
BOARD GAME UNDER CONSTRUCTION

PUTTING THE *DESIGN* IN *GAME DESIGN*

MASTERS OF FINE ARTS THESIS

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ABSTRACT

The contemporary design landscape is informed by the need for interactive design, yet not all interactive media is digital. Technology has transformed the way many people receive information, and thus the way that they interact with graphic design, and the impact of user interfaces in creating a positive interactive experience is more important now than ever. However, while this phenomenon is usually identified with the digital environment of smartphone apps, websites and video games, user interface is equally important in analog design, and few media illustrate this better than board games. Board games have enjoyed a surge in popularity over the past two decades, during which time the variety and complexity of games on the market has increased dramatically. Board games rely on a thematic and intuitive analog user interface to create an immersive experience for their players, and graphic design plays a substantial role in the success of this interface. Good design bridges the gap between players and a game's mechanics, and can therefore help make a game more engaging and its rules easier to understand and remember. Conversely, poor design can create unnecessary frustration that inhibits players' ability to engage with a game. Furthermore, unlike magazine articles or websites, which often follow a relatively predictable format, the mechanics of individual board games might require radically different approaches to design. Therefore, it is necessary to gain a better understanding of the impact of graphic design in board games by examining the success (or failure) of the graphics, icons, text, illustrations, and layout of the components in a board game's prototype, with the goal of discovering the most effective approach to the game's user interface and ultimately developing a finished, publication-ready game.

INTRODUCTION

Board games have grown in popularity in recent years, and the number of new games released each year has steadily risen over the course of the past two decades. The game mechanics, complexity and production value of board games have evolved considerably, and hobbyists can now choose from a wide selection of games ranging in complexity from simple, fast-playing party games to deeply strategic games that may take hours to play and feature hundreds of components. Game scholarship has also increased, with more researchers exploring the study of ludology in the hopes of applying their findings to game design, and while much of this scholarship is focused on the video game industry, the concepts apply equally to other types of gaming, including board games.

This thesis, and the research involved in its development, attempts to examine the influence of graphic design in board game composition. The designer's goal is to deepen the understanding of graphic design as a tool for creating a clear user interface and to show the importance of integrating design with a game's mechanics early in the game's development. To that end, it is crucial to understand how a game's graphic design supports, influences, and enhances game play. How can design be used to make a game's rules more intuitive and accessible, and how can design improve a game's thematic immersion? Though most game design scholarship delves deeply into the theories underpinning game mechanics, board game graphic design has not received much academic attention, and most information on the subject comes from experiential advice provided by industry experts.

Through this thesis, the designer explores these concepts by developing a complex, heavily-themed collaborative adventure board game called *Reaktor Mutants*, with the goal of pitching the prototype to game publishers.

While research highlights various approaches and strategies that might lead to effective game component design, the only way to learn whether or not the application of those strategies will be successful is by prototyping a game and conducting playtest sessions with groups of board game players. This process allows the game's designer to ascertain the effectiveness of the game's mechanics and its visual design. Thus, while research provides ample justification for this thesis and general strategies for solving the research problem (i.e. the creation of a marketable board game), the specific solutions developed to solve the problem will rely on prototyping and evaluation research.

The dynamic experience of playing a game emerges from the interface between the players and the game's rules. A game's designer influences the play experience most directly through the game's mechanics, but players approach the game experience from an aesthetic perspective first, interacting with the rules through the visual, tactile, and sometimes auditory qualities of the game's components (Hunicke). Thus, the design of a board game's components serves as a crucial gateway to an engaging and enjoyable play experience. Poorly designed components can frustrate players and hinder game play, while well-designed components can enhance a game's theme and make the rules more transparent and intuitive.

The designer addressed this challenge by conducting research on three levels. First, he researched existing philosophies, studies, and examples of game design, focusing specifically on the ways component and

visual design can impact game play. This included an examination of scholarly articles, interviews and case studies of successful board games that have qualities similar to the game designed for the thesis. Second, the designer conducted a series of playtest sessions in which real players tested early prototypes of the game, followed by a feedback survey on the components' final designs. These playtest sessions allowed the designer to garner feedback on the game's mechanics and visual design. This helped him evaluate his design decisions and make improvements based on observable player experience. Third, the designer researched the production costs and specifications involved in printing the board game. This research influenced the practical design of the game components.

The end result of this research and prototyping process is *Reaktor Mutants*, a fully designed board game prototype suitable for pitching to publishers.



1

RESEARCH

1. Research Rationale
2. Literature Review
3. Research Methods
4. Summary of Findings

1.1

RESEARCH RATIONALE

Despite recent academic interest in game design, formal research has yet to deeply explore the role of graphic design in the success of board games even though it seems obvious that design should be a crucial component of board game development. Game publishers certainly respect the importance of graphic design, but the value of visual design in a board game goes far beyond the obvious implications for marketing.

Even though industry experts, including published game designers and board game artists, have commented on the importance of graphic design in board game development, little academic scholarship has been lavished on the topic, and even among some professional game designers, good graphic design is often seen as an afterthought—something a publisher adds during the final stages of game development. However, just as an effective user interface is critical to modern digital app design, a board game’s graphic design is a valuable component of the game play experience, often assisting or obstructing that experience. Therefore, graphic design should be a key consideration in a game’s development from the beginning, even if initially it is limited merely to the basic layout of information on cards or the physical design of game components.

The goal of this research was therefore twofold. First, the designer aimed to develop a more complete understanding of prevailing game design theories and practices by examining existing scholarship and expert opinions. The literature review covered much of this research, but further research involved an analysis of graphic design as it applied to board games and a review of several existing board games that demonstrate both effective and ineffective elements of design.

Second, the designer attempted to apply these research findings to the development of the *Reaktor Mutants* board game prototype and then test that prototype through playtesting in order to assess the game’s mechanics and the effectiveness of its graphic design. Through this iterative prototyping process, the designer hoped to discover the most effective means of improving his own board game through the use of carefully considered graphic design.

1.2

LITERATURE REVIEW

A review of current literature on board game design revealed that relatively little scholarly research addresses the role of graphic design in board games, either ignoring it altogether or touching upon graphic design only peripherally. To some extent, this stands to reason: most game designers are not also graphic designers. Though rudimentary design work is necessary to generate early prototypes to playtest a game, a game's final visual design usually emerges during the process of publishing the game, after the game's mechanics have been fully developed. Most scholars are more concerned with the game's mechanics or the social/emotional interactions between players and rules systems than they are with the game's graphic design. However, a more holistic approach to game design that includes an awareness of graphic design's role in the development process could improve the effectiveness of a finished game.

SCHOLARLY RESEARCH

At the same time, scholarly literature also reveals that the key factor in determining a positive player experience with a game is immersion, followed by a game's ability to encourage social interaction (d'Astous, 87). The distinctive quality of that immersion is one thing that differentiates board games from other forms of entertainment such as movies: as a form of escapist experience, games rely on the fusion of both immersion and active participation (Mayra, 94). A game's mechanics are critical in creating this kind of active, immersive experience. The challenges set by a game's rules and the degree of competition or collaboration required to win a game create player investment in the game's outcome, and game mechanics involving hidden information or random chance can create suspense that helps keep players emotionally engaged (Barbara, 65). However, another crucial component of immersion is a game's ability to let players transcend their own reality and become involved in an imaginative narrative framed by the game itself. The ability of board games to stimulate imagination and fantasy plays a significant role in many players' enjoyment of a game (d'Astous, 82, 87). In this respect, a game's theme—and the visual design that expresses and reinforces that theme, are vitally important.

One notable game design philosophy, known as the MDA (Mechanics-Dynamics-Aesthetics) approach, suggests that a game's designer and its players approach the game experience from opposite ends of a spectrum. The designer establishes the mechanics that govern the game's rules, while the players approach the game from an experiential, aesthetic point of view, and the aesthetics of the game therefore define player interaction with it.

The dynamic experience of playing a game thus lies in the interaction between the game's mechanics and the emotional experience of the players playing it. This model shows that the game play experience is not firmly under the game designer's control (Hunnicke; Duarte, 84). However, it also suggests that compelling and functional visual design, which has a direct impact on player aesthetics, can play a crucial role in establishing the kind of dynamic experience a game's designer hopes to create by shaping the way players interact with the game.

Though most scholarly research does not directly address graphic design in board games, the research does offer data that strongly supports the value of visual design. Qualities such as comprehensibility and clarity are significant factors in player experience, and since a board game's components are a player's user interface, they are the primary channel through which a game can be made more or less clear to players (d'Astous, 81). Clarity and comprehensibility, in turn, improve a player's feeling of competence, which is also a key factor in player enjoyment of a game, especially in the analog environment of a board game, where the game's mechanics need to remain fairly transparent to players so that they feel that they have a greater sense of control over the game's outcome (Barbara, 75). Indeed, according to some sources, these qualities, alongside the social interaction encouraged by face-to-face play, are part of what contributes to the current success of board games in an entertainment industry dominated by video games (Donovan, 269).



INDUSTRY EXPERTISE

Literature from industry authorities such as board game designers, graphic designers, and publishers offers much greater insight into board game graphic design. Several prevailing opinions emerged from this literature, all of which emphasize the value of clarity, intuition, and theme in board game graphics. Industry professionals also strongly encourage playtesting—evaluating the success of a game and its components by garnering feedback from players.

Clarity and intuition are key to graphic design in board games. It should always be clear to players how a component is to be used. When components convey information (such as on game cards), that information should be presented as clearly as possible. Often, this provides a challenge: game components must sometimes present a large volume of information in a relatively small space, and finding a way to usefully organize that information requires the designer to consider what can be removed or combined to make better use of the space and to present information as efficiently as possible (Carslaw). Board games are often very complex, and it is the graphic designer's job to minimize that complexity through design. This helps facilitate game play and player immersion and can make difficult game mechanics more approachable and easier to remember (Brachmann).

One tool that designers can use to improve the efficient and thematic use of space is a game's iconography. A game's iconography can serve as a space-saving shorthand for conveying important game information and can also make game play more efficient and intuitive, as long as the icons are easy to learn and remember (Nunn, Part 2). In order to avoid semiotic confusion, the convention of meaning for the icons must be clearly established by the rules, and the icons must recognizably express the concepts that they represent (Crow, 64). Furthermore, they must reinforce the game's theme, and in doing so they can provide a more immersive player experience.

Icons are not appropriate for all information in a game, however. Too many obscure icons can be a roadblock to player entry into a game, and poorly designed icons might not cross cultural or linguistic barriers effectively (Major). In many cases, text will provide greater clarity and will speed up game play since it can provide all relevant game information directly on a card or other component (Nunn, Part 1). Text is also better for conveying complex mechanics or rules interactions, since it involves less interpretation and therefore lowers the risk of confusion (Major).

Industry professionals also emphasize the value of theme—a game's setting or story—in board game design. Though there is perpetual debate over the relative importance of theme versus mechanics in the design of a game, most designers agree that a harmonious fusion of the two creates a better play experience (Villaneuva, 276; Derrick). A compelling theme that is visibly supported by the game's graphic design and illustrations can draw attention and attract players. It can make players more excited about a game and thus makes the experience of learning a game's rules less intimidating. It can also make rules easier to understand by helping to answer questions about why a rule works a certain way (Rosewater). Furthermore, theme can differentiate a game from its competition by offering players a new and unique narrative experience (Strain).



CONCLUSION

The research revealed that player immersion is crucial to a good play experience, and that a game designer can use graphic design to enhance a player's interface with the game, improving the degree of player engagement through efficient component design and compelling theme. The role of graphic design in a board game's success is therefore clear. Even a bad game can sell if it looks amazing, while a good game might languish on the shelves if it looks dull or confusing. However, the game created for this thesis must utilize graphic design that not only makes the game look appealing, but also supports the mechanics and reinforces fun, engaging game play. In order to do so, it must present a harmonious and even symbiotic fusion of mechanics and visual design.

1.3

RESEARCH METHODS

The development of this thesis and its final deliverable—a working board game prototype—relied upon a range of research methods to gather data about the game and its design. The primary avenue of research involved the iterative process of prototyping, playtesting, and revising the game’s design. In their seminal book on game design theory, *Rules of Play*, Salen and Zimmerman suggest that this process is crucial to effective and efficient game design (Salen, 12). Through prototyping and testing, the game’s mechanics and graphic design can be refined into an effective finished product. In addition, it was crucial to investigate existing board games as well as production methods and costs.

BOARD GAME REVIEW

The designer’s extensive personal experience with board games informed much of his initial approach to board game graphic design, but a more focused examination of existing board games allowed the designer to analyze specific design elements that either contributed to or diminished the success of those games. This research primarily revolved around the assessment of specific game components and the way players tended to respond to those components during game play, and was to some degree subjective. The examples set by successfully published board games served to establish an initial approach to *Reaktor Mutants*’ graphic design and helped reveal common trends in the industry that have become staples of game design thanks to either their inherent effectiveness or player familiarity.

ITERATIVE PROTOTYPING

The core of the thesis research revolved around an evolving prototype of the *Reaktor Mutants* board game. This prototype included all game components, including board tiles, cards, tokens, and standees. This allowed the designer to put the game’s mechanics into practice and to explore the ways the visual design and layout of the game’s components could be used to help players interface with the game. The prototyping process continued throughout all phases of research.

The initial prototype included relatively little finished graphic design; it was more important early on to ensure that the mechanics were working effectively since major alterations to the game’s rules inevitably resulted in sizable changes to the design of its components, including the addition or elimination of certain components. As the prototype developed, the designer created a fully designed version featuring a draft of the game’s graphic elements that allowed the designer to assess the game’s visual design.

INITIAL PLAYTESTING

Playtesting allowed the game designer to test the game's mechanics and design and to work out problems or to assess the game's components. During this first phase of playtesting, the designer played the prototype with a small group of 2 to 4 playtesters. The purpose of these playtest sessions was to gauge the effectiveness, balance and fun of the game's mechanics. Each session attempted to play the game through from start to finish, ending when either a) the game was successfully completed or b) serious flaws in the mechanics became apparent and required revision. During this phase, the designer assessed only the broadest elements of visual design, such as the overall layout of cards or the use of text versus icons.

After each playtesting session the designer conducted a focus group discussion to collect feedback from playtesters. These focus group discussions attempted to identify areas that were working or areas that needed improvement in the game mechanics and design. Questions for these sessions were selected from the list provided in the Appendix.

Much feedback was also derived from player comments during the game and from the designer's own experience playing the game and observing the players' reactions during each playtest session.

The designer used this feedback to modify the game's mechanics and prototype, sometimes drastically, before the next round of playtest sessions.

PRODUCTION RESEARCH

Prior to creating the first fully designed draft of the game's components, or even finalizing the early prototypes of the game, it was necessary to research the technical details of the game's production. In order to do so, the designer reviewed the printing specifications and costs quoted by printers who specialize in board game production. Prior research showed that *The Game Crafter* was the best option for printing the *Reaktor Mutants* prototype because it specializes in limited run and print-on-demand board game printing and caters to designers who need to print game prototypes, while also offering a wide range of possible components, including many custom game component options. In many cases, this helped determine the number of cards included in some decks or the number of different kinds of tokens included in the game. In addition, the designer acquired the appropriate printing templates to ensure that the design of the *Reaktor Mutants* components adheres to *The Game Crafter's* printing specifications.

BLIND PLAYTESTING

Once the initial prototype had been tested to a point where the game appeared to be working successfully and a polished draft of the game's visual design had been completed, the designer planned to expand the playtest process to include a much wider group of playtesters who had not played the game before. This playtest group would include volunteers from local gaming clubs. The playtesters for this phase of development would not have prior experience with the game and would be asked to read the rules,

learn to play, and then play one or more sessions of the game without any input from the designer. This process is known in the industry as “blind” playtesting. This phase of research would utilize a fully designed draft of the game’s prototype, and its goals would include the following:

- Assess the clarity of the rules and game mechanics, including areas that can be improved through the game’s graphic design or rulebook.
- Assess the player experience and level of player engagement among players new to the game.
- Assess the effectiveness of the game’s graphic design, including layout, icon clarity, size and readability of text and the immersive qualities of the components.

After each playtest session, the playtesters would be asked to complete a questionnaire to provide quantitative feedback on the game and its design.

CHANGE OF PLANS

Unfortunately, because of restrictions on social gatherings imposed by the COVID-19 pandemic, the designer was unable to organize blind playtest sessions as originally planned, and was therefore forced to find other means to assess *Reaktor Mutants'* finished graphic design.

The designer considered several alternate methods for conducting playtest sessions remotely, including asking players to print and assemble the game’s components and then participate in online meetings to play the game. However, *Reaktor Mutants'* complexity and its large number of components, especially the double-sided tokens and markers, made this solution impractical. The designer also investigated well-known online platforms such as *Vassal* for simulating tabletop games, but found that they required a depth of programming knowledge that made them inaccessible for the purposes of his playtesting needs (*Vassal*).

To solve the problem, the designer created an online survey that asked many of the same questions from his original blind playtesting questionnaire, specifically those that addressed elements of the game’s graphic design. He then provided a selection of reviewers—all either professional artists and designers or avid board game hobbyists—with the *Reaktor Mutants* rulebook and access to digital versions of the game’s illustrations and game components. Reviewers were asked to read the rules and carefully review the components before providing guided feedback on their impressions through the survey. Though this solution did not provide the same depth of insight as a series of blind playtest sessions would, the data collected from it was sufficient for the purpose of analyzing players’ reactions to the game’s graphic design and identifying areas where that design might be improved.

Hopkins and K.C. are two of Reaktor Mutants' playable characters. The images shown here represent the final versions of the characters after a long design process that involved several different approaches to the illustrations.



1.4

SUMMARY OF FINDINGS

Research revealed numerous approaches to design and areas for improvement in the *Reaktor Mutants* prototype. These revisions improved the game's mechanics, and more importantly, they helped enhance the design of the game's components, ensuring that they support and improve player experience.

BOARD GAME REVIEW

The board game review loosely addressed an assortment of board games with which the designer was familiar, as well as a number of games acquired in an attempt to broaden the designer's experience with different types of games. This phase of research attempted to identify elements of various games' graphic design that the designer or his fellow players felt contributed either positively or negatively to player experience. Components from several games illustrated key trends worthy of note:

Abomination: The Heir of Frankenstein (Plaid Hat Games): *Abomination* successfully evokes the dark themes of Mary Shelley's *Frankenstein* with a somber board, player boards with instrument dials and laboratory graphics, and macabre illustrations, including the body part tokens that players work to assemble into a finished monster. However, the game's sometimes confusing collection of icons increase the barrier of entry for new players, making it difficult for them to understand the benefits of various choices when taking each turn. As with similar resource management games, this symbolic shorthand becomes second nature upon repeated plays, and therefore streamlines game play for seasoned players, but can hinder the enjoyment of inexperienced or casual players.



Above: *Abomination* player board.
Right: *Abomination* game board set up.





Star Wars: Outer Rim player board shown with game cards attached and reputation slider “switches” shown on right.

Star Wars: Outer Rim: The player boards in Fantasy Flight Games' *Star Wars: Outer Rim* board game demonstrate good game component design. The board itself is a semicircular arch, visually representing the outer rim of the *Star Wars* galaxy and making the game both more immersive and unique. The player boards include clearly labeled slots for game cards acquired during game play, readily apparent game information, and plenty of area to place relevant game tokens. The thematic graphics help immerse players in the *Star Wars* experience, and the slider slots for reputation tokens on the far right of the player board evoke the feeling that the board is a starship's instrument panel. Furthermore, the cards are designed so that all important information is still visible when they are tucked under the player board. However, the game's design suffers from small, light type, which can be difficult to read on some cards.

Last Night on Earth (Flying Frog Productions): *Last Night on Earth* is a zombie game that successfully evokes the experience of zombie films. Although the game's use of typography leaves much to be desired, the layout of game cards is very clear, if sometimes cluttered, following a standard and easily understandable format with text that is clearly and consistently placed for easy reference. The extensive use of textures on game components helps to establish the game's atmosphere, and the use of photography instead of illustrations helps to deepen player immersion in the theme, easily matching the gritty look and feel of a classic zombie film. This game's approach demonstrates the value of design in establishing theme.



The Last Night on Earth cards demonstrate a standard approach to card layout, but sometimes seem cluttered.



Last Night on Earth player reference card with game information, important keywords, and icons to track damage.



Malifaux 3rd Edition card.

PROTOTYPING AND ILLUSTRATION

Malifaux (Wyrd Games): Although *Malifaux* is not a board game *per se* (it is a tabletop miniatures game), the design of its components have much in common with board game design. The game recently released a third edition in which it completely redesigned its brand, including the cards containing game information for the various playable figures used in the game. The updated third edition cards provide a succinct case study in design refinement. The card size was increased to make information and graphics more visible, key game statistics were given greater prominence on the new cards, a serif typeface makes the text more readable at small sizes, and the vertical arrangement of the information make the overall layout easier to follow and understand. In addition, better contrast makes much of the information more readable. Even with all of those changes, the new card size and format leaves more room for the illustration, making it easier to identify the card from among others during a game and showcasing the game's beautiful artwork much more effectively.

It became clear over the course of the board game review that striking a balance between theme and usability was key to good board game design. Creating a heavily thematic design helps improve player immersion, but only if the design remains intuitive and easy to use. Furthermore, designs that help players organize their play experience—such as player boards with clearly marked areas for keeping cards collected during the game—improve player enjoyment and streamline game play.

The early prototypes of *Reaktor Mutants* were completed using a rudimentary approach to graphic design, a few roughly sketched illustrations, and components fashioned largely from cardstock. In the final version of the game, most of the tokens, standees, and board tiles will be printed on and cut from thick cardstock or chipboard.

- The early prototype cards were printed on cardstock and sleeved in plastic card sleeves with colored backs to make them easier to shuffle and distinguish. The designer used different colors of card sleeves for each of the game's different decks. In the final version of the game, these decks have different back designs to distinguish them.
- Tokens and markers were printed on cardstock and cut out using circle punches.
- Board tiles were printed on cardstock and trimmed to size.
- Character profile cards were printed on cardstock.
- Character standees were created using printed cardstock.
- Some tokens, such as radiation counters or the tokens used to mark the amount of salvage collected by the players, were represented in the prototype with small, colored plastic game tokens. In the finished version of the game, these were replaced with fully designed tokens, each featuring its own unique graphics.

In addition to building a loosely designed prototype, the designer also explored various approaches to the game's artwork, often using projects in other graduate classes to do so. As a result, the designer was able to create illustrations for several of the prototype's board tiles, and began to develop images for the game's playable characters. Two examples of these illustrations are included below.

Top Right: An early Reaktor Mutants prototype used during initial playtest sessions, showing board tile layout, tokens, character profile cards, and sleeved card decks.

Bottom Left: Illustration experiment for Voss, the salvage crew's captain. Despite the success of this image, the designer chose to use vector illustrations for characters and equipment instead of digital painting.

Bottom Right: Board tile illustration representing the ship's cargo bay.





Above: Character lineup featuring first draft illustrations for two playable characters (Hopkins, the crew's pilot, and Madhavi, the crew's chief mechanic) and the game's titular Reaktor Mutant. The researcher eventually decided to refine the illustrations further to evoke a more streamlined atomic age cartoon style and to make them more dynamic.

Right: An assortment of icons designed for the game. These icons are used on various game components to quickly convey important information, such as the behavior characteristics of the game's monsters. They also demonstrate aspects of the game's color scheme.



Each round of playtesting consisted of between 2-4 games played using the prototype, usually 1-2 games per week using the same sets of players.

Since the game supports 2-4 players, each session involved between two and four players, with most sessions including three players, one of whom was the designer. The other players were board game hobbyists who represented *Reaktor Mutants'* target audience (i.e. board gamers who prefer collaborative, thematic adventure board games).

After each set of playtest sessions, the prototype was revised based on player feedback and the designer's observations on the game's mechanics, pacing and player enjoyment. Throughout this initial phase of development, most refinements to the game focused on its mechanics rather than its graphic design, but some elements of design, such as the way bonuses or penalties were presented on the cards or the icons used to indicate the results of various player actions, were revised as needed. Although many things changed during the course of the game's development, the major revisions in the design are summarized below:

Monster Spawning and Game Pacing: In *Reaktor Mutants*, players play characters who are members of a salvage crew attempting to make a big score by collecting salvage from a derelict spaceship. However, the ship is highly radioactive, and the characters will inevitably become mutated by the radiation over the course of the game. If a character acquires too many mutations, she might transform into a "Reaktor Mutant," turning against the other players. In addition, the ship is filled with mutated monsters—the remains of the ship's former crew.

Initial versions of the game included a mechanic that would continually spawn monsters to attack the characters as they explored the ship. This kept pressure on the characters and was intended to maintain a high level of tension during the game. However, the spawning mechanics often made the endless supply of monsters overwhelming, and sometimes slowed the game down as the characters fought off wave after wave of monsters without making any real progress toward their goals. This became a critical problem with the game's pacing, and left the players feeling helpless to overcome the game's challenges. The problem was compounded by the difficulty of acquiring useful equipment, such as weapons, early in the game.

Over the course of several prototype iterations, the designer resolved this problem by devising a new spawning mechanic that revealed new monsters as "sensor contacts" in empty rooms as the players explored the ship. This gave the players some control over when monsters would spawn, and also allowed the players to take steps to secure rooms against spawning sensor contacts, ultimately giving the players more tactical options and limiting the number of monsters that were likely to spawn and attack the characters at once. In addition, since monsters initially spawn as sensor contacts that are only revealed once a character enters the same room, players can see how many monsters there are, but they don't know whether a contact represents

a weak, timid monster or a powerful, aggressive one, and some sensor contacts, when revealed, might turn out to be false signals. This new system proved very popular with players since it gave them much greater control over the course of the game while maintaining an appropriate degree of tension and suspense as the characters moved deeper into the derelict ship. The visual design element of the sensor contact tokens, which look like radar blips, also improved the thematically immersive qualities of the game.

Searching for Salvage and Equipment: One challenge present in the game's development was finding ways to encourage characters to explore deeply into the game board (the derelict ship) while searching for salvage. To search for salvage, a character must draw and resolve a Salvage card. If successful, she would acquire either a useful equipment item or one or more Scrap tokens. The initial draft of the game allowed characters to search in any room on the game board for salvage, but this did not encourage exploration of the ship.

A second draft of this mechanic allowed players to search each room only once. This required the addition of a new game component: "Searched" tokens. These tokens were used to mark rooms that had already been searched. Unfortunately, this limited the amount of salvage characters could collect over the course of the game and could potentially lead to a scenario in which all rooms had been searched without the characters accumulating enough scrap to win the game, especially if they drew numerous Salvage cards that provided equipment instead of salvage. Furthermore, the addition of Searched tokens made an already crowded game board even more cluttered. The designer ended up abandoning this mechanic in favor of better options.

The final version of the salvage mechanics introduced another new component: Opportunity tokens. Players start with a number of Opportunity tokens and must spend them in order to have their characters search for salvage. The number of opportunity tokens that must be spent to search a room on the game board depends on the Radiation Level of the room in question: higher Rad Levels require fewer opportunity tokens, making it more efficient to search in more dangerous regions of the ship.

In addition, characters can spend one Opportunity token no matter where they are on the board to search for equipment, which lets the character draw an Equipment card.

These changes forced players to make tough choices when searching for salvage or useful equipment, while also giving them a more reliable way to gain equipment early in the game. Salvage became engaging and strategic, which increased the degree of player enjoyment and immersion.

Character Mutations and Radiation Accumulation: The speed with which characters accumulate radiation and mutations changed significantly over the course of playtesting. Initial playtesting sessions proved that players

were accumulating “rads” too quickly, and that they did not have sufficient options for managing the rate at which they gained radiation tokens. As a result, characters accumulated mutations very rapidly, and the most common way the game ended during the early rounds of playtesting was for multiple characters to transform into Reaktor Mutants.

In order to solve this problem, the designer altered the cards that determined how many rads a character received at the end of each turn, significantly reducing the average number of rads each card gave characters. Since mutations are tied to rads, this not only lowered the number of rads characters accumulated, but also the number of mutations they acquired over time.

Initial versions of the game included a “Radiation Suit” item characters could acquire. This item lowered the number of rads acquired at the end of each turn, but became useless if the character suffered any damage. The suit could be repaired, but only by spending scrap - the very thing the characters were trying to accumulate in order to win the game.

The rad suit was a popular item that improved the game’s balance and player enjoyment, and it also gave players new choices to make (suffer more rads or spend valuable scrap to repair the suit?). Based on this feedback, the designer decided to give all characters a “rad screen” that operated exactly like the rad suit. This change not only helped players manage their rads more effectively, but also introduced additional choices into the game. It made encounters with monsters more tense, since characters faced the threat of damaging their rad screens if they were wounded.

Dice System: The initial dice system for the game used 10-sided dice. Players would attempt to roll equal to or greater than their character’s various skill ratings to succeed at various in-game tasks, such as fighting monsters or repairing a device. Though statistically sound, this system did not provide a positive play experience. The chances of success or failure often felt very tenuous, and while playtesters found it easy to predict the odds for any action, the system did not inspire any excitement when rolling the dice. In order to address this issue, the designer developed and playtested two other dice systems.

The second system, which used custom 8-sided dice of different colors, was visually appealing. However, even though the system was theoretically well-balanced, it left players feeling like they were more likely to fail than succeed. Furthermore, custom dice would increase the cost of the game prototype.

The third system proved far more successful. This system used six-sided dice of two different colors. Blue skill dice represented a character’s skill and expertise, while orange stress dice represented stress or hazards that might make a task more difficult. To see if a character completes an action successfully, the player rolls one or more skill dice and one or more stress dice together and looks at the highest rolling die. If a skill die rolls highest,

the action succeeds. If a stress die rolls highest, the action fails. Ties might be a success, a failure, or a draw depending on the situation, and various game rules or player options can modify the effects of a tie, making tasks more or less difficult. Certain game effects might also add additional skill or stress dice to a roll, shifting the odds of success or failure.

This final system was popular with playtesters and is currently the dice system used by the game's rules. Furthermore, it lends itself easily to concise visual design, since skill or stress die bonuses can be depicted on cards using a blue or orange die icon.



PRODUCTION RESEARCH

Production cost research revealed that the cost for the prototype would fall within the designer's projected budget, putting the prototype at roughly \$200. Furthermore, the production specifications influenced the number and form of many game components:

- The number and distribution of markers, tokens and cards was be adjusted to evenly fill full sheets as much as possible when printed.
- The original concept for the game included standees for the monsters as well as the characters. However, production research revealed that the game's cost could be lowered considerably if the monster standees were removed. The sensor contact tokens, when revealed, show an image of the monster they represent underneath, so these tokens remain on the board to represent the monsters. This also streamlines game play, since players would not have to switch the sensor contact token for a monster standee each time a monster is revealed.
- The board tile sizes offered by *The Game Crafter* do not correspond well to the sizes needed for *Reaktor Mutants*; they are either too small, leaving too little room for sensor contact tokens, character standees, and other game elements within each room on the board, or they are too large, making the board, once assembled, too big. Thus, the designer was forced to rely on custom board tile sizes for *Reaktor Mutants*. While this increased the cost of the prototype, the designer deemed the cost increase acceptable in the interest of better playability.

After completing a finished draft of *Reaktor Mutants'* components and designing the game's rulebook, the designer shared his work with a selection of reviewers in order to get feedback on the clarity of the game's rules and design. All reviewers were either professional artists or designers or board game hobbyists recruited from local gaming clubs who represented *Reaktor Mutants'* target audience. Reviewers were asked to read the rules and review the work in detail before responding to an online survey that asked questions about the game's graphic design, including the clarity of the design, the readability of the text, and the game's use of color. The survey questions and response data may be found in the Appendix on page 86.

The overall response to the game's design was very positive, and reviewers universally agreed that the design of the components effectively supported and reinforced the game's rules, mechanics and theme. Reviewers felt that the game's text was easy to read and follow, and that its iconography was identifiable, memorable, and easy to interpret. Only 11% of respondents noted any significant areas in which the design or rules were unclear to them, and those respondents still felt that the overall game design was successful and understandable.

In their comments, the majority of respondents noted that they felt the game's rules as presented in the rulebook were adequately supported by good visuals and examples that helped alleviate any potential confusion. They also noted that the images in the rulebook made it easy to find information when referring to the rules during game play, and that the rulebook was well-organized. A few reviewers expressed surprise at the complexity of the rules, but commented that they felt the game's design and the way the rules were presented in the rulebook would make it easy to answer any rules questions during game play.

Respondents commented favorably on the game's use of icons, and several respondents specifically noted that they felt the skill icons and the monster behavior icons were very expressive and easy to understand, since they clearly illustrated the concept they represented. The only major criticism of the game's use of icons was the icon for the "tie" result on skill checks. The original icon (⬠) was too similar to the icons for success (⬢) and failure (⬣), which respondents noted might cause confusion at a glance, especially when players looked at cards held by other players around the table. In response to this feedback, the designer changed the "tie" icon to use a circular graphic (⦿) in order to better differentiate it.

Most reviewers were very positive toward the game's color palette and the use of those colors in helping to identify various game components. Several reviewers commented on the deliberate use of colors to imply game elements that were either positive or negative for the players: blue being universally positive, and orange being universally negative, with green and yellow representing degrees in between. Most respondents also felt the color palette helped to reinforce the game's retro atomic age theme.

When creating the game's components, the designer specifically attempted to ensure that color was not the only signifier of important information. Thus, no game component relies solely on color to convey its purpose or meaning. This approach was intended to ensure that the game was easily accessible to colorblind players. One reviewer, who voluntarily identified as red-green colorblind in their comments, noted that they appreciated the game's use of color specifically for that reason, as they had no trouble identifying or reading game components despite their limited ability to see color.

Overall, reviewers seemed pleased with the game's illustrations and felt that they contributed to the game's theme, atmosphere, and immersion. Only a few reviewers were critical of the illustrations, and even then, their main criticism was that they felt the style of the illustrations was a bit inconsistent, with the board tiles, the monsters, and the characters all occupying different stylistic spaces. The majority of reviewers, however, did not seem to share that impression.

One very interesting phenomenon that emerged from this review process was a general disparity in the feedback from designers as opposed to board game hobbyists, specifically in regard to the clarity of the game's rules and components. Almost universally, the reviewers who identified as board game hobbyists (the game's target audience) found the rules to be clear and felt that the components were straightforward and easily understandable. The small percentage of reviewers who gave the game's rules or components a lower clarity rating (3 or 4 on a scale of 1–5) were all professional designers rather than board game hobbyists.

This minor deviation in the data suggests one of two things, and probably a combination of both. First, designers are likely to be more particular and critical of a product's design, and may therefore rate it more harshly than non-designers. Second, board game hobbyists are more familiar with the kind of design and complex rules found in games like *Reaktor Mutants*, and were therefore more comfortable with the game's design and user interface, finding it far more approachable than someone who has never played this kind of complex, modern, collaborative board game before.

Conclusions drawn from the feedback survey suggest that the *Reaktor Mutants* prototype is, on the whole, very successful in establishing a well-designed user interface, creating an appealing and immersive theme, and presenting the game's rules in an approachable, understandable manner. Aside from a few minor changes to icons and a few edits to the game's rulebook to address reviewer comments, the designer did not feel it necessary to make any major alterations to the game's design following the survey. If the game undergoes future changes, those changes will come as a response to further playtesting.

2

DESIGN PROCESS AND FINAL WORK

1. Moodboards
2. Color Scheme & Typography
3. Illustrations
4. Cards & Rulebook
5. Tokens and Markers
6. Board Tiles

2.1

MOODBOARDS

The design of the *Reaktor Mutants* board game draws heavily from atomic age science fiction and product design as well as the gritty look of sci-fi monster movies from the 1980's, such as *Aliens*, *The Thing*, and *Leviathan*. The selection of project moodboard images shown on the following pages reflect this inspiration.

BOARD GAME DESIGN

A great deal of the design inspiration came from existing board games. The designer frequently referenced his experience with modern adventure board games to find guidance on game component design. In particular, the games *Mansions of Madness* and *Zombicide* provided excellent examples of game tile design.

CHARACTER ILLUSTRATIONS

In order to capture the atomic age theme of *Reaktor Mutants*, the designer chose to pursue a mid-century cartoon aesthetic for the characters. This reinforced the fun tone of the game, which treats relatively dark science fiction themes with a light-hearted, campy touch. The cartoon style also aligned well with the medium: vector illustration.










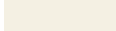
2.2

COLOR SCHEME & TYPOGRAPHY

COLOR SCHEME

The game's typography and color scheme needed to evoke atomic age design while also feeling crisp and modern. Both were also informed by science fiction monster movies from the 1980's

Because many of the game's components use color to help convey important information to the players, the palette had to remain fairly diverse. In practice, most of the color palette emerged in the process of creating the game's illustrations. The primary palette for the game consists of the following colors:

	C 9 M 97 Y 100 K 0		C 64 M 25 Y 86 K 7
	C 0 M 70 Y 100 K 0		C 78 M 64 Y 58 K 51
	C 0 M 40 Y 100 K 0		C 55 M 34 Y 37 K 0
	C 50 M 0 Y 100 K 0		C 41 M 58 Y 80 K 38
	C 56 M 0 Y 27 K 0		C 4 M 4 Y 10 K 0

TYPOGRAPHY

The typeface chosen for most of the game's text is Fabrikat, while the body copy in the game's rulebook is Acumin Pro Light. Fabrikat is a geometric typeface that nicely bridged mid-century design with a more modern look, and it has a slightly technological feel that worked well with the game's science fiction themes.

Titles, Card Names and Bold Copy

FABRIKAT BLACK

Card Titles and Risk Headers

FABRIKAT BOLD ITALIC

Headers and Card Traits

FABRIKAT BOLD

Body Copy

FABRIKAT MEDIUM

Narrative Text

FABRIKAT MEDIUM

Rulebook Copy

ACUMIN PRO LIGHT

2.3

ILLUSTRATIONS

The most challenging and time-consuming part of the design process was developing the character, monster and item illustrations. The character and monster illustrations underwent many variations during this process as the designer refined the illustration style and settled on an effective illustration technique. The designer began the process with concept sketches and experimented with both digital painting and vector illustration. After completing four of the six character illustrations in Adobe Illustrator, the designer realized that the character designs were not strong enough. They lacked dynamism, were overly detailed in some areas, and did not adequately evoke the game's atomic age cartoon aesthetic. As a result, the designer revisited the character design process with coaching from the Thesis Chair (Monica Bruenjes), attempting to infuse the characters with more personality and stronger poses. The revised character illustrations fulfilled the designer's vision for the game much better than the first attempt.

GENERAL CHARACTER POSE SKETCHES



These sketches represent the designer's revised approach to the character designs, and were completed after he decided to revisit the character illustrations. They are included here to demonstrate the initial steps of the final character designs.

VOSS CHARACTER DESIGN

Voss is the captain of the salvage crew. He is a daring, charismatic leader with a devil-may-care attitude and big plans. He doesn't sweat the details of the salvage crew's operations (he leaves that to his first officer, K.C.), but he's the first through the airlock when it comes time to get the job done. Roguishly handsome if somewhat disheveled, Voss should evoke the bravado of a pulp sci-fi hero.



CHARACTER DEVELOPMENT SKETCHES



COSTUME AND COLOR VARIATIONS



VECTOR ILLUSTRATION (FIRST ATTEMPT)

Right: During the character development process, the designer considered painting the characters digitally instead of rendering as vector art. The designer ultimately chose to finish the illustrations as vector art because he was more comfortable with that medium and because the look of vector illustration better reflects the sleek mid-century cartoon style required for the illustrations.

Below: After deciding to revisit the character illustrations, the designer drew new versions of Voss. Though similar to the original Voss drawings, the results were much more dynamic than the first attempt.



COSTUME AND COLOR VARIATIONS

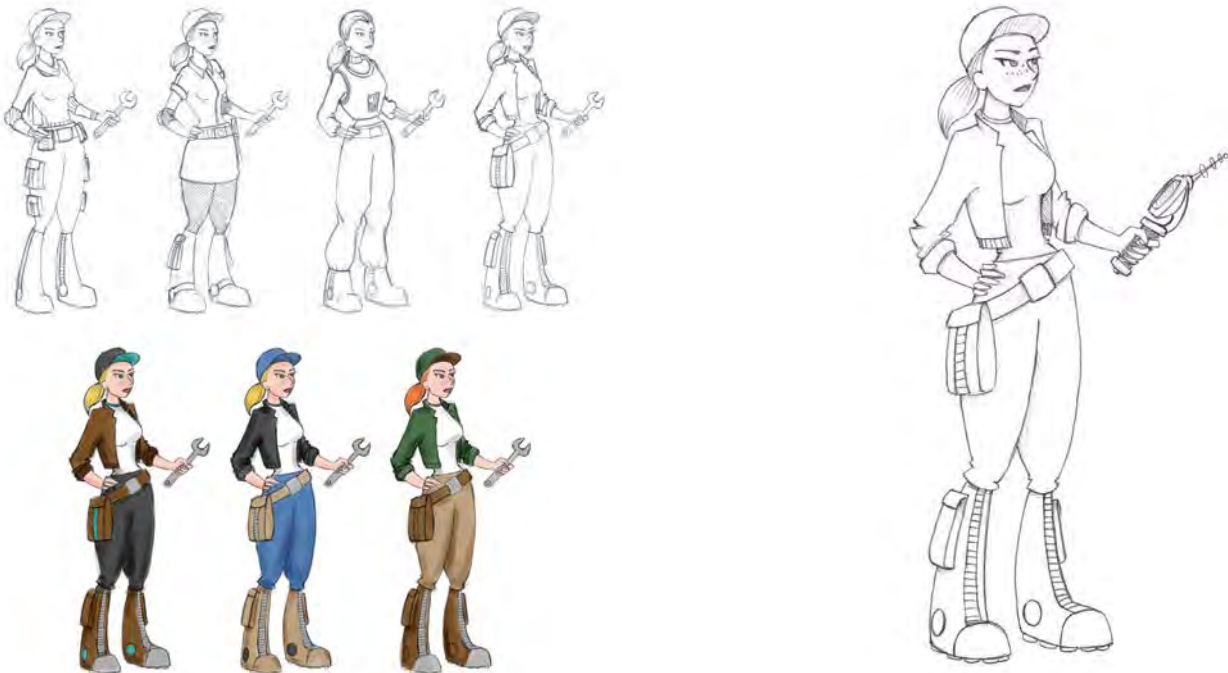
FINAL VOSS ILLUSTRATION

K.C. CHARACTER DESIGN

K.C. is the salvage crew's operations officer and second-in-command. She is a perfect foil to Voss: organized, responsible, and detail-oriented. Unlike Voss, she frets over details and tends to be a bit anxious, but she's a hard worker who always gets the job done. Even though the rest of the crew gives her a hard time for her straight-laced attitude, she is incredibly loyal to them; after all, *someone* has to make sure they don't get in over their heads.



CHARACTER DEVELOPMENT SKETCHES

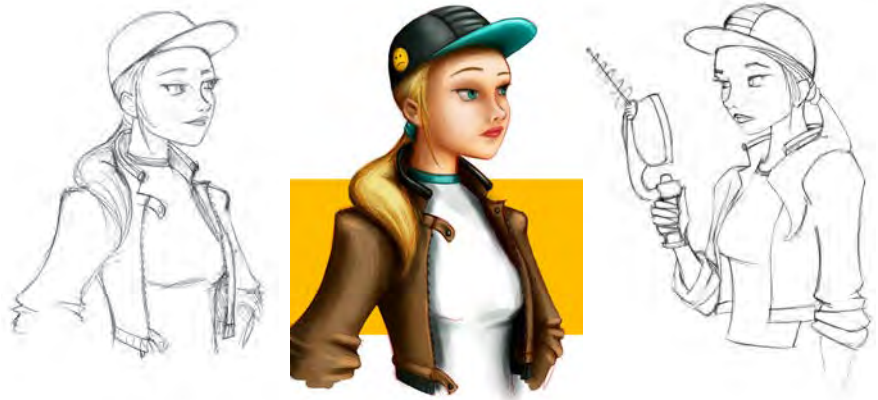


COSTUME AND COLOR VARIATIONS

REVISED ILLUSTRATION (FIRST ATTEMPT)

Right: As with Voss, the designer attempted a digital painting of K.C. However, the result was unacceptable. The designer attempted a second sketch, planning to try another painted version, but decided to abandon that approach in favor of vector illustration.

Below: After deciding to revisit the character illustrations, the designer drew new versions of K.C. These drawings altered her pose and expressed her personality more clearly, exaggerating both and bringing them in line with her character concept.



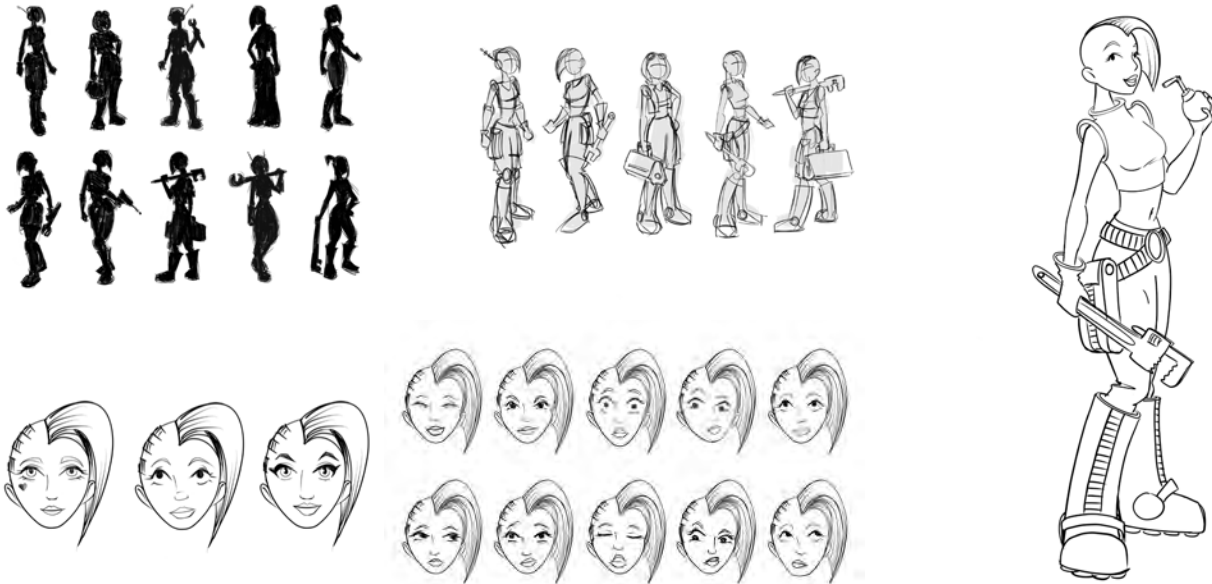
REVISED ILLUSTRATIONS



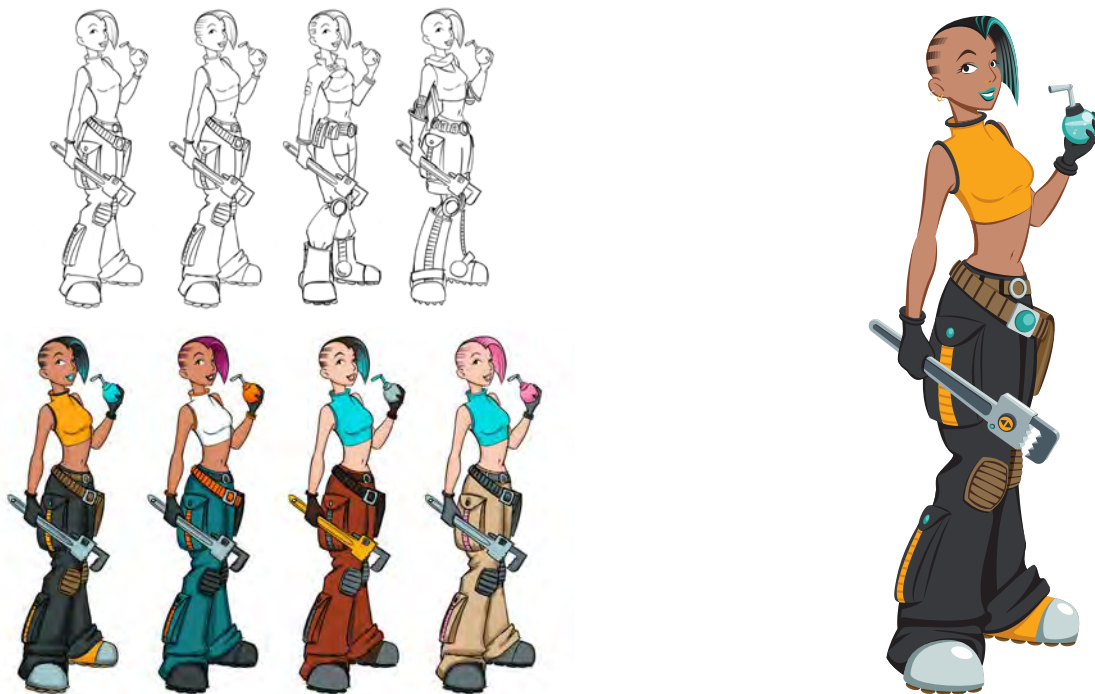
FINAL K.C. ILLUSTRATION

MADHAVI CHARACTER DESIGN

Madhavi is the salvage crew's sexy, fun-loving, anti-authoritarian mechanic. She styles herself with a punk aesthetic, and she is outgoing, vivacious, and a bit sultry. She is naturally flirtatious, but her real passion is for ship mechanics, and it doesn't take much to get her babbling excitedly about the inner workings of fusion couplings. She's very direct in her approach to just about everything, and isn't afraid to take a wrench to just about any problem.



CHARACTER DEVELOPMENT SKETCHES

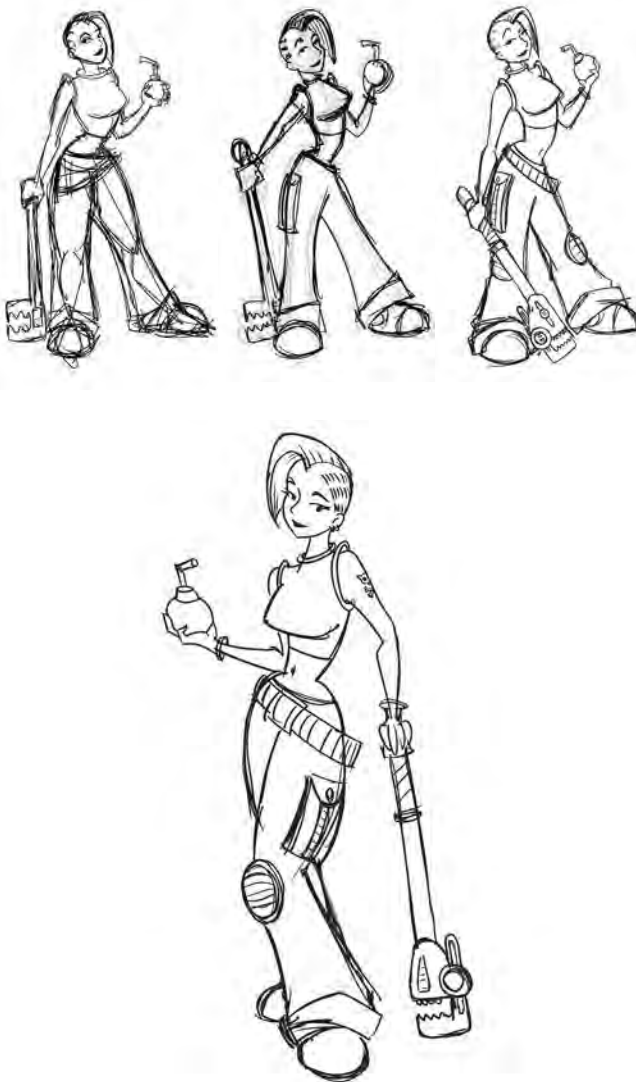


COSTUME AND COLOR VARIATIONS

VECTOR ILLUSTRATION (FIRST ATTEMPT)

Right: Madhavi's digital painting represented a very different vision of the character. The designer felt that she lost some of her fun, edgy qualities and disliked the heavy-lidded style of the design, so he decided to abandon this version of the character.

Below: Madhavi's final revisited design maintained most of the qualities of the first attempt, but injected a more fitting personality and more dynamic pose. The designer experimented with a wide, arrogant pose at first, but settled on a different, more natural pose for the final illustration.



REVISED ILLUSTRATIONS

FINAL MADHAVI ILLUSTRATION

FREDDY CHARACTER DESIGN

Freddy is the crew's muscle and EVA specialist. He's a big, athletic guy with a bright smile and the personality to match. Always in a good mood and unflaggingly positive, Freddy always keeps the crew's spirits up, even when things look grim. He's brave and selfless, willing to put himself in harm's way to protect others.



CHARACTER DEVELOPMENT SKETCHES

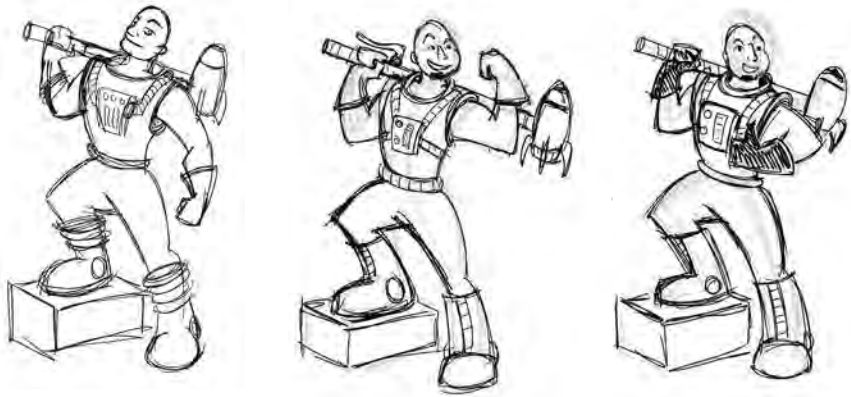


Left: Unlike the other characters, Freddy was first designed as a sketch for a digital painting, and therefore does not share the same depth of character development as the other characters. The finished digital painting is shown at right. The researcher was able to develop Freddy's design more during the second round of character design revisions.

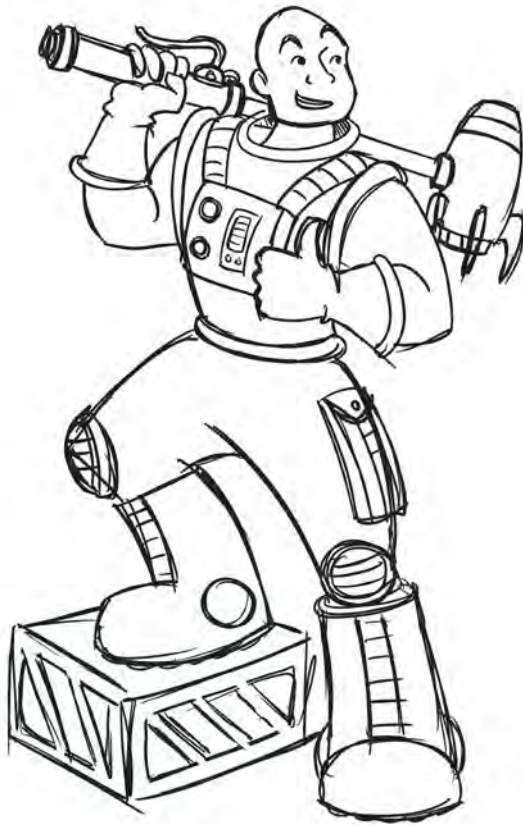
DIGITAL PAINTING (FIRST ATTEMPT AT CHARACTER DESIGN)

Right: The biggest challenge in finalizing Freddy's character design was deciding what to do with his left arm. The arm kept interacting oddly with his body or the rocket hammer perched on his shoulder. In the end, the designer decided to stick with the "thumbs up" pose even though it would require extra attention to color in the final illustration to ensure that Freddy's hand was readable in front of his body.

Below: The revised version of Freddy's character design looks more confident, friendly and heroic—all of which perfectly express Freddy's concept.



REVISED SKETCHES



FINAL REVISED SKETCH



FINAL FREDDY ILLUSTRATION

CLARA CHARACTER DESIGN

Beautiful, sassy, and caring, Clara is the salvage crew's medic and the unofficial den mother to their makeshift family. Her warm personality is spiced with a sharp wit, and she's the only member of the crew who can boss Voss around. She used to be a public relations icon for the Galactic Space Force (GSF), but left after losing her left leg in a space battle that showed her how corrupt and tyrannical they were.



CHARACTER DEVELOPMENT SKETCHES

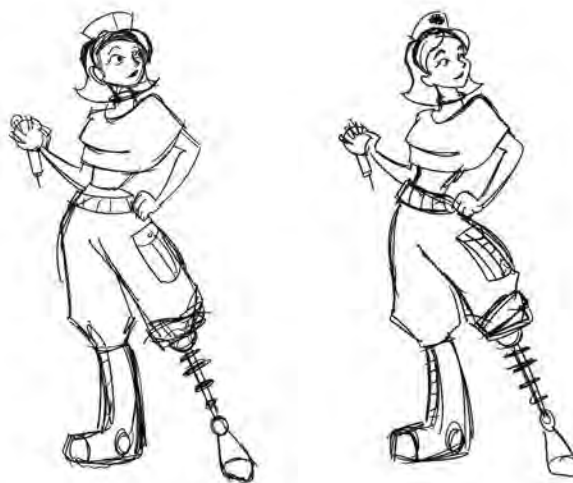


REVISED SKETCHES



VECTOR ILLUSTRATION (FIRST ATTEMPT)

Right and Below: Since the designer was relatively happy with Clara's original design, she did not change much in the second round of major revisions. Mainly, the designer exaggerated her pose and gave her a more dynamic expression in order to make her a bit more active.



REVISED SKETCHES



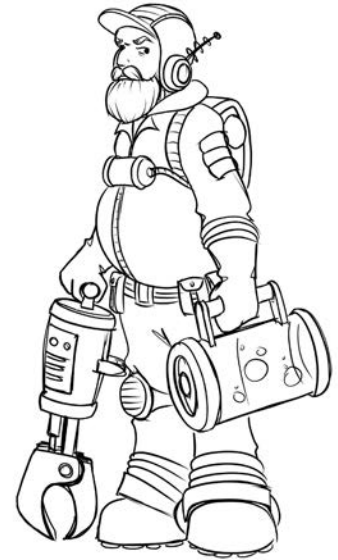
FINAL REVISED SKETCH



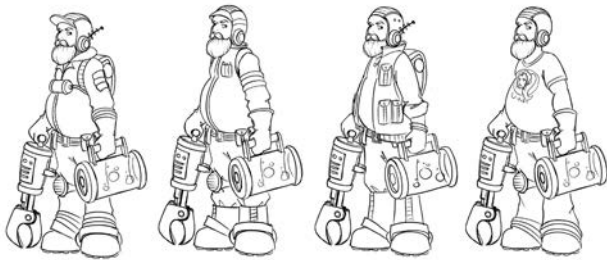
FINAL CLARA ILLUSTRATION

HOPKINS CHARACTER DESIGN

Hopkins is the salvage crew's pilot. Though he was once a hotshot who flew for the Galactic Space Force, he has since gone to seed and, like the rest of the crew, has developed a poor opinion of the GSF's politics and greed. Hopkins is surly and anti-social, avoiding company when possible. But he's not afraid to get his hands dirty to get a job done, and he's got the age and experience to handle pretty much anything that comes his way.



CHARACTER DEVELOPMENT SKETCHES



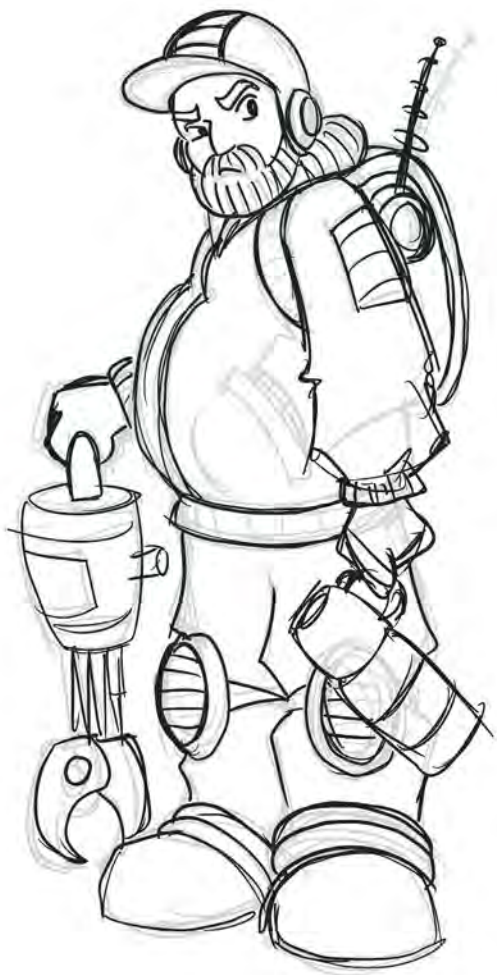
COSTUME AND COLOR VARIATIONS

VECTOR ILLUSTRATION (FIRST ATTEMPT)

Right and Below: At first, Hopkins did not change much in the second round of revisions, but after completing the revised drawings, the designer realized that the image was not adequately expressing Hopkins' character and was much less dynamic than the other designs. As a result, he pushed the design a bit further with a another sketch that became the final illustration.



REVISED SKETCHES



FINAL REVISED SKETCH

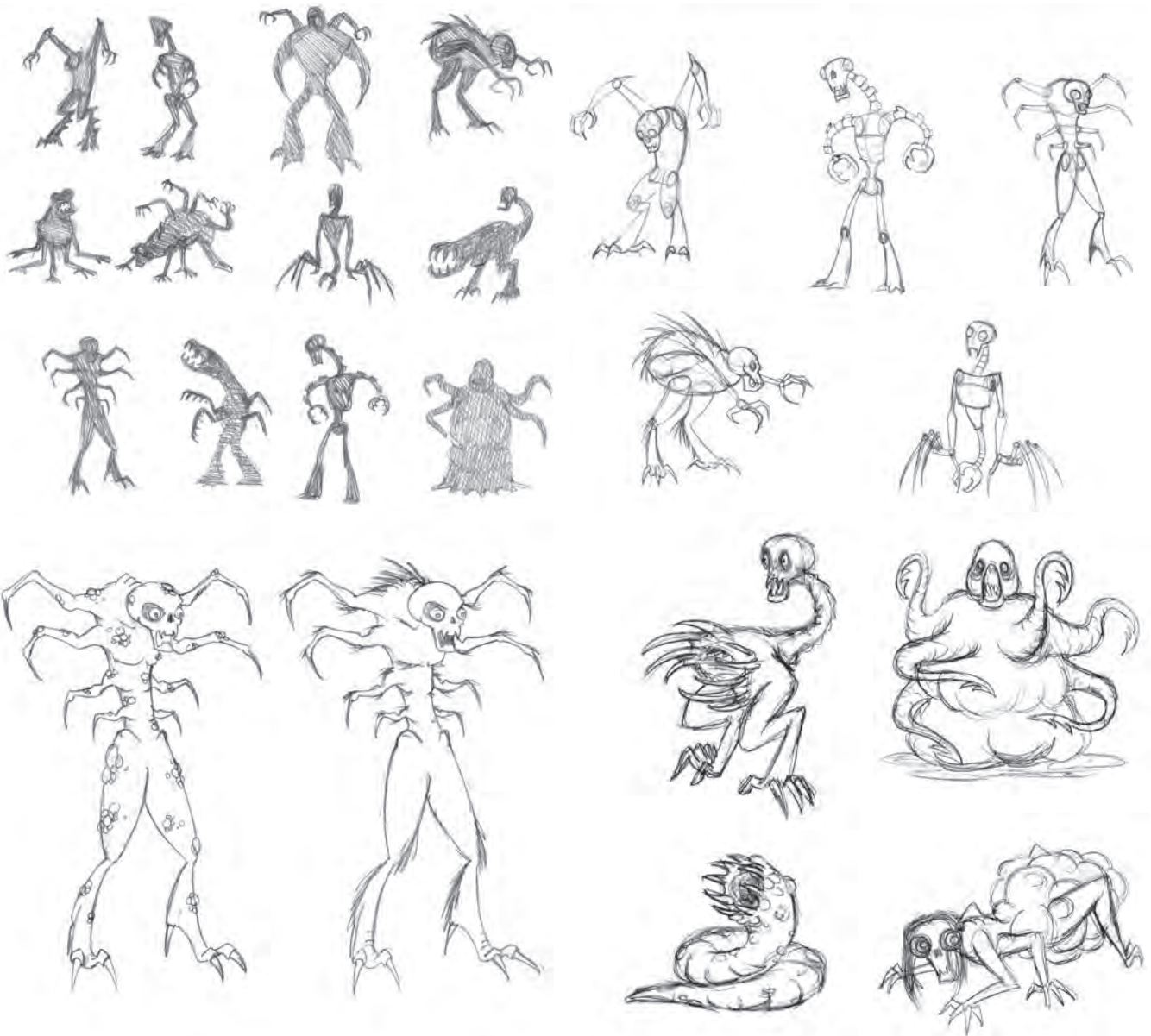


FINAL HOPKINS ILLUSTRATION

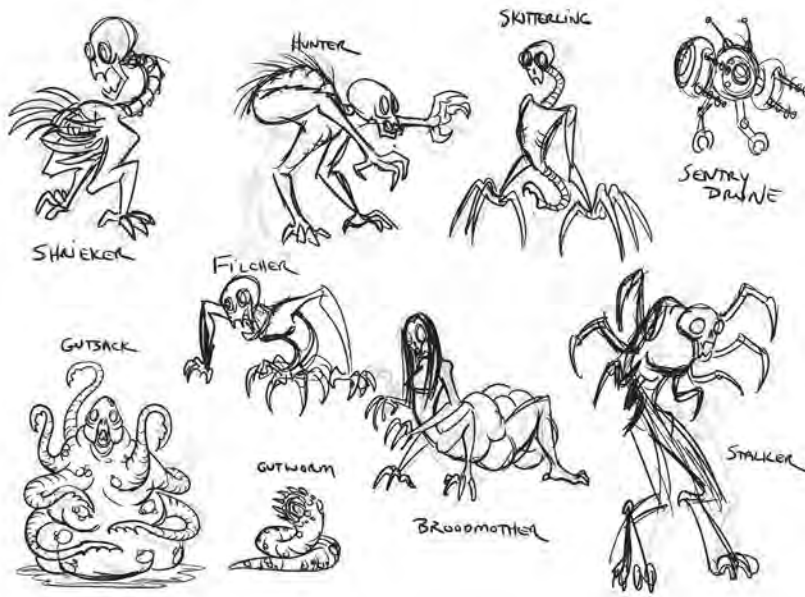
MONSTER DESIGNS

The board game features a variety of different monsters, each a mutant abomination that was once a member of the derelict ship's crew (or previous salvage operations). Since each creature operates differently within the game, their designs needed to reinforce their game role.

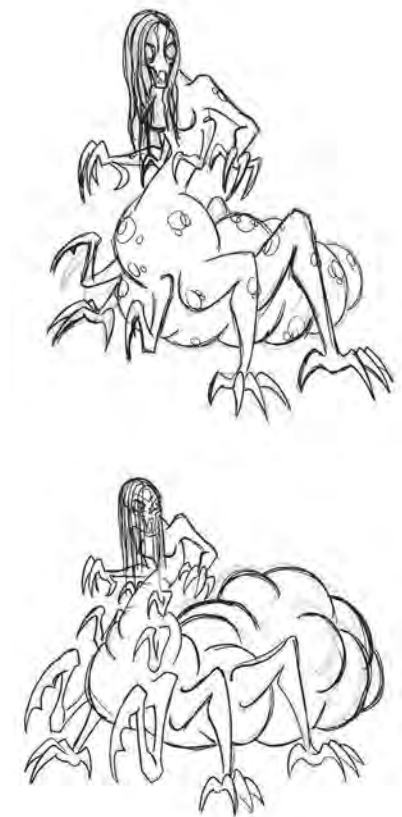
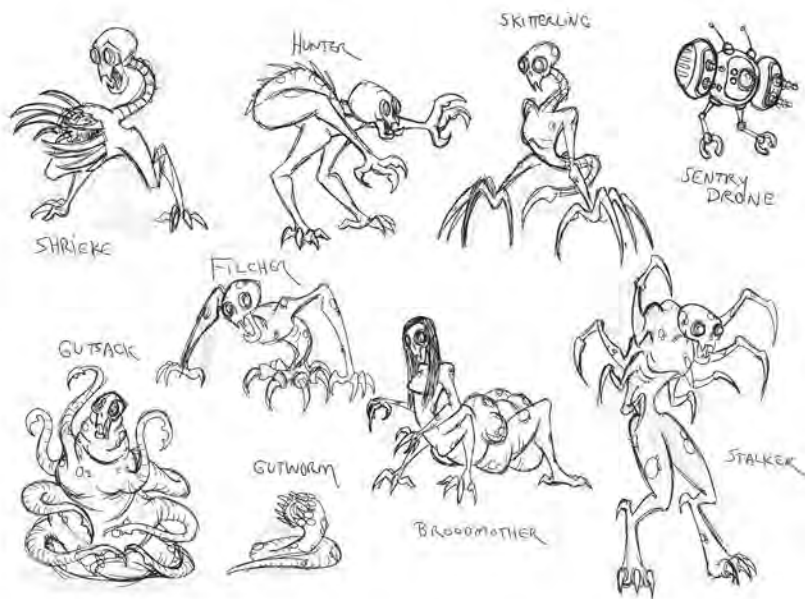
Whereas the designer approached each character as an individual and developed them accordingly, the monsters were designed as a group. Most of the designs emerged from a process of brainstorming and sketching that led to some creative monster concepts, and the designer then developed these concepts more through revised sketches. The exception was the game's titular Reaktor Mutant, which was designed using the same process as the playable characters.



MONSTER DEVELOPMENT SKETCHES



MONSTER DEVELOPMENT REVISED SKETCHES (1ST DRAFT)



MONSTER DEVELOPMENT REVISED SKETCHES (2ND DRAFT)

ADDITIONAL DEVELOPMENT SKETCHES

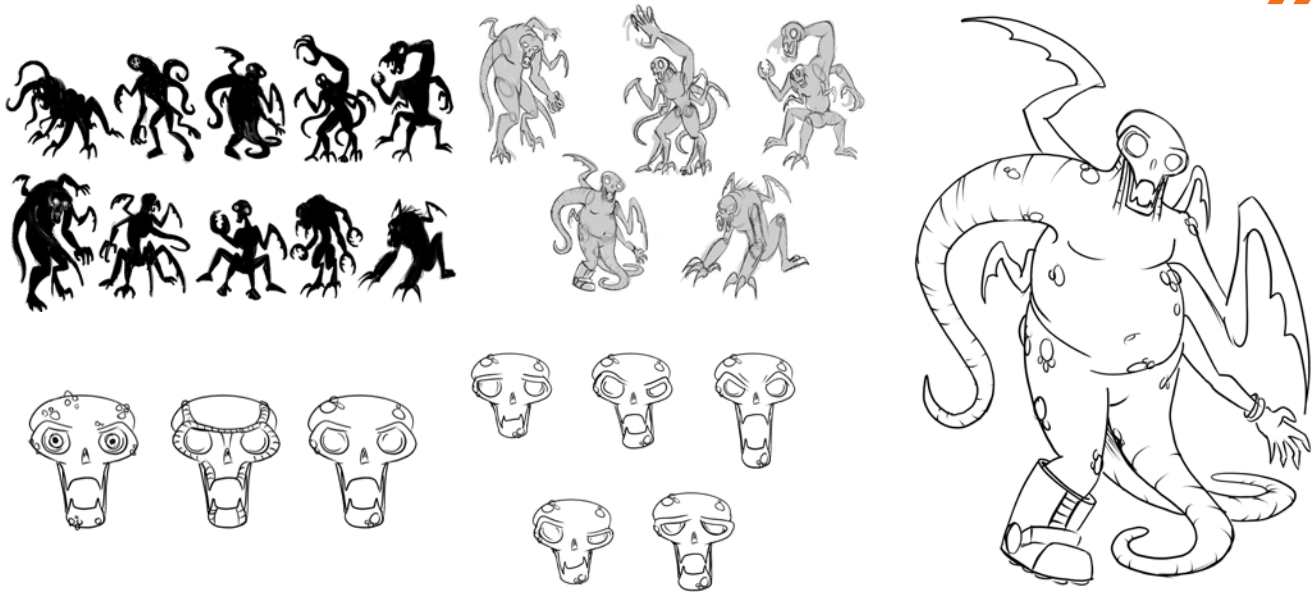


FINAL MONSTER ILLUSTRATIONS



REAKTOR MUTANT
CHARACTER DESIGN

The Reaktor Mutant is the most dangerous monster in the game. If a character accumulates too many mutations over the course of a game, that character could turn into a Reaktor Mutant, at which point she becomes a major threat to the other characters. The mutant needed to look impressive and dangerous, while also keeping some vestiges of its former humanity.



CHARACTER DEVELOPMENT SKETCHES



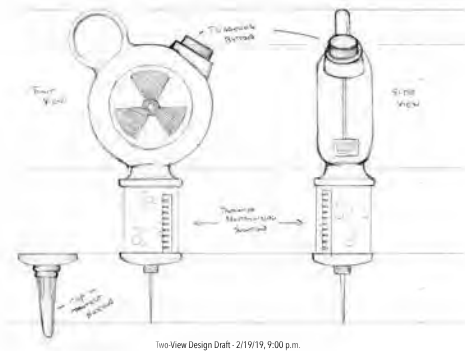
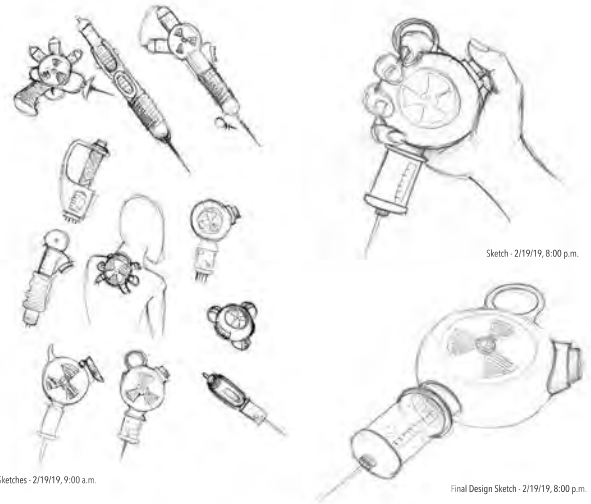
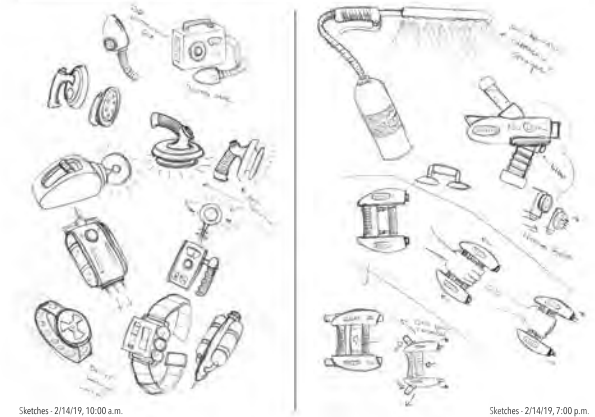
"COSTUME" AND COLOR VARIATIONS

VECTOR ILLUSTRATION (FIRST ATTEMPT)

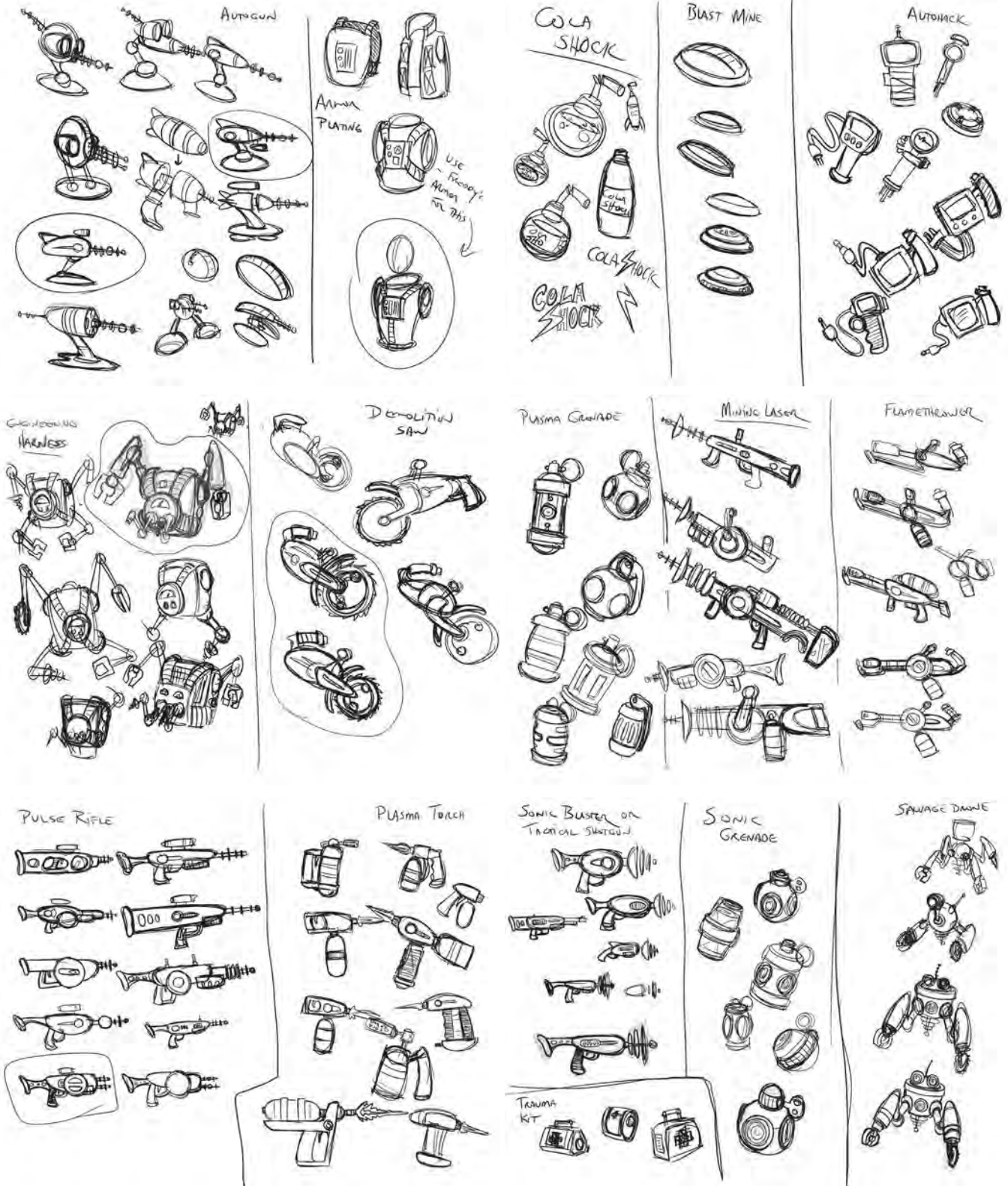
EQUIPMENT ILLUSTRATIONS

Aside from the character and monster illustrations, the designer had to create twenty-three equipment illustrations for the game's Equipment, Supply and Starter Item cards. The designer's goal was to design objects that looked like they belonged in the pulp science fiction world of *Reaktor Mutants*, but it also needed to be obvious from the illustration how each object might be held and operated so that players could easily imagine their characters using the equipment during a game. Feedback from reviewers and playtesters suggest that the equipment designs are successful in that regard, one reviewer even observing that she found it very easy to understand how she might operate each item if it were real.

One challenge in designing these illustrations was balancing a high tech, science fiction appearance with a retro theme. The items could not look too advanced, but still had to look like they emerged from a 50's era perspective on the future. The designer also drew inspiration from the grungy, industrial tech seen in films such as *Aliens*.



EARLY EQUIPMENT DEVELOPMENT SKETCHES



EQUIPMENT DEVELOPMENT SKETCHES





AUTOGUN



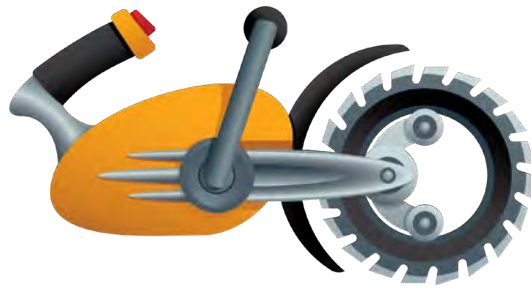
AUTOHACK



BODY ARMOR



COLA SHOCK



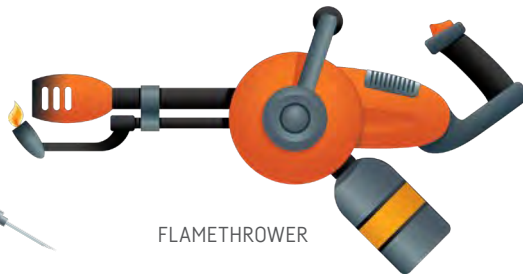
DEMOLITION SAW



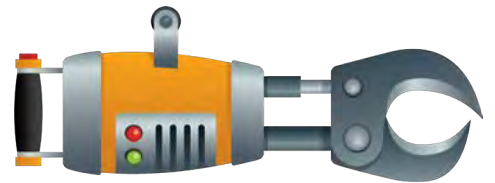
PROXIMITY MINE



DEVOLVER



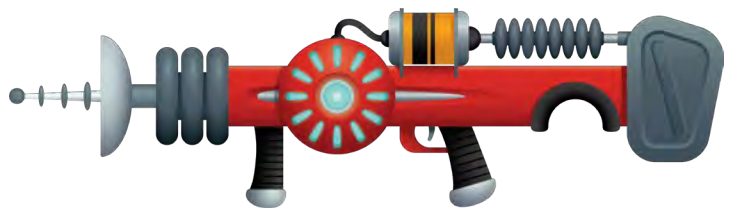
FLAMETHROWER



HYDRAULIC CUTTER



ENGINEERING HARNESS



MINING LASER



NUCLEAR



NUCLEAR PLUS



PLASMA GRENADE



PLASMA TORCH



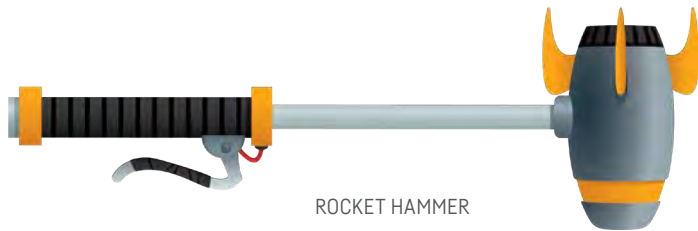
PULSE RIFLE



RAY GUN



SONIC GRENADE



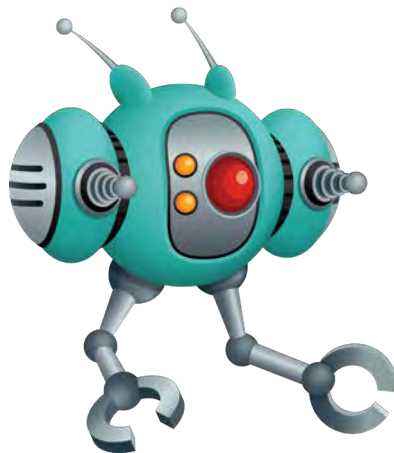
ROCKET HAMMER



SONIC BLASTER



SALVAGE DRONE



SENTRY DRONE



TRAUMA KIT



2.4

CARDS & RULEBOOK

Reaktor Mutants includes several card decks crucial to game play, including Equipment, Supply and Starter Item cards, Mutation cards, Radiation cards, and Sensor cards. In addition, each player uses a large character dashboard card to help keep track of his character's status and abilities during the game. Finally, the game includes a set of Monster cards that contain the game information players need to manage the game's monsters.

The design and development of these card decks was organic, and their final form was informed by playtesting research. The first drafts of the cards were mocked up for early prototyping purposes to be used in the initial phase of playtesting. During that phase, the cards underwent several revisions related to changes in the game's mechanics, primarily to the text and the icons for each dice system. The final card designs are intended for the game's printed prototype, and will be used for further blind playtesting in the future.

The icons used on the various card decks, particularly to differentiate the backs of each deck, were designed directly in Adobe Illustrator. They underwent relatively few changes after their initial creation.

Production issues influenced the quantity of cards produced for the game. The number and distribution of cards within each deck was adjusted so that all of the game's cards would fit as evenly as possible on full sheets when printed, in line with *The Game Crafter's* printing specifications. This actually required the addition of a few components. For instance, according to *The Game Crafter's* specifications, 4" x 8" cards like the character dashboards are printed four to a page (*The Game Crafter*). The game's six character dashboard cards only required one and a half printed sheets, so the designer added two 4" x 8" reference cards to make use of the otherwise wasted space. These cards serve as a useful game aid for players, including common reference materials such as descriptions of the actions and maneuvers available to characters, the results of System Operation actions, and the text of the sensor encounters that are sometimes triggered when revealing sensor tokens. The addition of these cards not only makes the game's production more efficient, but also improves game play by reducing the need to reference the rulebook during play sessions.

CHARACTER DASHBOARDS
[4" X 8" CARD]

Character dashboard cards are used to help players track their characters' status and abilities. Early versions of the cards contained the character's special abilities, skill ratings, and spaces to track their wounds. However, as the game's mechanics developed, it became necessary to add spaces to track the character's Status (Ready or Fatigued) and the state of the character's Radiation Screen (Active or Inactive), so the designer added places on the dashboard where players could place the double-sided markers used to track those elements during the game.



The first fully designed version of the character card used an earlier digitally painted illustration. The skill ratings reflect the first version of the game's mechanics, which used a 10-sided die to make skill checks. The two numbers represent the die roll needed for normal and critical successes.



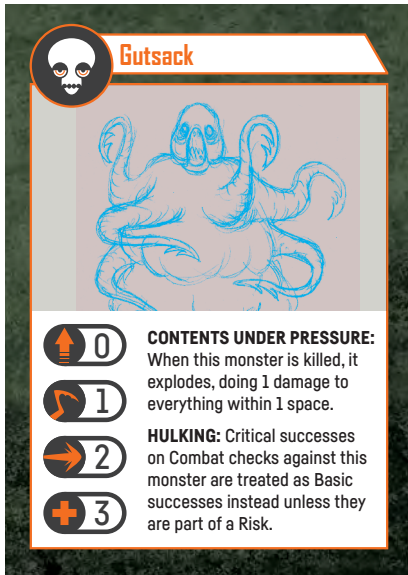
A second version of the card introduced a different dice system, which used several different colors of 8-sided dice, each with different success/failure probabilities, to make skill checks. This version of the cards also changed characters' special abilities based on playtesting feedback.



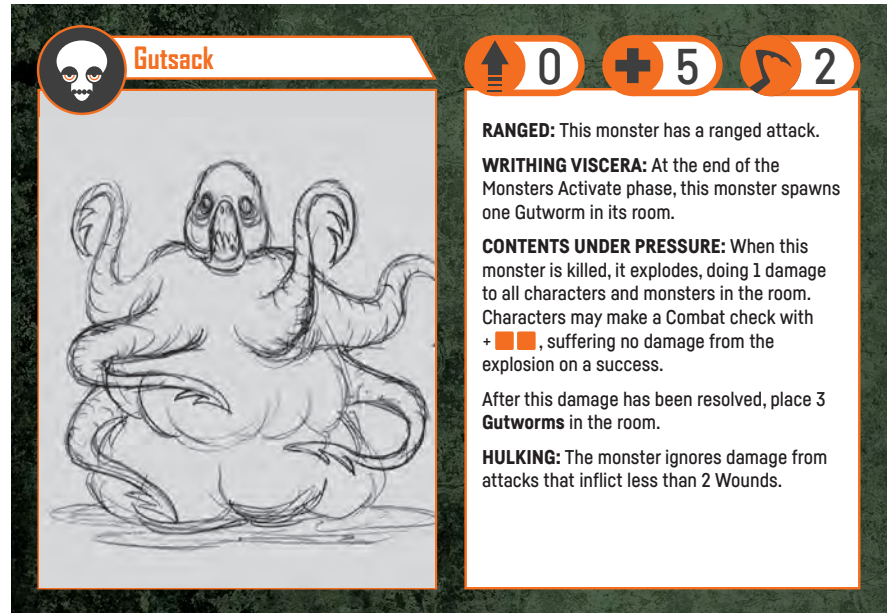
The final version of the dashboard reflects the game's finished dice system as well as its overall design and color palette.

MONSTER CARDS
[3.5" X 5.5" JUMBO CARDS]

The first draft of the Monster cards was designed for standard playing card sizes, but the designer expanded them onto a larger card size during initial playtesting to allow more room for the illustrations and special abilities. After that, the layout of the Monster cards changed very little during the game's development, aside from the removal of the monsters' movement ratings, which became unnecessary as the game's mechanics evolved.



The first version of the Monster cards were a standard 2.5" x 3.5" playing card size, and included movement and separate ranged combat attack ratings.



Later versions of the card moved to a large jumbo card format, which provided more room for the illustration and special abilities. The designer also removed the separate ranged attack rating, replacing it with a simple "Ranged" notation in the monster's special abilities.

In the final version of the monster card, the designer added a color-coded circle around the monster's behavior icon to more easily coordinate between the Monster cards and the monsters' markers on the game board.

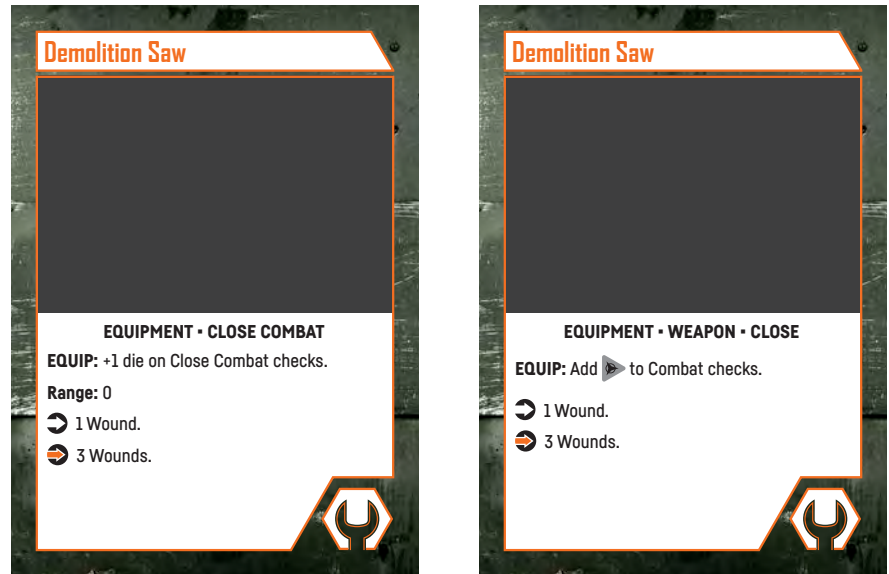


The designer developed four different icons to represent monster behaviors: Aggressive, Ambush, Lazy and Timid.



EQUIPMENT, SUPPLY AND
STARTER ITEM CARDS
(2.5" X 3.5" PLAYING CARDS)

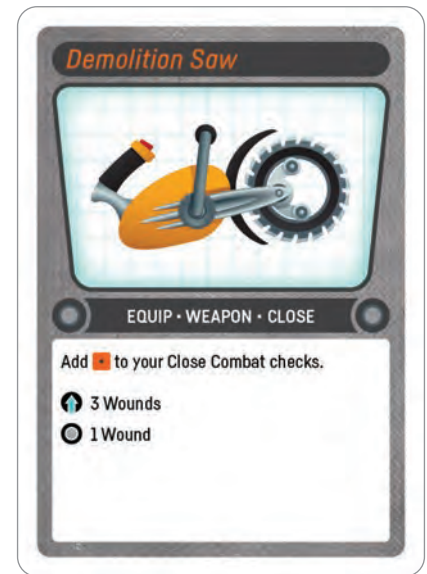
The faces of the Equipment, Supply and Starter Item cards are nearly identical aside from the fact that the Starter Item cards include stars in the upper right corner to help players manage their selection of starting equipment. However, the cards are acquired differently during the game, and each deck contains a different mixture of equipment. The design of these cards is very straightforward and intuitive, especially to board game hobbyists, for whom this layout should be quite familiar.



Early prototypes of the Equipment cards reflected evolving versions of the game's dice system and combat mechanics. The cards used a blank placeholder for the illustrations since they had not been completed during initial playtesting.



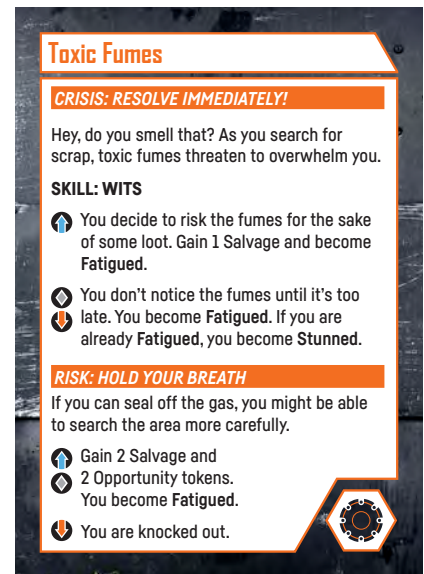
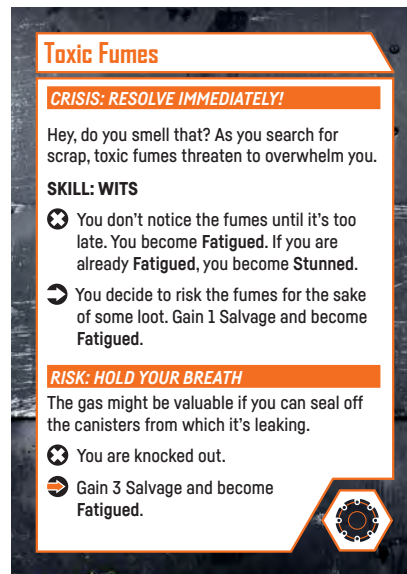
Though the faces of the Equipment, Supply and Starter Item cards are virtually the same, the backs allow players to easily distinguish them when setting up the game and during game play.



The final layout of the cards is slightly simplified, and relies on an understanding of the rules to interpret.

SALVAGE CARDS
[2.5" X 3.5" PLAYING CARDS]

Salvage cards are the most complex cards in the game. Each card must present a full encounter, including the results of skill checks and risks, in a very small space. The cards therefore convey information on the results of die rolls using icons for success, failure, or ties. Information is presented on the cards in the order players will need it, which makes the cards easier to follow. Even though the cards are text-heavy, players are interacting with most of the information during the game, making the experience of resolving the card narrative and engaging.



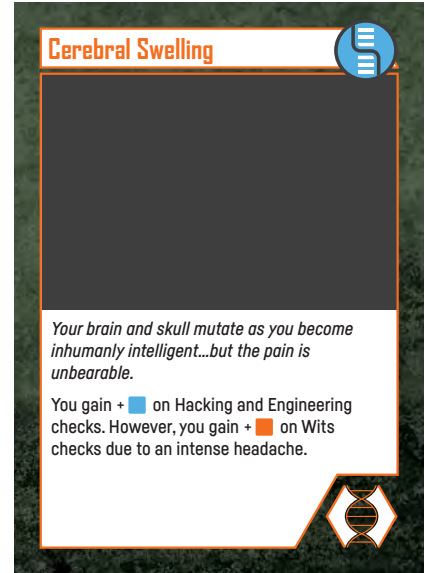
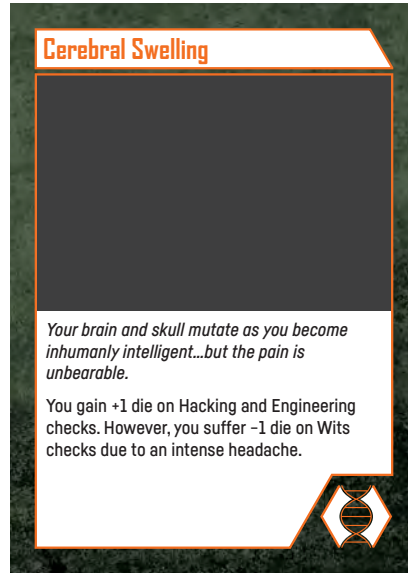
The early Salvage card prototypes used in playtesting included older versions of the game's icons and lacked some of the clarity introduced in the final card design.



Research showed that text-heavy cards were not appealing to some board gamers, but the Salvage cards needed a large amount of text. In this final design, the designer attempted to present the text in a way that makes it clear and easy to interpret.

MUTATION CARDS
[2.5" X 3.5" PLAYING CARDS]

Mutation cards serve two purposes. First, when players accumulate too many Rads, they must draw Mutation cards for their characters. Each card provides bonuses or penalties from the mutation, either helping or hindering the character in some way. Second, if a player acquires three Mutation cards with the same DNA symbol, her character immediately transforms into a Reaktor Mutant. The design of the cards thus had to work on two tiers.



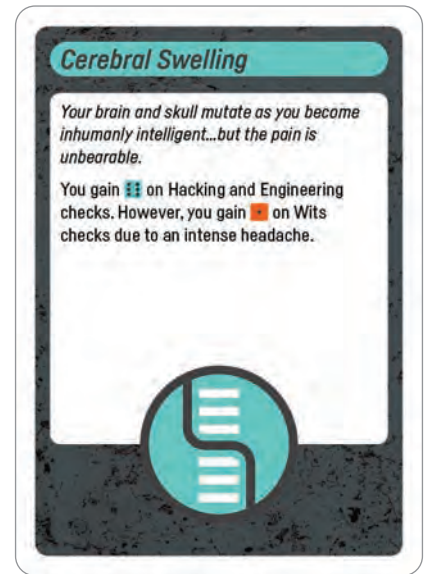
Early versions of the mutation system had players rolling dice to see if their characters transformed, and thus they did not have DNA symbol icons. Playtesting showed that using the DNA symbols to determine transformation created better tension, streamlined game play, and helped make the cards more visually engaging.



Three different color-coded DNA symbols appear on Mutation cards.

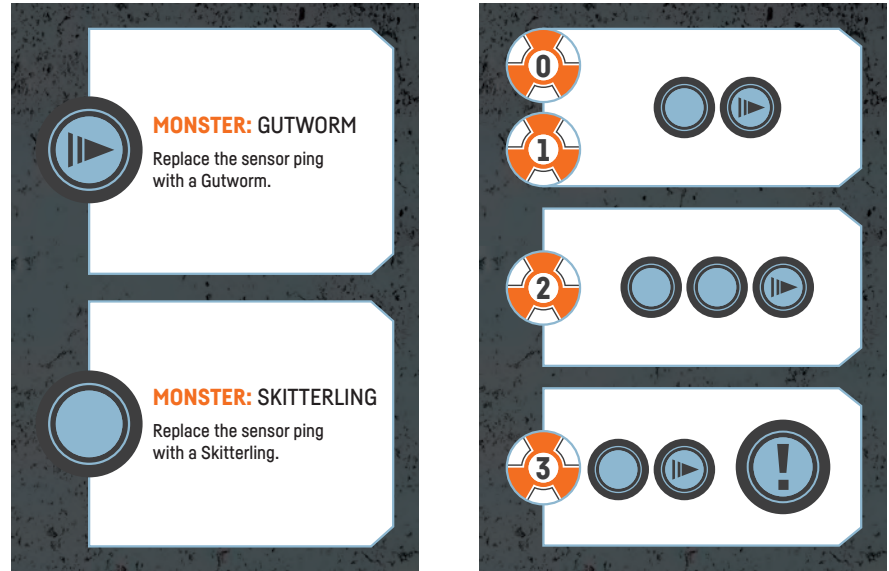


The final version of the Mutation cards uses both color and a larger DNA symbol to make it easier for players to see how close their characters are to transforming.

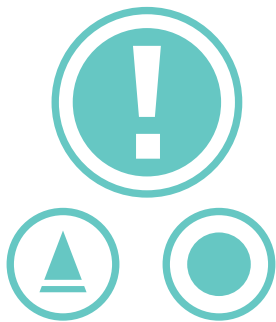


SENSOR CARDS
[1.75" X 2.5" MINI CARDS]

Players draw Sensor cards to help determine where new sensor contacts appear on the board. These cards were not a part of the original version of the game, which did not use sensor contacts. Initially, monsters were placed on the board during the game's setup and then continued spawn throughout the game. Playtesting proved that the sensor contact system was more original, better balanced, and offered a greater sense of mystery and drama, making the game more enjoyable.



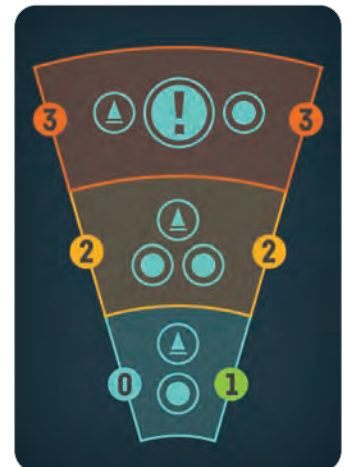
The original version of the sensor contact rules had contacts spawning continually throughout the game, and the cards were used to determine what each contact was when revealed. Later versions were closer to the final game's rules, but were normal playing card size rather than the smaller card sized used for the final design.



Icons on the sensor cards represent mobile, immobile, and massive sensor contacts, and match the appearance of the sensor contact markers used to place contacts on the game board.



The final version of the sensor cards attempt to present game information in a thematically visual way by making the sensor contact placement diagram look like a scanner readout.



RADIATION CARDS
[1.75" X 2.5" MINI CARDS]

Players draw Radiation cards at the end of each game round to determine how many Rads their characters soak up that turn, collecting Rad tokens equal to the numbers shown on the cards. These cards changed very little from their initial design, and were added about halfway through the playtesting process. Prior to the introduction of these cards, the designer experimented with other ways of determining how many Rad tokens characters received each turn, including drawing tokens from a bag.



The earlier prototype version of the Radiation cards was straightforward and proved to work perfectly well during playtesting. The only major change was the distribution of different numbers in the deck to better balance the rate at which characters accumulated Rad tokens.



The final version of the Radiation cards is virtually the same as early prototype versions, the only major changes being the addition of more elaborate graphics and an adjustment to the card's dimensions to match the printer's specifications.

PLAYER REFERENCE CARDS
[4" X 8" CARD]

The player reference cards contain useful reference information intended to help speed up the game and reduce the amount of time players spend referring to the rulebook. The designer added these cards to streamline game play and also to fill out otherwise unused portions of the printed sheets for the game's 4" x 8" cards.

SENSOR ENCOUNTERS

AIR RECYCLER
This malfunctioning machine is on its last legs, but it might make good salvage. Place 1 Scrap token in the room.

CLEANING ROBOT
A friendly cleaning robot equipped with radiation scrubbing gear mists the room with anti-Rad chemicals. All characters in the room discard 2 Rads.

COOLANT LEAK
A jet of steaming coolant erupts from a burst valve. Place a Vapor marker in this room.

DYING MUTANT
A dying mutant mutagenic spores.

FALSE ECHO
It was just a scare.

GUTWORMS
Place 3 Gutworm markers in this room.

ROBOVENDOR
A malfunctioning vending machine then shorts out.

SENSOR GHOST
It's gone! Wait... possibly, the first type in an adjacent room.

SPAWNING POND
The spawning pond emerges from it. If it is a monster room.

SURVIVOR
It's a survivor. He's away! It's too late remains on the table. Wounds values to him at the best tokens at the end. The Survivor may peacefully if a character.

SYSTOP ACTIONS

BRIDGE: DIAGNOSTICS

- 1 One character gains 2 Opportunity tokens, or two characters each gain 1 token.
- 2 You accidentally set off a security alert. Sound an Alarm on the Bridge.

COMMISSARY: AUTOVENDOR

- 1 Draw three Equipment cards. Choose one to keep and discard the others.

CONTROL ROOM: SECURITY

- 1 You may either reveal one sensor contact anywhere on the board, or flip one door marker anywhere on the board from Locked to Open, or Open to Locked.

INFIRMARY: TRIAGE

- 1 Heal all Wounds and remove all Rads from a character in the Infirmary.
- 2 Heal 2 Wounds and remove 2 Rads from a character in the Infirmary.
- 3 Heal 2 Wounds or remove 2 Rads from a character in the Infirmary.

INFIRMARY: MEDIPORTER

- 1 Place a Mediporter marker in the Infirmary.

The SysOp Actions and Sensor Encounters card contains the same information printed on the back of the rulebook and is a useful reference for specialized actions or the results of encounters triggered by revealed sensor contacts.

MANEUVERS

EQUIP
Choose one of the following options:

- Change your equipped items.
- Trade items and/or Scrap tokens with another character in the same room. Both characters may change their equipped items.
- Pick up any Scrap tokens and/or Equipment cards in your room. You may change your equipped items.

ESCAPE
If you are in the room, you may move out of the room before you can perform the same action.

MOVE
Move into an adjacent room connected by a door. If monsters are present, you must move.

RECOVER
Take a moment to rest. Flip your Fatigue marker from Fatigued to Rested.

RUN
Move two rooms away from the current room. If monsters are present, you may run only if you are not Fatigued. You must perform the Run action.

ACTIONS

BYPASS
Open a locked door by making a Hacking check.

COMBAT
Fight a monster in your room by making a Combat check. If you are successful, you damage the monster. If you fail, the monster damages your character. If the roll is a tie, then you manage to fight to a standstill and neither suffers any damage.

FIRST AID
You may use this action only if there are no monsters in your room. Heal 2 Wounds on yourself or another character in your room.

REPAIR
Discard 1 Scrap token and flip your Rad Screen marker from Inactive to Active.

SALVAGE
You may use this action only if there are no monsters in your room. Spend Opportunity tokens to draw and resolve a Salvage card:

Rad Lvl 0 = 3	Rad Lvl 1 = 2	Rad Lvl 2 = 1
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SEARCH
Search for useful equipment in your room. Spend 1 Opportunity token to draw an Equipment card. You may immediately change your equipped items.

SYSTEM OPERATION (SYSTOP)
You may use this action only if there are no monsters in your room. Perform the SysOp action of your current room.

The Actions/Maneuvers card describes the actions and maneuvers available to characters during their turns, and will be extremely useful to players new to the game as they learn what their options are when their characters activate.

RULEBOOK
(8" X 10" SADDLE-STITCHED
BOOKLET)

Reaktor Mutants' 32-page rulebook contains all of the rules needed to set up and play the game, and includes images and examples that not only help clarify the rules, but also make the book easier to reference during play. The organization of the rulebook is intended to provide a clear introduction to the rules, starting with an overview of the components and basic rules concepts before moving on to the game's setup and the process of playing each round of the game. The rulebook ends with additional rules and two scenarios, while the back of the rulebook contains useful game information and is intended to serve as a quick reference during the game.



2.4

TOKENS AND MARKERS

Out of necessity, the tokens and markers in most board games are relatively simple in their execution. They have to be, since they are usually quite small, generally no more than one inch in diameter. However, as the designer discovered in the process of developing the tokens and markers for *Reaktor Mutants*, the process of these game components can be complicated.

The first challenge was developing iconography and graphics that would read well at the small sizes required by the tokens. This meant that the graphics on the tokens either needed to be very simple, or had to be instantly recognizable in silhouette so that players could easily identify them at a glance.

The graphics were only part of the design solution, however. Both the color and the shape of each marker was important, and as the designer finalized his token designs, he took care to use different shapes, sizes and colors to help players easily differentiate the game's tokens. During initial playtesting, many of the tokens were similar in size and shape, mostly circular, and either 0.75" or 1" in diameter. This sometimes led to confusion among the players, and in the finished prototype, the greater variety of token shapes helps to facilitate game play by categorizing the tokens into easily identifiable types.

As with any major project, the printer's specifications had a major impact on the final design of these components. All tokens are printed as "punchouts" cut from 60 point (0.06 inch) thick chipboard that makes them easy to pick up and manipulate on the game board. *The Game Crafter* produces most tokens in sheets composed of 10 slugs, and each slug can accommodate a different type of component. Thus, when determining the number and shape of each token, the designer had to make sure that they would fit evenly onto slugs, and that the total number of slugs would fit evenly as evenly as possible into sheets in order to ensure the most efficient production.

These production parameters had a tremendous influence on the game's design process and final design. The designer had to modify several plans for the game to align with the realities of production. Most notably, the game was originally meant to include standees for each of the monsters, but the cost and difficulty of fitting those standees within the game's already copious number of components was untenable. This forced the designer to use the faces of the sensor contact tokens to represent the monsters on the game board, which ended up being a better solution that helped streamline game play.

CHARACTER TOKENS
(0.75" CIRCULAR TOKENS)

Reaktor Mutants uses an assortment of tokens to help players track their progress in the game, including the amount of Scrap they have collected and the Wounds and Rads they accumulate. The designer chose to use similar sizes for all of these tokens since they are all used in a similar way. Most of these markers are meant to be collected and kept in small piles or stacks with each player's character dashboard, where they can be easily distinguished from one another.

Rad Tokens: *Early versions of the game used a special type of marker to indicate each room's Rad Level, but the finished version of the game simply provides that information on each board tile. This allowed the designer to eliminate an unnecessary component from the game, and also helped to avoid any potential confusion between Rad Level markers and Rad tokens. Like most of the token designs, the original design used orange and gray, but the designer made the final design bright green to help the token stand out easily from the other character tokens.*

RAD LEVEL MARKER



INITIAL DESIGN



FINAL DESIGN



Opportunity Tokens: *The Opportunity tokens changed little during the design process. The main alteration in the final design was simply a change in color to help distinguish the tokens from the Scrap and Rad tokens.*

INITIAL DESIGN



SECOND DRAFT



FINAL DESIGN



Scrap Tokens: *The designer was happy with the initial designs for the Scrap icon, so the Scrap tokens changed very little aside from a slight color change to make them match the Salvage cards better.*

INITIAL DESIGN



FINAL DESIGN



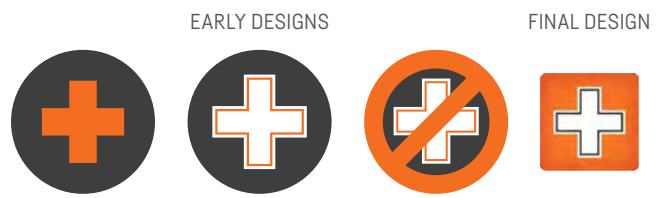
WOUND AND CONDITION TOKENS
(0.5" SQUARE TOKENS &
0.75" TRIANGULAR TOKENS)

Wound tokens are used to track damage on both characters and monsters, so they had to be designed both to fit the character dashboard, and also to be easily distinguishable from other tokens and markers when placed on the game board. The designer accomplished this by making them a unique square shape among the game's small tokens. Combined with the bright orange color, the shape ensures that Wound tokens are easily identifiable.

Furthermore, playtesting suggested that placing the Wound tokens on the Wound slots of the character dashboard rather than simply stacking them near the dashboard to track damage created a greater visual impact and helped to improve the game's sense of immersion.

The Stunned and Glued condition tokens are also a unique triangular shape. Since they have a major impact on the way certain phases are resolved in the game, and since they are placed and removed routinely during play, it was important that they be easy to recognize on the game board, and the triangular shape makes them stand out among all the game's other tokens.

Wound Tokens: *The Wound tokens evolved considerably during the design process, and the final square design emerged in conjunction with the final design of the character dashboard.*



Stunned and Glued Tokens: *These tokens changed radically in shape and color in order to make them stand out from other tokens on the game board, but the core icons on each token did not change much after initial development.*



STATUS AND
RAD SCREEN MARKERS
(1" CIRCULAR MARKERS)

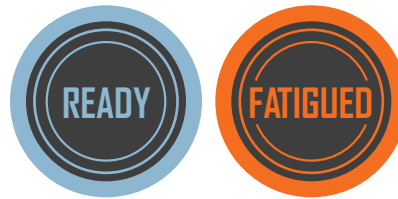
The Status and Red Screen markers were not part of the game originally, but were added as the game's rules developed and it became important to track whether characters were Ready or Fatigued or whether their Rad Screens were active or not. During playtesting, the Status token marker was simply placed near the character dashboard, but in the final design of the components, each character dashboard has a specific space to place the Status marker.

Similarly, during playtesting, players tracked the status of their Rad Screens simply by placing a Rad token on their character cards to indicate that their screen was inactive, but the final game needed a more elegant solution. In the end, the designer added the double-sided Rad Screen markers to the game along with a slot to place them on the character dashboards.

These markers allow players to easily see and manage their characters' status throughout the game simply by flipping them over whenever a game effect causes the status to change.

Status Marker: *The initial design of the status marker simply used text and color to distinguish the different sides, and was really meant to be a placeholder to test the concept during game play. The final design adds a graphic to help visually illustrate the status represented by each side.*

INITIAL PLACEHOLDER DESIGNS



FINAL DESIGN (FRONT AND BACK)



Rad Screen Marker: *The Rad Screen was one of the last components added to the game after the rules for Rad Screens changed. The design is relatively simple and utilitarian, and the final design shown here is essentially the same as the initial design.*

FINAL DESIGN (FRONT AND BACK)



SENSOR CONTACT MARKERS
[1"AND 1.25" CIRCULAR
MARKERS]

Early versions of *Reaktor Mutants* did not use sensor contacts at all. Instead, monsters were simply placed on the board during setup, and more monsters would spawn each turn from rooms containing Gutsack and Broodmother monsters. That system caused numerous issues with the pacing of the game, creating an endless parade of monsters than tended to bog down game play and leaving players with few real strategic options.

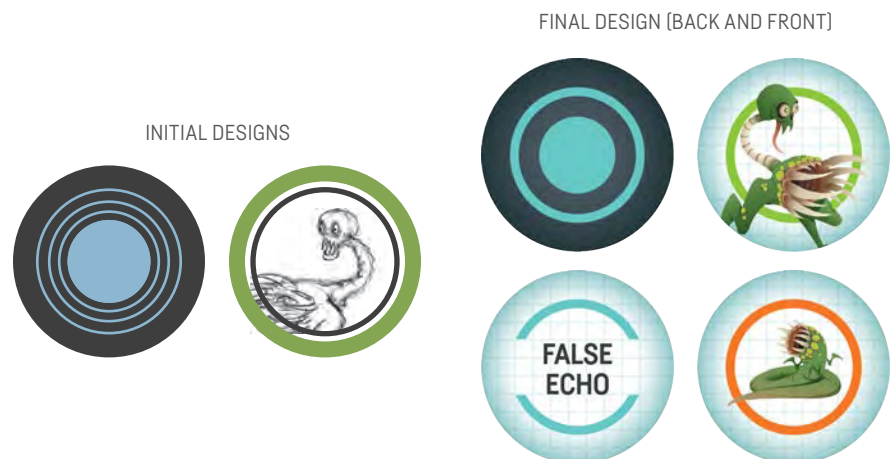
The addition of sensor contacts to the game was a major breakthrough in the game's design. Not only do the rules for spawning sensor contacts give the players a great deal of control over when and how new sensor contacts appear, but playtesters felt that the contacts also create a sense of tension and mystery that makes the game more immersive and engaging.

Sensor contact markers must be easily recognizable on the game board and may also remain on the board to represent monsters once they are revealed. Therefore, they had to be double-sided, and the monsters pictured on them had to be easily identifiable. One challenge in creating the markers was making them large enough for the art and graphics, while remaining small enough that they would not overly crowd each room of the game board.

The design of the backs of the markers, which merely identify each contact as mobile, immobile, or massive, is intended to improve the game's sense of immersion by echoing the appearance of radar blips on a scanner.

In future playtesting, it will be important to test the practicality of these tokens. The designer is not convinced the monster graphics will read well when printed, and there is also a possibility that the graphics running off the edges of each token might make the markers somewhat identifiable even when they are face down. These issue will need to be addressed through playtesting once the markers have been printed, but finding possible solutions may be challenging since the use of borders on the markers is not possible given their size and potential printing registration issues.

Immobile Contacts: *The sensor contact markers changed in appearance during the design process. In particular, the designer simplified the sensor icon on the back. However, the core concept worked well during playtesting, so the designer did not alter it much in the final design. Although he wanted to add the monster behavior icons to the faces of each contact, there was not enough room without overwhelming the illustration, so that idea had to be abandoned.*



Mobile Contacts: *The design of the mobile contacts echoes the immobile contacts. Although the designer was unable to add the monster behavior icons to each monster, he did add a color-coded ring that matches the color of the ring around each monster behavior icon on the Monster cards. Though this solution has yet to be fully playtested, the designer hopes that it will help players easily determine which monsters act according to different behaviors traits.*

INITIAL DESIGNS



FINAL DESIGN (BACK AND FRONT)



Massive Contacts: *Massive sensor contacts represent rare, powerful monsters, and the designer made these contacts larger than the mobile and immobile contacts in order to provide more room for the monsters' illustrations and to give these monsters a greater visual presence on the game board. Evens so, the size of these contacts changed considerably during development due to limitations imposed by printer specifications.*

INITIAL DESIGNS



FINAL DESIGN (BACK AND FRONT)



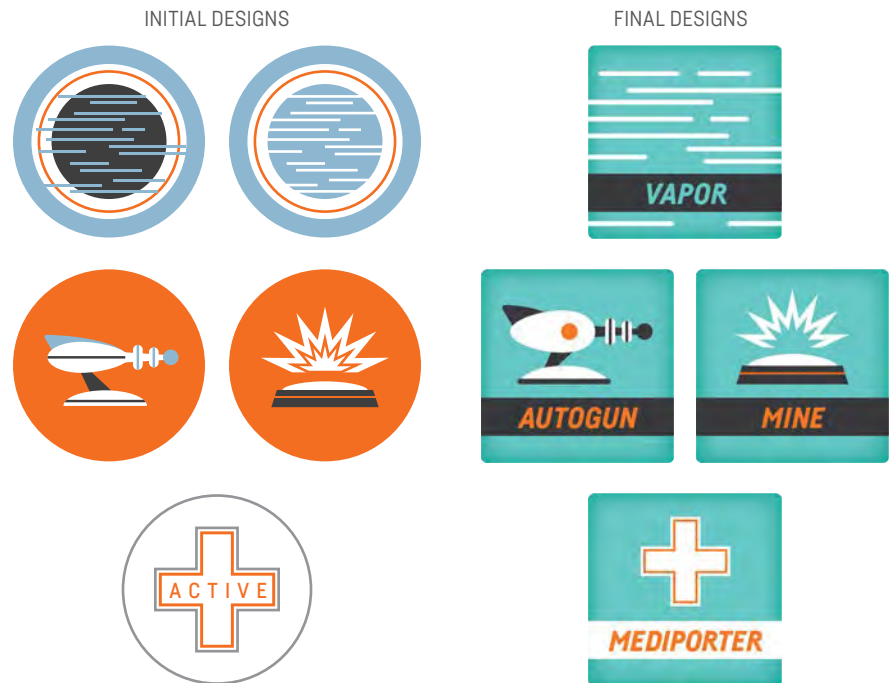
One massive contact is also the game's Objective marker. Though the scenarios currently included with the game do not use the Objective in a way that would require it to be hidden beneath a sensor contact, future scenarios may do so, and the designer planned ahead when making the Objective match the other massive sensor contacts.

EFFECT MARKERS (1" SQUARE MARKERS)

Effect markers are placed on the game board to mark various game effects, such as deployable equipment items, active mediporters, or room effects like smoke or steam that might modify the way combat works. As such, they are very specialized.

The primary challenge in designing these markers was to make them stand out on a game board already littered with sensor contacts, character standees, and possibly condition and wound markers. Thus, the designer made them large, square markers to help distinguish them from the other markers on the game board.

Effect Markers: *The graphics on each effect marker remained fairly consistent throughout the design process. The Autogun marker is the only one that changed significantly, since it had to be altered to match the Autogun equipment illustration. Like many other tokens used during playtesting, these markers were circular, but the designer made the final version square to help them stand out on the game board. The designer also unified their color scheme to help visually separate them from the game's other tokens and markers.*



DOOR MARKERS (1.25" SQUARE MARKERS)

Door markers small are double-sided tiles used to connect rooms on the game board and to show which doors are locked or open. These markers are easily visible, and the colored background helps players recognize each door's status (Locked or Open) more readily. Unlike the other markers and tokens, which feature vector graphics, the door markers are digitally painted to match the painted illustrations on the board tiles.



CHARACTER STANDEES
(1" X 2.25" STANDEES)

The character standees are used to mark each character's position on the game board. The design of the standees is simple, featuring little more than a character illustration and a matching color-coded slot base. While the designer experimented with adding each character's name to the standees, the type was not very readable and it crowded the illustrations too much.



2.5

BOARD TILES

Reaktor Mutants is a board game, so naturally, it relies on a game board. Unlike many games, however, *Reaktor Mutants*' game board is assembled from a set of board tiles. These double-sided tiles can be reconfigured for different game scenarios, creating new board layouts each time. Adventurous players could even experiment with home-brew board configurations for their own custom scenarios.

This type of game board is not unique to *Reaktor Mutants*. Other games, such as *Mansions of Madness* and *Last Night on Earth*, use a similar concept in their designs. However, using this type of game board makes the game's prototype more expensive than a single, traditional folding game board. Despite that, the designer opted for board tiles rather than a folding board because the folding boards offered by *The Game Crafter* were not large enough to accommodate the size of the *Reaktor Mutants* game board, and making the board smaller would make the rooms too small to comfortably hold the various tokens and markers required for game play. Furthermore, the modular, reconfigurable nature of the board is a selling point for the game, and also grants the game far more replay value than a static board.

The board tiles are based on a 3.5" grid, with individual tiles measuring either 3.5 x 7", 7 x 7" or 7 x 10.5." This size is consistent with similar games like *Mansions of Madness* and is large enough to accommodate the game's markers and tokens while still being small enough to fit the board on a table with room left for player components like the character dashboards. Unfortunately, *The Game Crafter* does not offer this size as a standard board component. Therefore, when printed, the board tiles will need to be printed as custom chipboard punchouts rather than standard board tiles.

Initially, some tiles—notably the Commissary and Infirmary, were designed as L-shaped tiles, which created interesting opportunities for the design of various board configurations. However, the designer discovered that sticking with standard rectangular sizes made the tiles easier to store and more versatile when designing new board configurations.

The illustrations on the board tiles are distinct in that they are digitally painted, unlike the character, equipment and monster illustrations, which are all vector images. The designer chose to paint the board tiles in order to achieve a more subtle sense of mood and tone in the environments, and also to evoke the atmosphere of retro cartoons, in which cell animation was photographed in front of gouache-painted backgrounds.

The designer did run into several issues in the design of the board tiles. First, the use of borders is not fully compatible with the printer's printing guidelines since any errors in registration will be magnified by the inclusion of a border. However, the borders are crucial for separating rooms on the game board, so the designer decided that the risk was worth it, and he attempted to make sure that the borders were thick enough to avoid major printing issues. Once the prototype is professionally printed, this potential issue can be analyzed and, if necessary, the designer can attempt to identify a better solution.

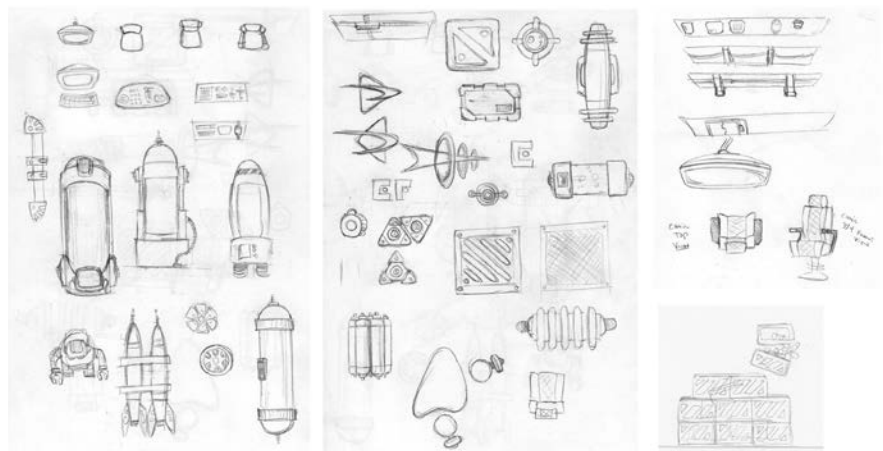
Second, when painting the rectangular board tiles (including the Commissary, Infirmary, Corridors, and Cryosleep Chambers), the designer did not account for the slight narrowing in proportions caused by adding a border, and instead painted the rooms to fit the full 3.5" x 7" format of the board tile. Thus, those tile illustrations had to be adjusted and in some cases slightly repainted to fit the narrower space within the borders.

The process of designing each board tile began with a rough sketch of the room layout and the objects that would appear in it. Then, the designer used Illustrator to block out the larger shapes that composed the room's graphics, and transferred those shapes into Photoshop, where he used them to make selections to help define the crisp outlines of the room furnishings.

The rooms themselves were painted with a combination of digital brushes, and in some places photographic textures were modified and added to enhance the effect. This is most apparent in the textures of each room's floors. Finally, the designer painted in lighting effects on a separate Overlay layer, including darker shadows and the bright glow surrounding the lights and monitors in the rooms.

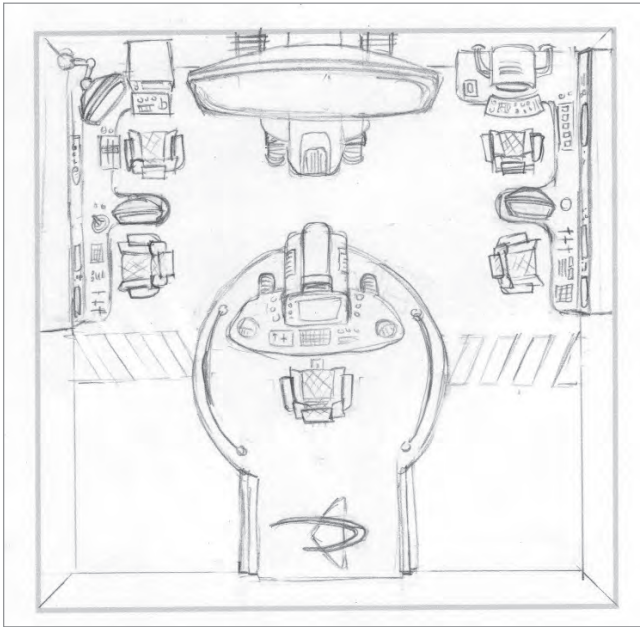
The early prototype versions of the board tiles did not indicate each room's Rad Level. Instead, players used Rad Level tokens placed in each room to show the Rad Level there. The designer eliminated the unnecessary Rad Level tokens from the final version of the game, adding the Rad Levels directly to the game board to the left of each room's name.

Prior to designing the layout of each room, the designer spent some time sketching concepts for the rooms' furnishings, and incorporated these into the final illustrations.

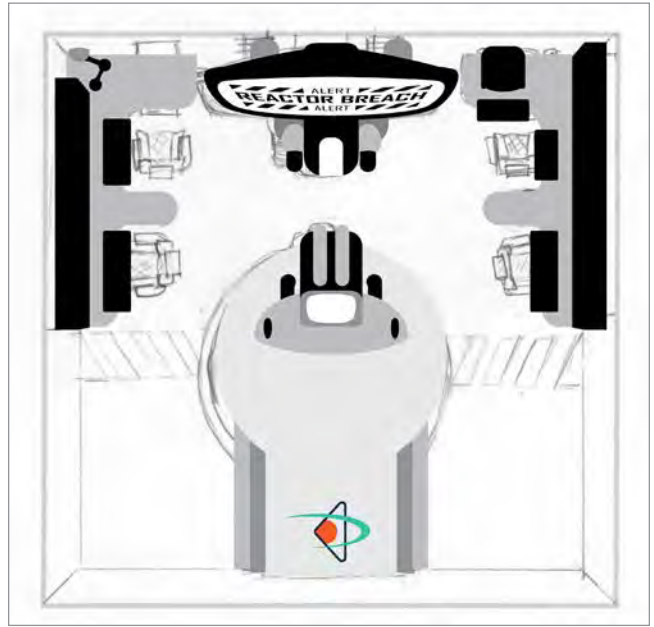


BRIDGE
[7" X 7" TILE]

CONCEPT SKETCHES



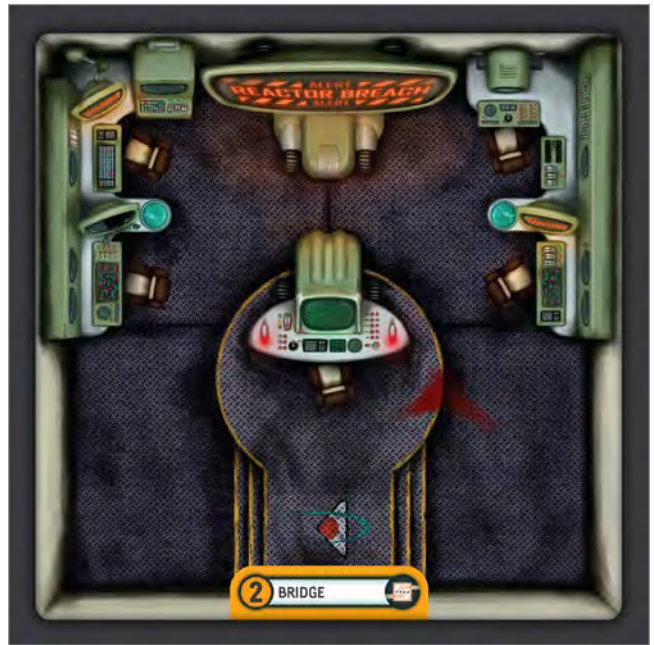
VECTOR SHAPES



GAME TILE PAINTING

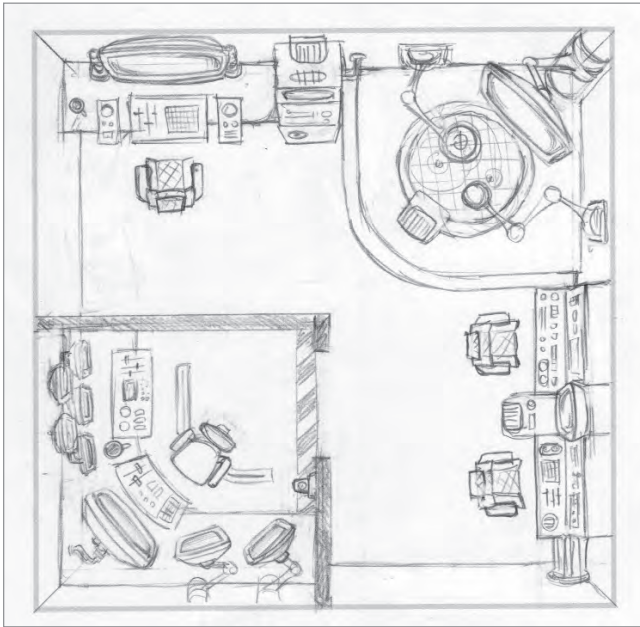


FINAL BOARD TILE



CONTROL ROOM
[7" X 7" TILE]

CONCEPT SKETCHES



VECTOR SHAPES



GAME TILE PAINTING

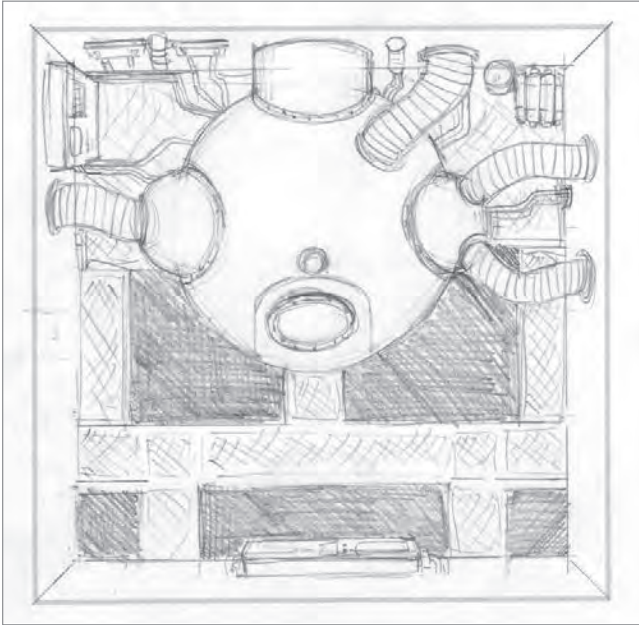


FINAL BOARD TILE

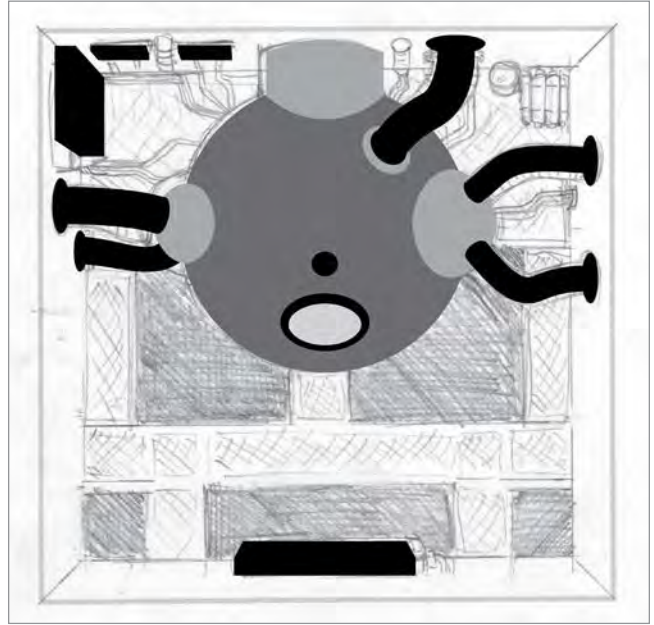


REACTOR
[7" X 7" TILE]

CONCEPT SKETCHES



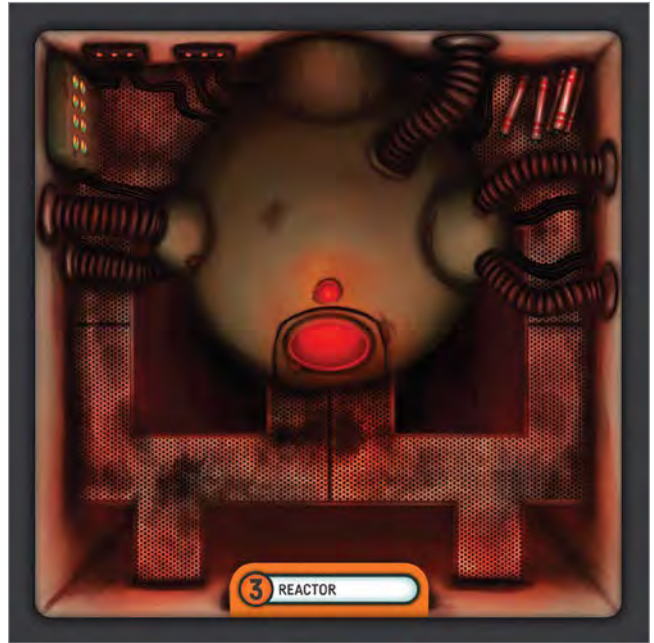
VECTOR SHAPES



GAME TILE PAINTING

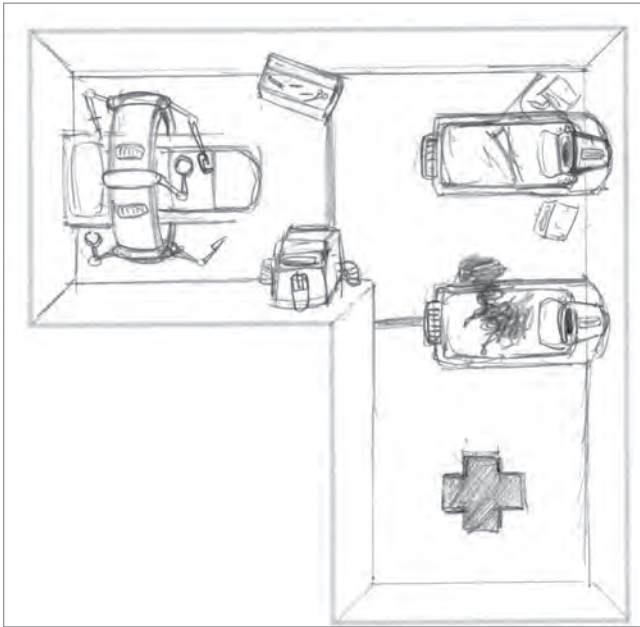


FINAL BOARD TILE

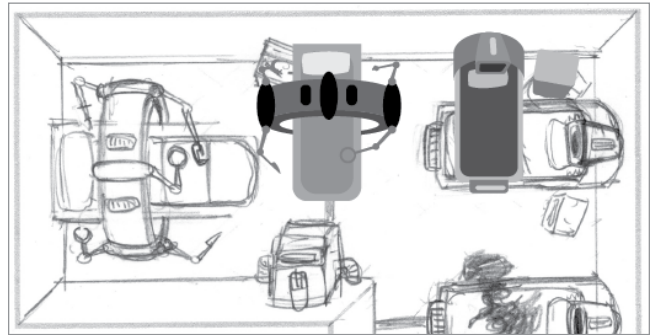


INFIRMARY
(3.5" X 7" TILE)

CONCEPT SKETCHES



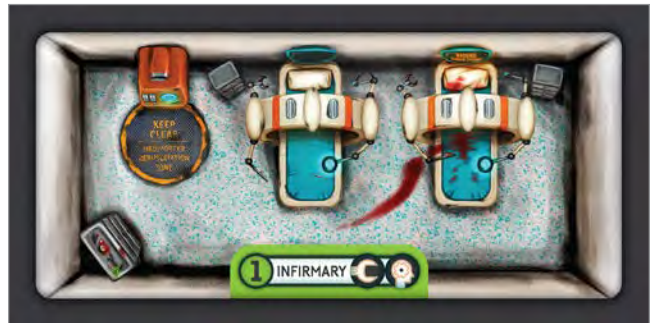
VECTOR SHAPES



GAME TILE PAINTING

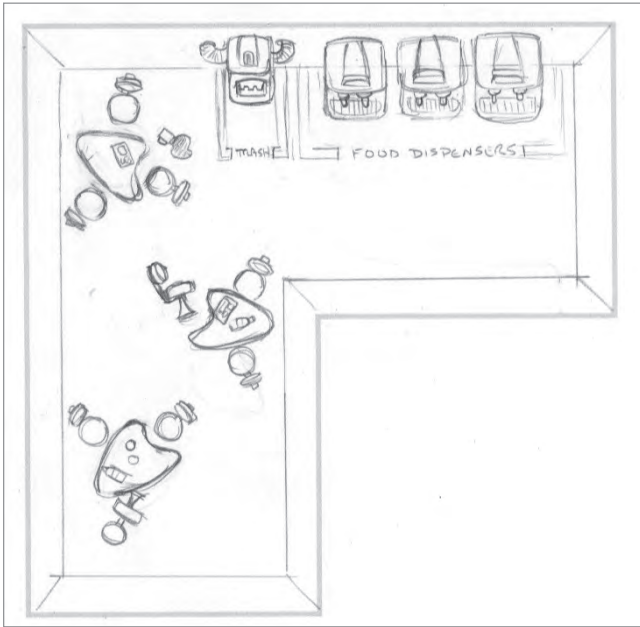


FINAL BOARD TILE



COMMISSARY
(3.5" X 7" TILE)

CONCEPT SKETCHES



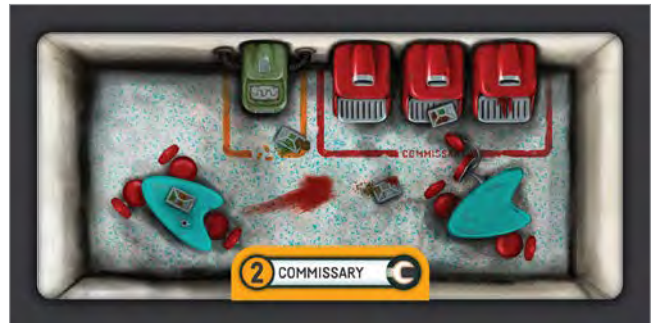
INITIAL L-SHAPED GAME TILE PAINTING



GAME TILE PAINTING

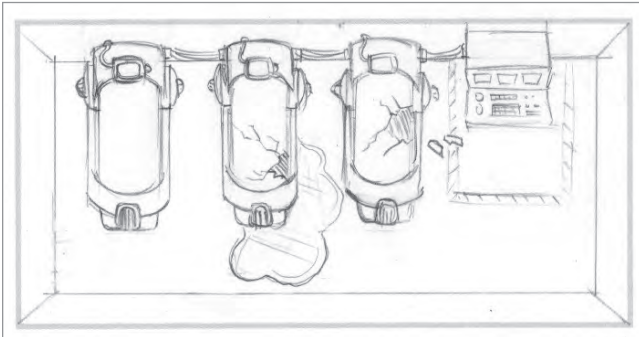


FINAL BOARD TILE

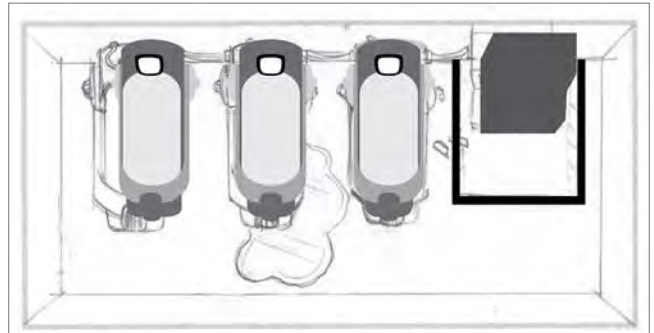


CRYOSLEEP A & B
(3.5" X 7" TILE)

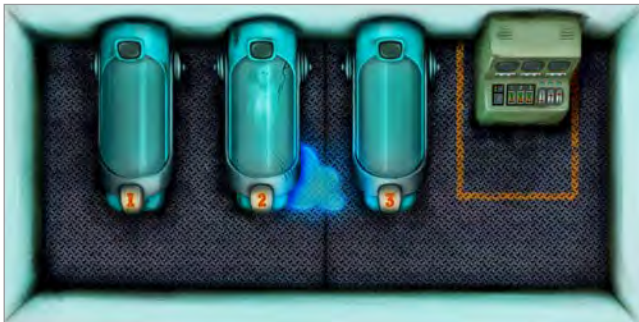
CONCEPT SKETCHES



VECTOR SHAPES



GAME TILE PAINTINGS

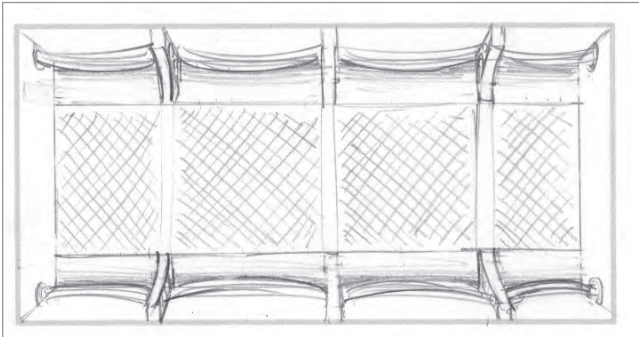


FINAL BOARD TILES

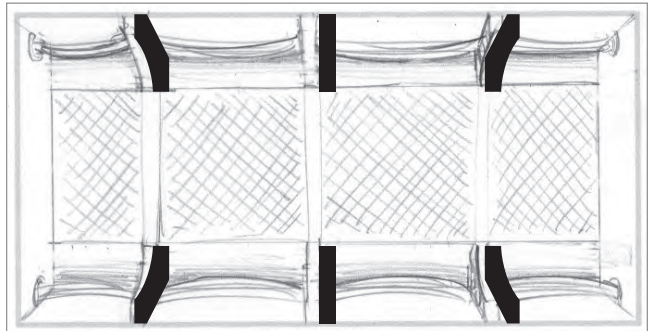


CORRIDORS A, B & C
(3.5" X 7" TILE)

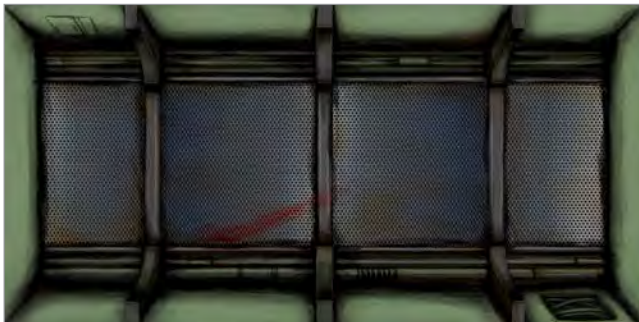
CONCEPT SKETCHES



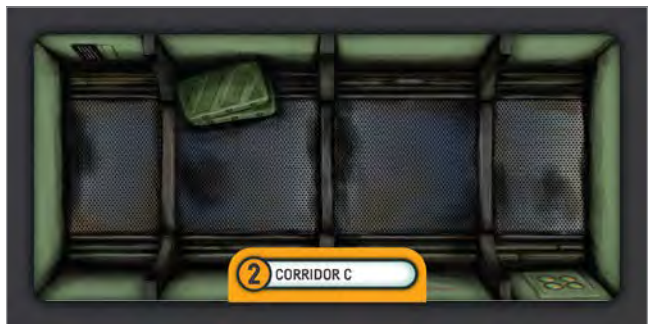
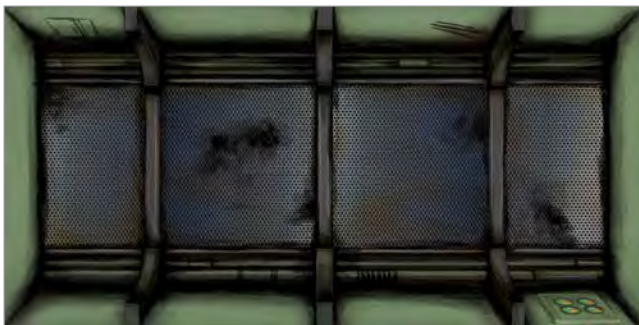
VECTOR SHAPES



GAME TILE PAINTINGS

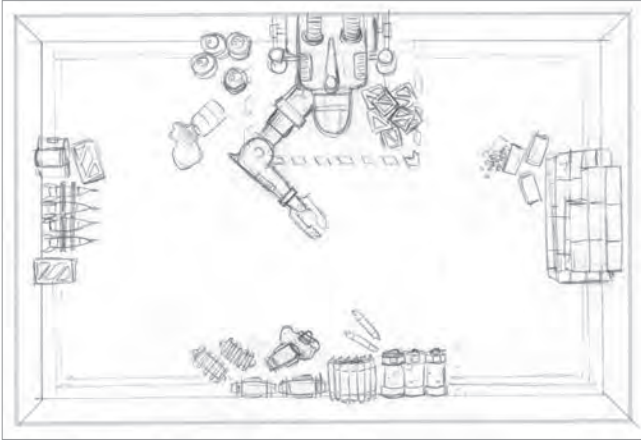


FINAL BOARD TILES

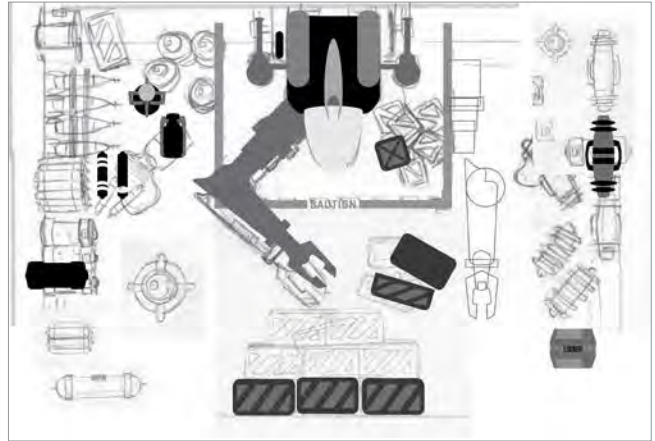


CARGO BAY
[7" X 10.5" TILE]

CONCEPT SKETCHES



VECTOR SHAPES



GAME TILE PAINTING



FINAL BOARD TILE



3

DEFENSE OF WORK

1. Conclusions
2. Further Research

3.1

CONCLUSIONS

CREATING A POSITIVE USER EXPERIENCE

Board games are a microcosm of design. The process of designing a board game is an exercise in branding, illustration, product design, layout, iconography and user experience. It requires careful attention to customer feedback and production specifications. There are few better projects through which to explore the breadth of graphic design.

The designer's goal in undertaking this project was to create a fully designed and tested board game prototype, with the hope of eventually pitching the game to publishers. However, wrapped within that goal were several important objectives, all of which were vital to the success of the project.

First, the designer needed to understand how iconography, color, product design, and text operated within the board game framework to create an appealing and streamlined interface for players. Because a game's illustrations and graphic design are the principle gateway through which players experience the game (Hunicke), its user interface is crucial to a positive play experience. In order for the designer's game to be successful, its design had to engage players and help them understand the game's rules and mechanics.

This idea underpinned almost every aspect of the game design process. The character dashboards were designed to make information clear and easy to reference. They included spots to keep track of key game effects such as wounds, character status or the state of rad screens using visually distinct double-sided markers. Tokens were designed to be easy to distinguish, their purpose clarified not just by the icons printed on them, but also their shape, color and size. Cards were designed with a very clear, vertical typographic hierarchy enhanced with a few easy-to-read icons in order to make the text as approachable as possible. The rulebook itself, which provides a necessary key to the rules that govern the rest of the game's design, was presented with careful organization supported by copious visuals intended to both clarify the rules and establish visual connections between the game's mechanics and its components.

As a result of these careful design decisions, the game's components become almost intuitive in their use. While there will always be a learning curve with any board game, particularly a game as complex as *Reaktor Mutants*, a well-designed game should make it easy for players to become comfortable with the game's mechanics after playing it a time or two. Both playtesting feedback and survey results indicated that *Reaktor Mutants*



ESTABLISHING THEME THROUGH ILLUSTRATION

succeeds in this regard. Playtesters found that they were able to master the game's rules very quickly once they were playing the game, and most survey respondents expressed confidence that they could easily grasp the game once they had gotten some hands-on experience with it. Although the designer will still need to conduct a series of blind playtest sessions to definitively assess the effectiveness of the game's design for players new to the game, the research so far is highly encouraging.

The designer's second objective was closely tied to the first: he wished to develop effective illustrations for the game as a means of improving player engagement and immersion. A game's artwork is one of the most important elements in establishing its mood and theme, which directly impact player experience. Therefore, the game's art direction was crucial. As illustrated in Chapter 2: Design Process and Final Work, the designer put considerable effort into developing the game's imagery, and even abandoned early attempts at the character illustrations in an effort to improve the direction of the game's art.

The final images created for *Reaktor Mutants* represent a substantial improvement over earlier attempts. The illustrations are much more dynamic and more clearly express mood and personality. Feedback received through the online survey suggested that the characters and monsters were fun and appealing, and that the board tiles evoked an ambience of danger and dread. While it is arguable that the digitally-painted board tiles are not consistent with the rest of the game's vector-based art, most survey respondents seemed comfortable with the game's attempt to reproduce the "cell-art on painted background" effect of mid-century animation.



INTEGRATING MECHANICS AND VISUAL DESIGN IN THE GAME DESIGN PROCESS

The third, and perhaps most important objective for this project was to establish the important link between a game's graphic design and the design of the game's mechanics. Many insights emerged through the *Reaktor Mutants* design process, but the most compelling was the idea that a game's graphic design should grow in conjunction with the game's mechanics. This attitude is not necessarily shared by other game designers, many of whom seem to feel that graphic design should be tacked onto a game by the publisher once the mechanics have been firmly established. However, since a player's experience with a game depends so heavily on the game's interface, it seems apparent that game design is simultaneously a mechanical and visual process. Ignoring either part of the process can ultimately inhibit a game's development, while embracing both aspects of design can breathe life into the design process (Laukat).

Reaktor Mutants' most distinct and memorable mechanic illustrates this idea perfectly. The sensor contact markers used to introduce monsters and other encounters to the game were added over halfway through the design process. Prior mechanics were, in fact, purely mechanical: new monsters were simply added to the game board each turn, usually as a result of die rolls. The system was dry, rote, and unoriginal. Furthermore, merely adding monsters directly to the board ignored one of the key cinematic conceits that

inspired the game: the idea that you could scan monsters on a radar screen or a motion detector but not know exactly where or what they were. This convention was used famously and to great effect in the James Cameron film *Aliens*, which is one of *Reaktor Mutants'* biggest inspirations.

The addition of sensor contacts to the game was not merely a mechanical decision. It was a visual and thematic decision. By adding some well-designed tokens that evoked the look of radar blips on a scanner, the designer made the appearance of monsters on the game board mysterious and dramatic. The uncertainty of encountering and revealing new sensor contacts as the characters explored the ship was far more exciting for the players than merely seeing monsters parading around the game board. The relatively simple visual element of the unknown helped to deepen player immersion and strengthen *Reaktor Mutants'* thematic game play.

This kind of visual solution to a mechanical problem is an important element of almost any graphic design process, yet it seems to be frequently overlooked or undervalued by less experienced game designers who, for the most part, are not also visual artists. Having established the impact of this approach through the design of *Reaktor Mutants*, this designer hopes to utilize this close-knit fusion of visual and mechanical design in future game design projects.

Reaktor Mutants is not the only board game the designer hopes to design. It is not merely a prototype in its own right, but also a prototype for the designer's entire board game design process, and the lessons learned from *Reaktor Mutants* will be applied to future game design projects. Furthermore, as a participant in both the graphic design and board game communities, the designer plans to share the insights acquired from this process with others, including fellow game designers and graphic design students.

3.2

FURTHER RESEARCH

Even though the designer fulfilled the goals of this thesis by completing a successful board game prototype, the *Reaktor Mutants* project must still undergo further development before it is done.

The next step is to produce a physical copy of the game. The designer was unable to do so before the conclusion of this thesis because the printer through which he was working to produce the game's prototype, *The Game Crafter*, temporarily suspended operations through May 2020 due to the COVID-19 pandemic. Now that the *The Game Crafter* has resumed operations, the designer plans to work with them to print the prototype.

Once social distancing conditions permit blind playtesting, the designer will organize a series of blind playtest sessions using the printed prototype to further test the game's design and mechanics among new players. Insights from these sessions will help further refine the game's design.

After the game has been soundly tested and revised, the designer hopes to pitch the game to publishers. There are a number of conventions and related board game events where designers and publishers are able to connect with one another, and many publishers are also open to receiving submissions through official communication channels on their websites.

The board game industry is thriving and competitive, so getting a game like *Reaktor Mutants* published is far from guaranteed. However, with hard work and prayers, perhaps the game will find its way to store shelves within the next few years.

4

APPENDIX

1. Feedback Questions
2. Production Specifications

4.1

FEEDBACK QUESTIONS

Throughout the design process, and particularly during the initial playtesting phase of *Reaktor Mutants'* design, the designer relied heavily on feedback from playtesters and reviewers to gauge the success of the game's mechanics and visual design. After each early playtest session, the designer conducted a short, informal focus group session with the players, during which he asked questions from the list provided on page 85 to help guide them into offering useful feedback on their experience.

The final stage of the designer's research required direct feedback from people that had some experience with the game. Originally, the designer planned to run a series of blind playtest sessions through which to receive feedback on the game play experience and the ways in which the graphic design of the prototype enhanced or hindered that experience. However, due to restrictions on social gatherings imposed by the COVID-19 pandemic crisis, the designer was unable to arrange second phase playtest sessions during the time frame of this thesis. Instead, he composed an alternate set of questions focused exclusively on the game's graphic design, and used the questions in an online feedback survey offered to a selection of board game hobbyists and graphic designers. Survey respondents were asked to carefully review the game's rules and components and answer a series of questions on their impressions of the game's design.

While the revised survey eliminated many useful questions regarding the experience of playing the game, it did allow the designer to focus on the elements of the game's design that were most directly affected by the graphic design of the components. To that end, it adequately satisfied the research goals for the thesis.

The numerical data acquired from the feedback survey is summarized on page 86. Most survey respondents also provided insightful comments on each question, but those comments have already been summarized and addressed in Chapter 1: Research.

REAKTOR MUTANTS

FOCUS GROUP QUESTIONS

1. Describe the game's difficulty. Was it too easy, too difficult, or did it provide a nice challenge?
2. Describe the game's complexity. Was it too simple, overly complex, or just right?
3. Describe the game's length. Was it too short? Too long? Was it the right length?
4. Describe the game's pacing. Did it feel too slow, too fast, or just right? Did the game remain exciting through the playtesting session, or were there moments of boredom?
5. Describe the clarity of the rules. Were they easy or difficult to understand?
6. Were there any specific rules that were unclear?
7. What elements of the game did you find most frustrating or confusing?
8. What elements of the game did you find the most enjoyable?
9. Did you find the game's theme engaging and fun?
10. Did you feel invested in the game's outcome and challenge?
11. Did you feel that you had many choices during the game? Describe the impact those choices had on the game's outcome.
12. Was important game information easy to find on the cards and other components?
13. Were the icons or other graphic elements clear and easy to remember?
14. Was the text on the game components easy to read?
15. Do you feel that the game's graphic design reflected the game's theme?
16. Do you feel that the game's graphic design helped make the rules and gameplay more intuitive?
17. Were there any instances where the graphic design hindered game play or made the rules less clear?
18. Were the game's components easy to use? Were they easily identifiable?

REAKTOR MUTANTS

ONLINE FEEDBACK SURVEY

Please provide feedback on your impressions of the design of the *Reaktor Mutants* board game components by answering the following questions and providing any additional comments you feel might be helpful.

1. Are you primarily an artist/designer or a board game hobbyist?

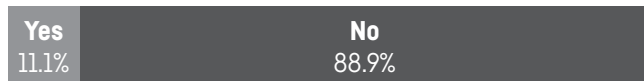


2. Describe the clarity of the rules. Were they clear or confusing? [1 = Confusing / 5 = Very Clear]

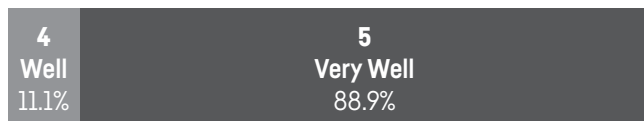


Average Rating: 4.4

3. Were there any specific rules you felt were unclear?

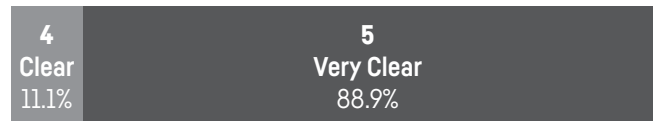


4. *Reaktor Mutants* attempts to evoke the mood and themes of atomic age pulp sci-fi from the 50's and 60's. It also attempts to frame sci-fi monster movie tropes in a fun way that doesn't take itself too seriously. How well do you feel that the game's illustrations and design reflect those themes? [1 = Very Poorly / 5 = Very Well]



Average Rating: 4.9

5. Please rate the clarity of the icons and other graphic elements. [1 = Very Confusing / 5 = Very Clear]



Average Rating: 4.9

6. Was the text on the game components easy to read and follow?



7. Rate the ease with which you feel you can find and understand important game information on the components. [1 = Very Difficult / 5 = Very Easy]

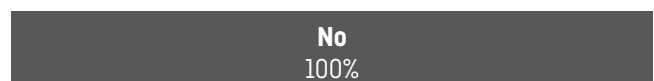


Average Rating: 4.7

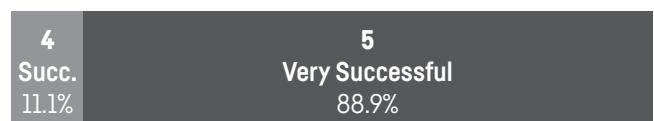
8. Do you feel that the overall design of the game's components adequately supports the rules and game play?



9. Were there any components or elements of the game's graphic design that you feel might hinder game play or make the game's rules less clear?



10. Please rate the use of color in the game. Was it successful at making the game's components more usable and identifiable? [1 = Completely Unsuccessful / 5 = Very Successful]



Average Rating: 4.9

4.2

PRODUCTION SPECIFICATIONS

Although the COVID-19 pandemic crisis made it impossible to produce a professionally printed prototype of the *Reaktor Mutants* board game within the time frame of this thesis, the designer did rely closely on the printer's printing specifications to guide the development of the game's components. After some research into suitable printers, the designer chose to rely on *The Game Crafter* to print the game prototype. *The Game Crafter* specializes in print-on-demand board game printing as well as limited run productions, and it offers a wide selection of potential components and the ability to create custom components if necessary. While *The Game Crafter* would not be suitable for producing a game like *Reaktor Mutants* in large quantities, it is ideal for printing the prototype for later stages of the game's playtesting.

The printing specifications on the following page include the number and type of each of the game's components, identifies how many of each component fit on each slug or sheet for printing, and also records the pixel size for the graphics necessary for the printer's printing templates. The specifications also include an estimate of the cost for a one-off prototype.

BOARD TILES	SIZE	IMAGE SIZE (PX)	QTY	ITEMS/SLUG	SLUGS/SHEET	SHEETS NEEDED	COST/SHEET	TOTAL COST
Square Board Tiles	7 x 7	2475 x 3150	3	1	2	2.5	\$6.45	\$12.90
Large Rectangular Board Tile	7 x 10.5	2475 x 3150	1	1	2	0.5	\$6.45	\$3.23
Small Rectangular Tiles	3.5 x 7	2475 x 3150	8	2	2	2	\$6.45	\$16.13

Total Sheets: 5 Cost: \$32.25

TOKENS & MARKERS	SIZE	IMAGE SIZE (PX)	QTY	ITEMS/SLUG	SLUGS/SHEET	SLUGS NEEDED	COST/SLUG	TOTAL COST
Stunned/Glued (Med Triangle)	0.75 x 0.75	300 x 300	15	15	10	1	\$5.99	\$5.99
Gutworm (Med Circle)	0.75 x 0.75	300 x 300	15	15	10	1	\$5.96	\$5.96
Opportunity (Med Circle)	0.75 x 0.75	300 x 300	30	30	10	2	\$5.96	\$11.92
Rads (Med Circle)	0.75 x 0.75	300 x 300	30	30	10	2	\$5.96	\$11.92
Salvage (Med Circle)	0.75 x 0.75	300 x 300	30	30	10	2	\$5.96	\$11.92
Wounds (Sm Square)	0.5 x 0.5	225 x 225	28	28	10	1	\$6.17	\$6.17
Immobile Contact (Lg Circle)	1 x 1	375 x 375	28	8	10	3.5	\$5.85	\$20.48
Mobile Contact (Lg Circle)	1 x 1	375 x 375	28	8	10	3.5	\$5.85	\$20.48
Status & Rad Screen (Lg Circle)	1 x 1	375 x 375	8	8	10	1	\$5.85	\$5.85
Effect Markers (Lg Square)	1 x 1	375 x 375	16	8	10	2	\$5.90	\$11.80
Massive Ping (Mini Circle Tile)	1.25 x 1.25	450 x 450	6	6	10	1	\$5.83	\$5.83
Door Markers (Mini Square Tile)	1.25 x 1.25	450 x 450	18	6	10	3	\$5.88	\$5.88
Character Standees (Lg Standee)	1 x 2.25	375 x 975	8	4	10	2	\$6.12	\$12.24

Total Slugs: 25 Cost: \$136.44

STANDARD CARD DECKS	SIZE	IMAGE SIZE (PX)	QTY	ITEMS/SHEET	SLUGS/SHEET	SHEETS NEEDED	COST/SHEET	TOTAL COST
Salvage Cards	2.5 x 3.5	825 x 1125	50	18	-	2.78	\$1.66	\$4.61
Mutation Cards	2.5 x 3.5	825 x 1125	40	18	-	2.22	\$1.66	\$3.69
Equipment Cards	2.5 x 3.5	825 x 1125	58	18	-	3.22	\$1.66	\$5.35
Supply Cards	2.5 x 3.5	825 x 1125	16	18	-	0.89	\$1.66	\$1.48
Starter Item Cards	2.5 x 3.5	825 x 1125	16	18	-	0.89	\$1.66	\$1.48

Total Sheets: 10 Cost: \$16.61

MINI CARD DECKS	SIZE	IMAGE SIZE (PX)	QTY	ITEMS/SHEET	SLUGS/SHEET	SHEETS NEEDED	COST/SHEET	TOTAL COST
Radiation Cards	1.75 x 2.5	600 x 825	33	32	-	1.03	\$2.89	\$2.98
Sensor Cards	1.75 x 2.5	600 x 825	31	32	-	0.97	\$2.89	\$2.80

Total Sheets: 2 Cost: \$5.78

LARGE CARDS	SIZE	IMAGE SIZE (PX)	QTY	ITEMS/SHEET	SLUGS/SHEET	SHEETS NEEDED	COST/SHEET	TOTAL COST
Character Dashboards	4 x 8	1275 x 2475	6	4	-	1.5	\$1.99	\$2.99
Reference Cards	4 x 8	1275 x 2475	2	4	-	0.5	\$1.99	\$1.00
Monster Cards (Jumbo Cards)	3.5 x 5.5	1125 x 1725	9	6	-	1.5	\$1.35	\$2.03

Total Sheets: 3.5 Cost: \$6.02

RULEBOOK	SIZE	IMAGE SIZE (PX)	QTY	PAGES	BASE COST	ADDITIONAL COST/PAGE	TOTAL COST
Jumbo Booklet (8 x 10)	8 x 10	2475 x 3075	1	32	\$0.90	\$0.14	\$5.38

Cost: \$5.38

TOTAL ESTIMATED COST FOR PROTOTYPE: \$202.48

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