2   Prototype

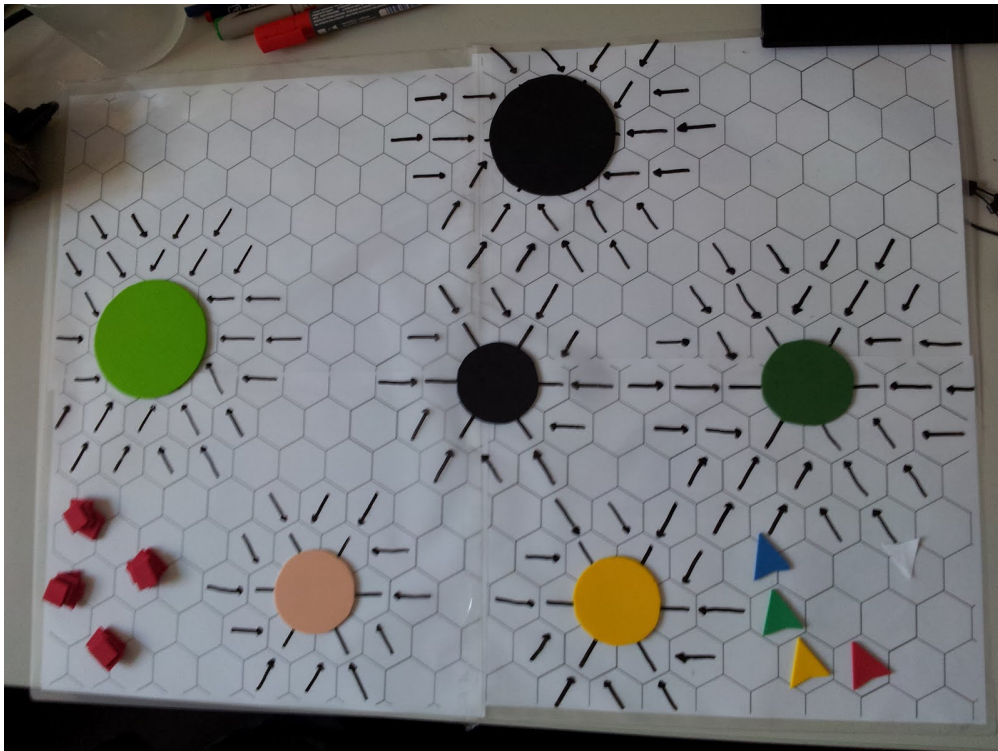## 2.1   Introduction & Prototype Overview

Fig 2.1. Initial planet setup. The red stacks in the lower left represent player hit points.

The core concepts we wanted to model in our physical prototype are:

- Movement of the players' space ships
- Gravity influence
- Weapons
- Shooting the opponents
- Tactical use of items

To achieve these goals, we asked ourselves various design questions such as

- How can we best model the playing field?
- How can we best approximate simultaneous movement and rotation of players?
- How does gravity influence player movement?
- How are items distributed?
- How much damage does each weapon deal?
- etc.

We hope that we have found the best possible answers to all these questions and more, as explained below.

Our game is modeled as a simple board game. The playing field is modeled closely on our actual game, since it is also be bounded by a rectangle and is conceptually a plane. We chose to divide the field into hexagonal panels, which allows modeling the movement of the players in any direction closest while keeping the concept simple.

Each participant controls a spaceship, represented as movable triangles in red, green, blue and yellow, respectively. Planets are shown as circles of different sizes at fixed positions on the map, with a gravity field around them indicated by arrows.

Each player throws a six-sided die in turn. He must then move the exact number of panels shown, regardless of his current rotation. A shot can be fired only in the direction of the last movement. Each player starts in one corner of the field and gets a number of health points at the beginning of the game. The game ends if all but one player have lost all of their health points. Health points are lost if a spaceship is hit by another spaceship's weapon, which can be fired at a straight line from any field position in moving direction. The last player left is the winner.

Additionally, some items can be collected and used throughout the game.

2.2 Rules

2.2.1 Turn structure

Each player executes all of the following one after the other:
- He may play an action card from his hand and discard it, or shoot his weapon
- He rolls a die and moves by as many cells as shown
- If his ship is in a gravity field, it is now moved by 1 panel in the direction indicated on it
- He may play an action card from his hand and discard it, or shoot his weapon

2.2.2 Card System

Available cards:
- 28x "1 additional damage" cards
- 7x "2 additional damage" cards
- 10x "1 health" cards
- 3x "2 health" cards
- 6x "gun turret" cards

- 6x "shield" cards
- 4x "teleport" cards

All cards are initially shuffled and placed in a draw pile. When a player picks up an item token, he takes the top card into his hand. If the draw pile is now empty, the discard pile is shuffled and serves as the new draw pile. As Health cards are applied and discarded immediately on pickup, the discard pile is guaranteed to always be non-empty.

2.2.3 Corner cases: Boundary and planet-occupied fields

Players can never enter or pass through fields outside the playing field or fields which are occupied by planets (filled in as black). The only way to "pass through" a planet is given by the teleport card, which does not require physically moving through the black field.

2.3 Iterative Development phases

2.3.1 Iteration 0: Basic setup and physical preparations

The initial setup included:
- 4 starting hit points per player
- No default weapon
- All items respawn after each phase (each player had one turn)
- Two kinds of item cards:
  - 1 & 2 healing points
  - 1 & 2 damage points
- Player's turns consist of:
  - Rolling the dice, moving the number of fields it shows
  - Moving one field in the direction of the gravity field
  - Playing one action card

2.3.2 Iteration 1: Fewer and fairer item respawns, default weapon

Playtesting Iteration 0 showed multiple issues:
Many turns ended without much achieved: Picking up only one item didn't give players enough shooting power to achieve guaranteed kills, so all players tended to ignore each other and only hoard action cards. As this is not what supposed to happen in our game, we thought it necessary to increase the motivation to attack your opponents.

Also, respawning items after each phase gave a statistical advantage to the

player who had the first turn each phase. We thus introduced non-determinism by only respawning at most   of all items with a 50% chance.

Also, an abundance of health cards led to hoarding and a reduced sense of chaos, as players held a "health buffer" in their hand. Thus, we now require that health cards be played immediately when picked up.

Adjusted rules:
- New item respawns: After each player's turn, roll one die. If it shows 4, 5, or 6 pips, roll again and fill all empty item fields marked with the new resulting number.
- 8 starting hit points per player
- Default weapon deals 1 damage
- The "1 damage" and "2 damage" cards now deal 1 and 2 **additional** damage.
- Player's turns consist of:
  - Shooting or playing an action card
  - Rolling the dice, moving the number of fields it shows
  - Moving one field in the direction of the gravity field
  - Shooting or playing an action card

For balancing, two health cards from the initial draw pile were removed.
We also collected positive feedback from iteration 0: The current rotation of the players' ships played a larger tactical choice than expected, which gave the game additional depth.

2.3.3 Iteration 2: Balancing

With the new rule of 8 starting hit points, we found games to last too long. Thus, we reduced the starting health to 6 points, with the maximum hit points set at 8. This way, initially picked up health items are not wasted. To further reduce game length, we added to extra damage weapons to the draw pile.
On the tactical side of things, we found that a mentality of "ganging up" worked really well, something we will probably also see in our final game, and which serves as a tactical choice.
To bring more variety into our draw pile, we introduced the "Shield" card, which can be played whenever a player would receive damage from a single shot to ignore that damage.

2.3.4 Iteration 3: Variety ahoy

As we now felt that our game had overall good balancing and was a fun experience,

we continued to add more variety by introducing additional action cards.

One of these was the "gun turret" card: It can only be played when the player is inside a gravity field, and is immediately dropped along the gravity field onto a planet. There, the player can rotate it once into any direction not blocked by the planet. Starting at the next round, the turret will shoot any enemy player that stops in its viewing direction, dealing 1 damage.

2.4   Impressions

- Playing the physical prototype involves more tactics than we intend for our final Xbox 360 game. This is a consequence of the turn-based game logic of the physical prototype, which gives the players time to evaluate different actions before actually deciding for one.

- We found that we could easily improve gameplay and fun in general by introducing new item types to spice up player turns. This, yet again, serves to show how iterative development, especially of game content such as planet and item types was a wise choice.
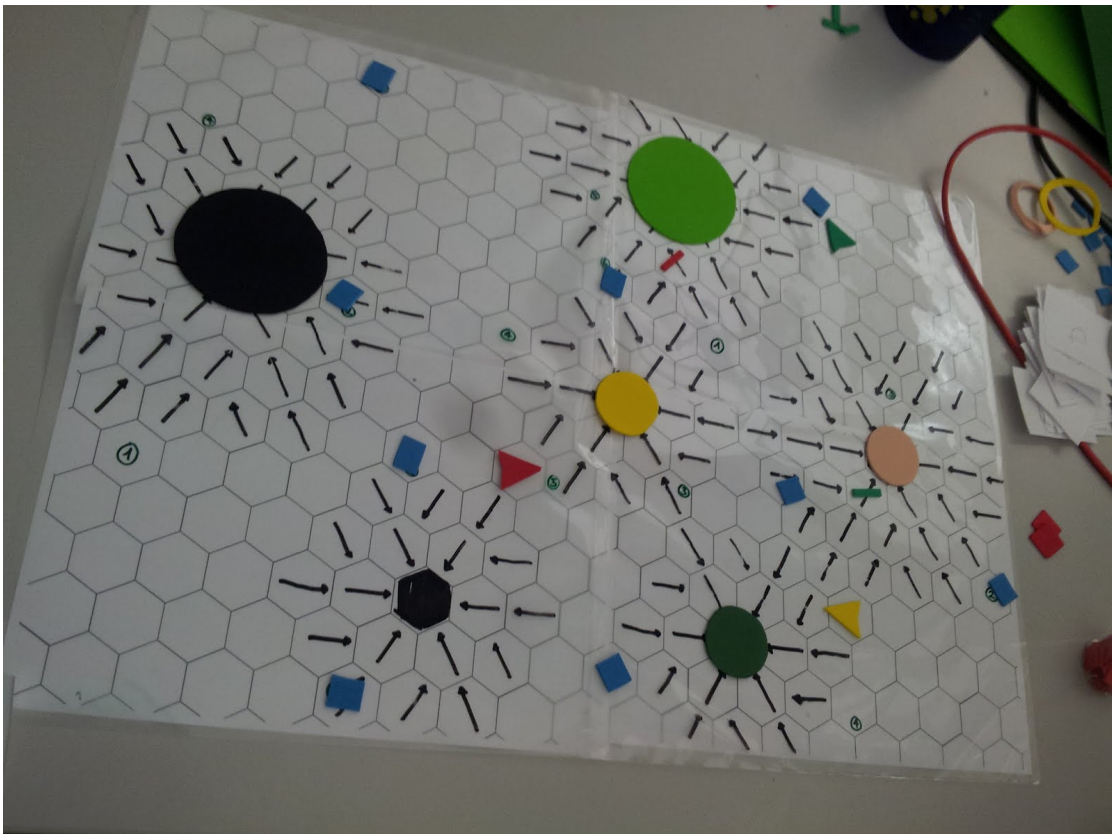

Fig. 2.2 (After iteration 3): Clearly visible are the three ships in yellow, red and green. Empty (circled numbers) as well as full (blue rectangles) spots for item pickup can also be seen. Players Green and Red have both dropped a gun turret, on the small peach and the large lime planet, respectively. To the side of the board lie the discarded playing cards.