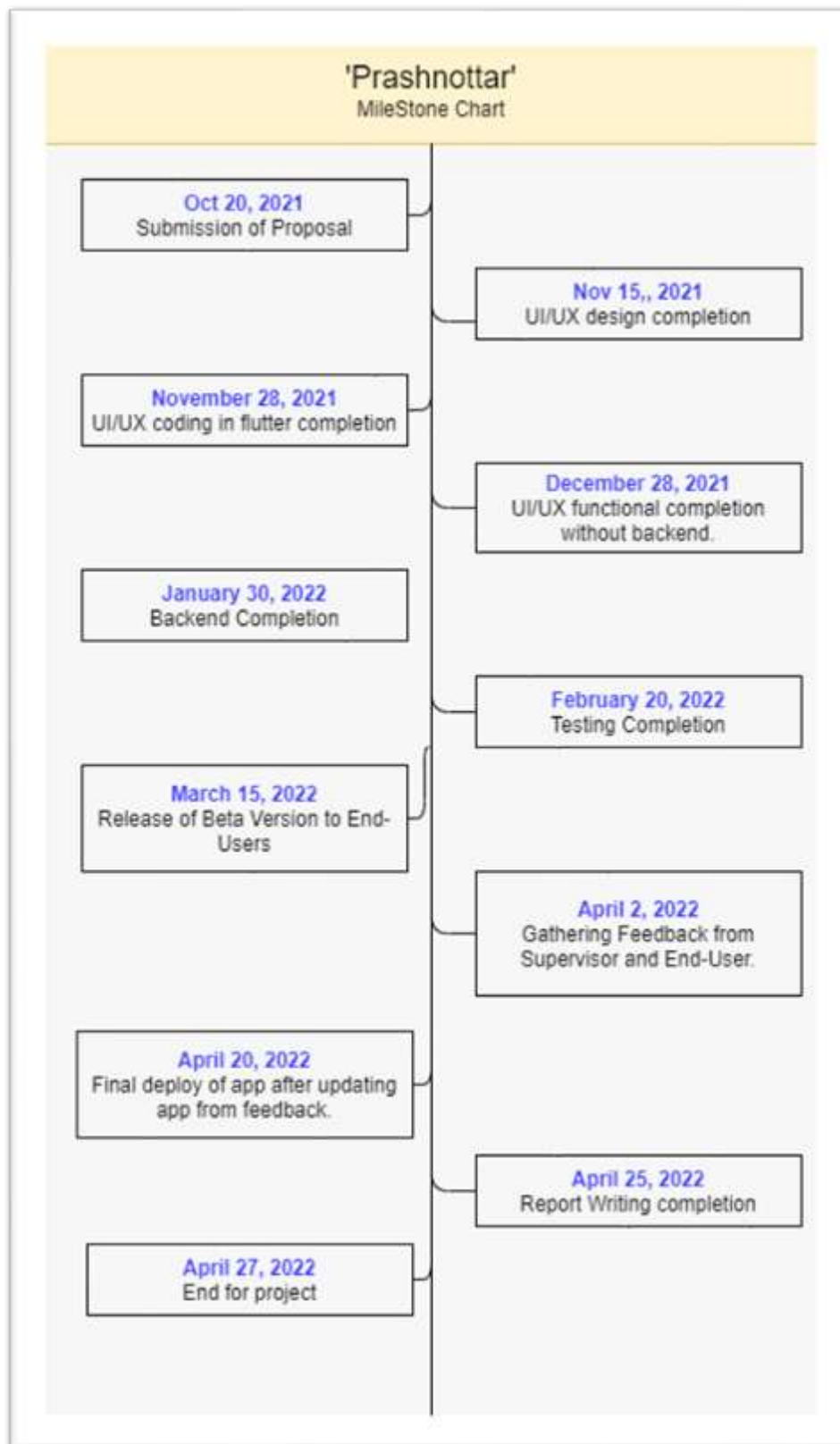


Figure 8 Prashnottar Milestone Chart

## 9. Project Gantt chart

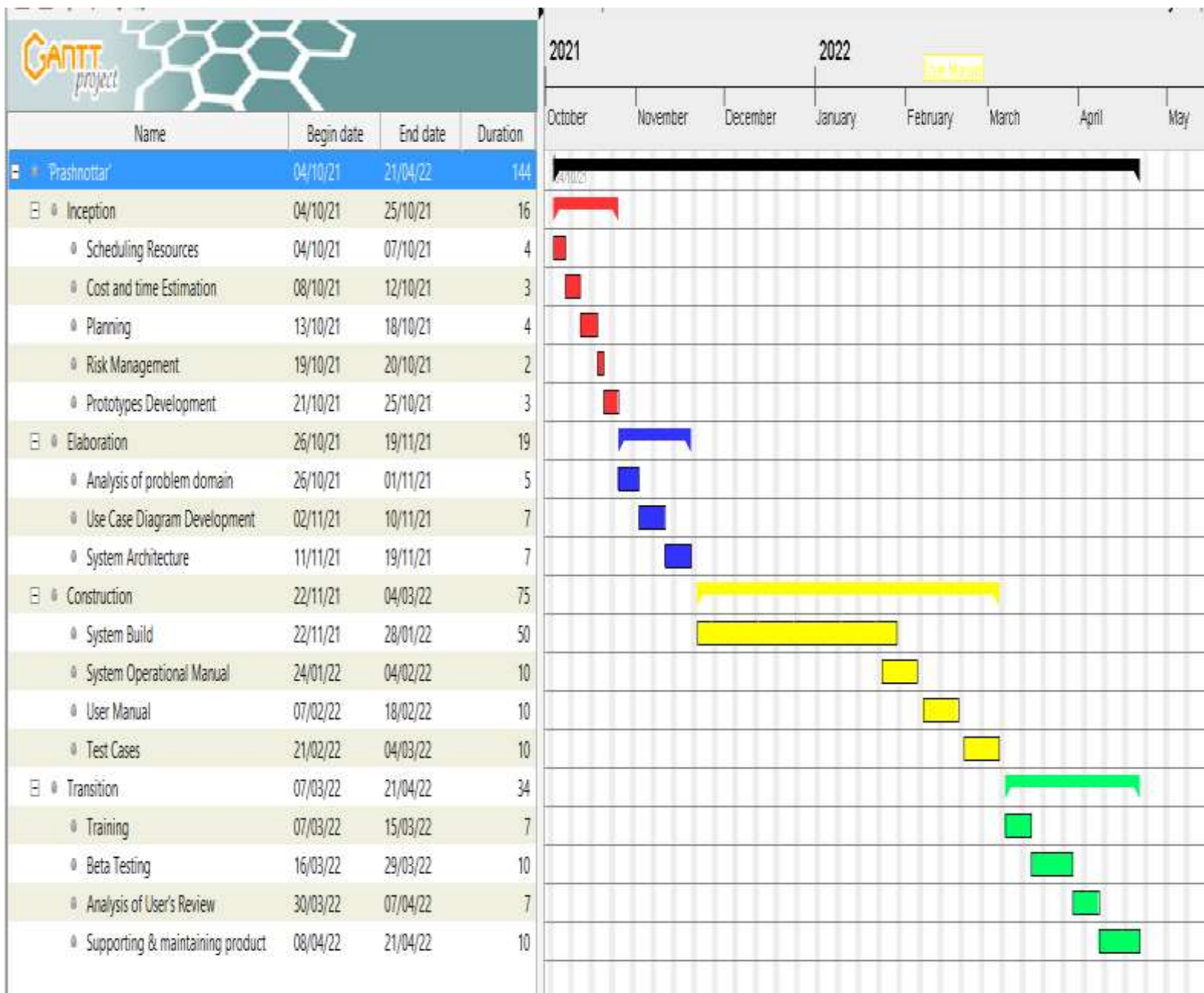


Figure 9 Gantt Chart of Prashnottar using RUP methodology

In the above figure, we can see the start of the work is October 4 and the finish date is April 21. With all the documentation the FYP will be over by the last week of April. The most crucial part for me to build 'Prashnottar' is the construction phase. During those times, I would be needing lots of help from supervisors and friends.

Above Pictures grants me the agility and confidence to finish my work under specific dates and times.



## 10. Conclusion

In the end, I would like to say, the FYP, 'Prashnottar' which I have chosen, is not just FYP but it's my dearest topic dreamed of from 2019 since studying BIT. This is the project that I want to finish by any means to help my Nepalese brothers and sisters. When I was studying at my school level, many times I used to have difficulties doing my homework, also I had no big brother and sister who could guide me in my exam times. I had more difficulties going to tuition centers that were far from my home for tuition rather than going to school. Also I tuition fees was too expensive at that time(Rs 3000 for three subjects). I guess, every day our students are facing the same problem I faced once, and who knows, my children might have to face this same problem again, so I want to build this app.

I would be using the Rational Unified Process methodology to make the app. Making milestone charts and breaking work structure, will be very helpful in my way of making my app. As, I have already mentioned other necessary tools, software, programming languages to build this app, I have to learn skills and increase my problem-solving skills to have a good career. If my proposal gets accepted, then I would love to hustle for my dream of becoming an app developer.

Everything considered, I would like to sum up by saying that, FYP is not easy, if it was easy then everyone would have done it. I am ready to face challenges, bugs, errors, ups, and downs, but feel extremely lucky to be surrounded by amazing friends, fast internet, and kind supervisors Mr. Prakash Koirala and Mr. Ravi Rouniyar for their mentorship and help in the time of need and depression. Hope I can contribute something to my community and Nepalese brothers and sisters with this FYP.

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