

Product Backlog

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# Problem Statement

This generation of students has a noticeably shorter attention span than previous generations. Getting children to learn by only sitting in a class has become a nearly impossible task. Science is a crucial subject that exists in every aspect of our lives, but it is difficult to get that across to children. Therefore, having the appropriate teaching method for a young audience can help maintain engagement and boost learning from a fun, positive experience. Our solution is a game that not only teaches and tests the user, but also is entertaining, addicting, and rewarding.

# Background Information

**Audience**

Our target users mainly consist of people of a younger age group, such as children and adolescents, since our product is an educational game that introduces chemistry. That being said, it will be enjoyable for all ages and can re-introduce anyone to the elements of the periodic table.

**Similar Platforms**

There exist many applications, gameplays, and simulations that deliver science education to students outside of the classroom. Some examples specifically geared for chemistry learning are Alchemy, 2048 Chemistry, Kids Fun Science Experiment, etc. These have the same intent as our product to teach or introduce chemistry, but each has a different gaming mechanic.

**Limitations of Other Implementations**

The other chemistry related education applications do not seem to be popular among the intended users. In contrast, ElementRium will have a completionist game mechanic that will engage our users. Additionally, most of the other applications do not seem to balance the quality of the user interface and the education it delivers. We will be creating an atmosphere of alive elements that move around by using refined graphics and animation, and in order to create new elements, the user will be tested on a little trivia about the element. They will be playing an intriguing game and expanding their knowledge at the same time.

# Requirements

**Functional**

1. **User**
   1. Introduction
      1. As a user, I would like a tutorial for most features of the game
      2. As a user, I would like to be able to zoom in and out of my workspace to see larger and smaller areas
   2. Individual Atoms
      1. As a user, I would like to be able to collect atoms representing the naturally occurring elements
      2. As a user, I would like to have my collection of atoms visualized inside of my workspace
      3. As a user, I would like to be able to select an atom from the workspace to look at its stats and information
      4. As a user, I would like to be able to refer to a journal for facts and trivia on an atom of interest
      5. As a user, I would like to be able to increase my atoms’ level stats
      6. As a user, I would like to be able to refer to a glossary for all of the possible atoms discoverable in the application, and the ones discovered thus far
      7. As a user, I would like to be able to view a visual representation of the elements I have unlocked on the periodic table
      8. As a user, I would like to be able to discard an atom into a wastebin after receiving a notification to make sure I am certain of my decision
   3. Compounds
      1. As a user, I would like to be able to perform chemical reactions on chemical structures within my workspace to formulate new ones
      2. As a user, I would like to be able to open a list that shows all of the possible compounds that are made up of at least one of the structures that is within my workspace
      3. As a user, I would like for there to be a chemical formula listed at the top of the user interface that will help guide me in selecting the chemical structures needed for the reaction or bonding I am in the process of completing
      4. As a user, I would like to have my collection of chemical compounds visualized inside of my workspace
      5. As a user, I would like to be able to select a compound from the workspace to look at its stats and information
      6. As a user, I would like to be able to refer to a journal for facts and trivia on a compound of interest
      7. As a user, I would like to be able to increase my compounds’ level stats
      8. As a user, I would like to be able to refer to a glossary for all of the possible compounds discoverable in the application, and the ones discovered thus far
      9. As a user, I would like to be able to view a visual representation of the compounds I have unlocked
      10. As a user, I would like to be able to discard a compound into a wastebin after receiving a notification to make sure I am certain of my decision
   4. Settings
      1. As a user, I would like to be able to have different background color options available for me to chose from in the settings menu
      2. As a user, I would like to be able to turn sound effects on and off in the settings menu
      3. As a user, I would like to be able to turn any music that plays on and off in the settings menu
      4. As a user, I would like to be able to turn off and on the faces that appear on the chemical structures
   5. Education
      1. As a user, I would like to be quizzed to see if I am retaining the information taught to me on the app
      2. As a user, I would like for facts that I unlock to be narrated and accompanied with a picture if applicable (if time allows)
   6. Social
      1. As a user, I would like to share newly discovered elements, molecules and compounds with others (if time allows)
2. **Developer**
   1. As a developer, I would like to implement smooth graphics that will increase aesthetic appeal to the users
   2. As a developer, I would like to use a database to store factual information about elements, molecules, compounds, and reactions
   3. As a developer, I would like to allow users to sync their progress to a database
   4. As a developer, I would like to restrict the speed at which a user can progress
   5. As a developer, I would like to be able to update the application when more information gets added or bugs get fixed

**Non-Functional**

1. Must be able to play this game on Android products
2. Must be able to play this game on Apple products (if time allows)
3. Must have an interface that is intuitive and easily navigable
4. Must have a database that is easy to maintain and extend for new content
5. Must not be too complicated that detracts from gameplay experience

**Architecture and Performance**

We will be using the Unity Game Development engine, which utilizes the Mono .NET Framework and the programming language C#. We will be storing our data into a custom database that will contain all of the chemical structures, reactions, formulas, facts, and anything else that a structure would need in order to be used fully within the game.

We want to deliver to the user a smooth gameplay experience with a relatively low app file size. For a project with a large number of game elements such as this, we need to minimize the overall file size of the imported visual assets while still maintaining professional quality. Routes to achieve this goal will include using image manipulation code to modify images rather than having them stored as another file.

**Security**

It is critical to secure the user’s progress information in the game. We will store the data locally, which allows easy access and better control over the data. If time permits, we can encrypt the data to secure the information and prevent users from manipulating the data to gain uneven advantage. Additionally if time permits, we may go further to store user data on an online server.

**Usability**

The application will have a main screen that involves an area where all of the elements can be seen moving around. On that screen, there will also be noticeable, clearly labeled buttons to access other functions like fusing elements, viewing trivia, etc. None of the User Interface itself will be intuitive, detailed, and it will perform smoothly to avoid difficulties interacting with elements of the game. Users of all ages will be able to use the app without frustration.

**Deployment**

The application will be deployed onto the iOS App Store and Android Google Play Store. Any updates to our app can be done through those app stores through normal app updates.