

## Hockey Manager

- General Gameplay
  - Use various UI to draft, develop, trade, sign, etc and build a team of Hockey players with a finite spending cap.
  - Various analytic tools will be available to analyze players performances / stats.
    - This will be based off of distributions in real hockey
    - There may be 'gamified' stats such as 'chemistry', 'hometown bonus', 'left D + right D', 'rivalry bonus', etc.
  - Players will be randomly generated each season for drafting and the league could theoretically go on forever.
- # Look into Football Manager 'tutorial' to gain knowledge of what it does
  - Try to figure out how its simulation functions.

## Hockey Manager

### • Player Generation

#### - Potential Stats

##### • Offensive Skills

- Shots on Goal (Av.)

- Shooting %

- Each area of the ice

#### - Passing?

- Don't know if there is in stats

#### - Goals (Av.)

wrist  
shot  
Backhand, etc.

#### - Primary Assists

#### - Secondary Assists

#### - Shot Side (L,R)

- Position (LW, RW, C, LD, RD)

#### • Misc Stats

#### - Chemistry Type

- Playmaker, Sniper, Finisher, Power Forward, etc.

- These will give small buffs if a line of players don't overlap.

- Can't only have Snipers on a line, who sets them up?

\* 18

### - Projection

- Steady, Steady Increase / Decrease, Large Increase / Decrease,

- Random Trend Up / Down,

- Players only get 'down' when Injured (% chance)

- Super Star: Gives a 'lucky' roll on stats to give ~~taller~~ more 'increased' stat distribution (McDavid, Crosby, etc)

- Conditioning: Injury chance / time on ice

Separate probability

## Hockey Manager

### • Player Generation

- Stats will be based on a ~~80-100~~ Scale  
0 - 99 where 99 would be in the top 1%.
- This will be determined by their stats in relation to the rest of the league.
- Aggregate of Stats  
(Offensive Overall + Defensive Overall) / 2.

Some constant

- Need to make 'offensive' stats weigh more for forwards  
vice versa for defensemen.

## \* KEY ASSUMPTIONS

- Defensemen are typically at offensive blue line or rear own goal, vice versa for offensemen.
- Player positions won't really be simulated due to complexity.

### Hockey Manager

#### • Simulation

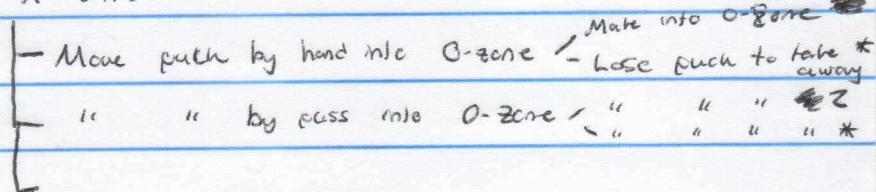
##### - Monte Carlo Chain of Potential Events

ex.

Start with puck drop

\* End of current possession

↳ Team A wins



1/2 Player Shoots puck / Goal \*  
Rebound 3  
Frozen (Goalie or O&B) \*

Player passes puck / Successful pass to cradler 1.  
Take away \*

(Zone based?)  
- Right D → Left D easily  
→ Right F easily

→ Left F touch →, through traffic, higher take away chance.

Cover F & tangent

#### 3. Player Retrieves Puck → 1

" loses "

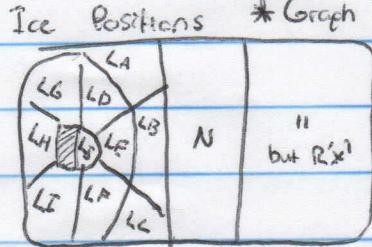
#### 4. Player/Line Change could happen whenever due to current ice time (Ice Time could be negative modifier here enter the Ice time gets for a single shift).

#### \* Further nodes on

graph or much less likely due to the play being harder.

Outcomes being

- Ice
- Offense
- Etc.
- Breakaway chance.



#### \* Graph Theory for Puck/player movement



Each Edge has a chance for a play to happen

\* Player positions could update to adjacent zones based on starts

- Speed to lose d-man?
- Passing to zones where players are

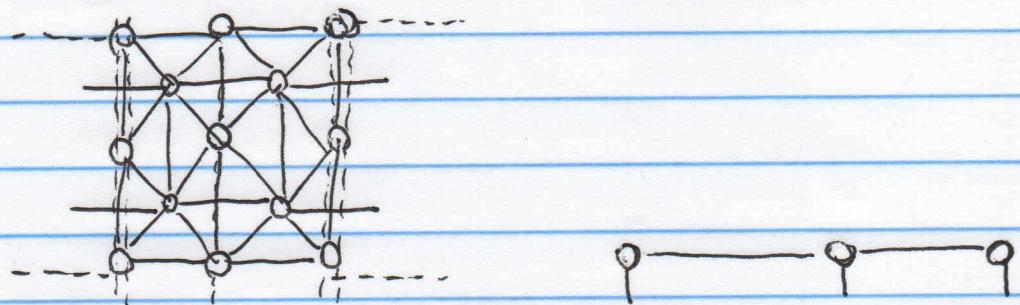
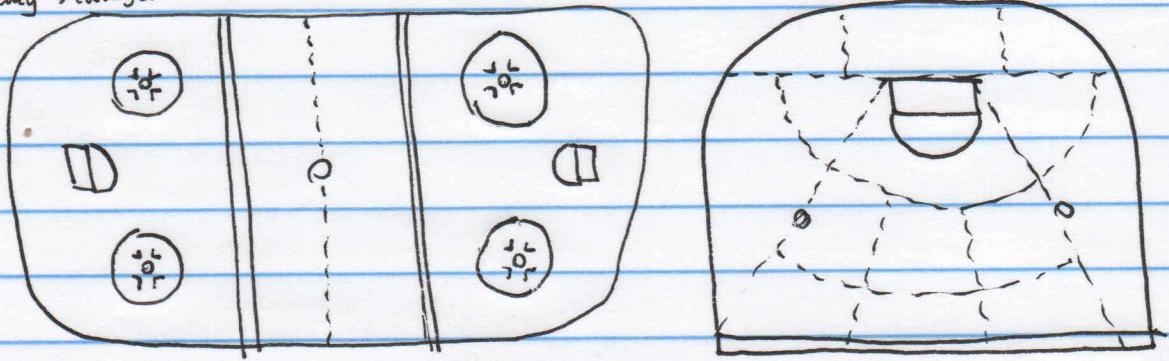
#### - Offense Goals

- Separation from D-men
  - move zone and shoot with puck
  - move zone and receive pass
  - Stay 'spread' out over O-zone
  - Go for high danger chance ideally based on type of player?

#### - Defensive Goals

- Don't allow separation
- Always try to be between shot and goal.
- Try to intercept passes when possible

Hockey Manager



## Hockey Manager

### Player Generation (Re-visited)

- With Context of Vertex based Simulation, players need skill sets associated with that
  - Passing Accuracy and Passing Bias / Shooting Bias
    - Short ↗ Preference to pass vs. shoot
    - Medium
    - Long ↗ 80/20 → Set up player ↗ 35/65 → Generally shooting
  - Shooting Accuracy
    - Short (High Danger)
    - Medium (Medium " )
    - Long (Low " )
  - Speed
    - Ability to break away from Defenders
    - Logs between their speed
  - Puck Handling
    - Ability to hold onto the puck under pressure  
(hits and defensive coverage)
  - Hockey IQ
    - Ability to choose the 'statistically optimal' decision when available
  - Pass Receiving
    - Ability to receive passes at various speeds
  - Discipline (Chance to trip, slash, hook, etc. on plays)  
(Speed could influence this)
- Defensive Stats
  - Takeaways
  - Shot Blocking
  - Covering Players
  - Discipline (Same as above with gear taking penalties)
  - Hits
  - Covering Dangerous Ice
  - Covering Passing Lanes
  - Puck Clears (or PP or S-on-S)
  - Not allowing it uncontested).

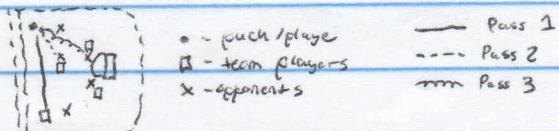
~~Out - Game~~

## Hockey Monitor

- \* Look up what takeaways happen the most
  - Passes or areas where ~~team~~ gets the touch other team

### \* Example Play Percentages

- Player at center O-Zone blue line, chance of potential passes



#### \* Pass 1

- High Success
- No Defensive Coverage
- Long Range, but no coverage is big plus
- Low expected goals

- Outcome most likely to pass 1, and try to open ice and get better Scoring chance / pass.
- Allow O-Zone players to reposition

#### \* Pass 2

- Medium Success
- Defensive Coverage
- Good player ≈ better coverage
- Short Range
- Higher Expected goals

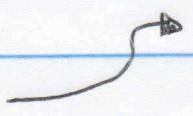
#### \* Pass 3

- Low Success
- High Coverage > Require Exceptional pass
- Medium Range
- High Expected goals
- Potential Shot Block

## Hockey Manager

### Player Object

- Stat Sheet
- Current Node
- Decision Script



### • Position

### • Stats

- Shooting %

- H, M, L Shots

- etc.

### • Dest. Node

- High Bias node to be  
around

:

### Rink Object

- Array of Nodes
- Current Game Time
- Clock Step
- Penalty Drawings

- Offsides
- Trips
- D.o.G
- Etc.

From Player  
- Signal?

### Nodes

### • X Pos

### • Y Pos

### • Adjacency List

### • Current Players

### • Has Puck Bool

### • Movement methods

inherited by player objects

### • More nodes contents

### • Replay Object

- Records current game 'state'

for 'replaying' or 'stepping'

through game

### • Score / Stats

- Player Stats might be written to

here? or by player obj?

### • Game Stats vs. Player Stats

- Important distinction

(1)

Short Plays

(2)

Med "

(3)

Long "

## Hockey Manager

### • % of a Goal

#### - Factors that influence a goal

- Goalie (Obv.) - Skill, Conditioning (~~↳ Quick consecutive shots, # shots saved so far more shots = more work for goalie~~)
- Shooter

- Shooting Skill

- Shot location

- Power

~~↳ Player Power~~

- Shot Type

~~↳ Shot~~

- Accuracy

↳ Low, Med, High, Rush, Snipe, wrist, Redirect, Backhand, etc.

• Traffic

• 'Luck'

• Play Before Shot

- Large angle change

~~↳ high %~~

Player Skill will / could

be coefficients that  
reduce impact of base  
percentage modifiers.

Base of 90% chance?

Test: 90% chance, faced 20 shots already

~~↳ LB~~ Conditioning Factor

$$.9 - (.9 * (1.01 * \text{Shots Faced})) + \text{Some performance metric}$$

$$.9 - (.9 * .02) \rightarrow .9 - (.018) \rightarrow .882 \rightarrow 88.2\%$$

ex. PC = Player Conditioning to  
reduce impact of  
 $(-.001 * PC) * \text{Shots Faced}$  this

per second, game, penalty  
random?

• Conditioning would ~~decrease~~ 'bounce back' a little  
after an intermission, and would reset on  
goalie ~~all~~ swap

Chance to ~~base~~  
Save

Process

1. Base Scoring chance  $\rightarrow$  2. Play Adjustment  $\rightarrow$  Shooter Modifiers

- ~~Player damage~~  
Player Skill to LA
- Condition Factor

- Type of shot  
one play  
modifiers

- Skill, Shot location,  
Player Shot power, type,  
etc.

\* Look at money puck definitions  
for Low, Med, High to get so  
rough areas to have  
percentage mod.

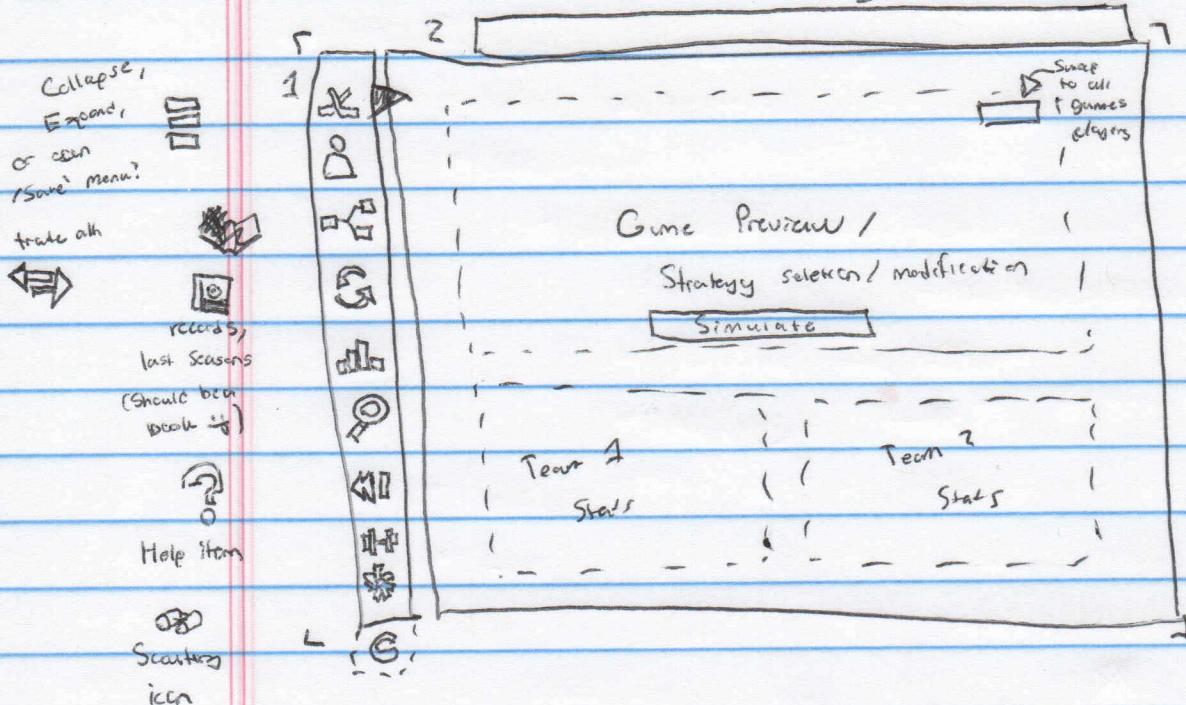
Out of  
this

log5 agains  
Save % explained  
above

\* These will raise and lower the  
Scoring 'chance'. Better plays put it more in Shooters favor more  
drastically

## Hockey Manager

- Basic UI/UX Draft



1. Menu Side Bar (could be a tab component in Godot (need icons though))

- Contains buttons for next game preview, Roster, Standing, Trade Market, Stats for the league, Search Function, Red/Yellow Review, Player Development, Settings, Developer Mode (to easily allow custom player creation, modification, etc.)
2. Specific Contents for selected menu
- Game Preview window for Stats on both teams,
  - Roster - List of current players (Searchable, Sortable)
    - ↳ Selecting a player expands their stats and roster options

3. Main Header with Time, Games Left, Standing, Cap, Team Name, etc.

- Maybe Settings button goes here to right? or a ? icon for help.
- Maybe this goes into 2 so information could change dynamically to what would be useful?

## Hockey Manager

- Game Options

- League Type

- Male, Female, Co-ed

- Randomized Player Portraits

- Skin Color, Hair, Facial Features, missing teeth, etc.

↳ Could be affected by games when injured.

- Teams

- Random Names, Cities, and colors

↳ would need duplicate protection on all three.

- Ability to customize own team as well as others

- Ability to import JSON file to do this automatically  
(or Godot Resource?) (Same with PLAYERS!)

- Coaches \* Maybe just random generation but have all schemes available?  
Seems convoluted with salary being separate from cap space.

- Just like players, they have Contracts and can be signed.

- Give access to different strategies for players and game set-up

- Goal is to get coach that fits players strengths.

- Randomized Player Appearances (More realistic and constrained.)

- Name

- Based on country of origin, but maybe CAN and US have

some specific names for specific races (Kwandre Miller for example).  
Have some chance to role a name like this when race matches.

- Hair

- Similar to above, hair could have a random chance to be race affiliated. Hair color could also have weights depending on players race.

- Origin • Players from 'rarer' origins will have a stat bump to their averages. Less accessible to hockey = better player in NHL

## Hockey Manager

### Drafting

#### - Prospects

- Generate each season similar to real players
- Stats improve / degrade each season similar to players
- Stats will not be 100% visible due to 'Scouting' fluctuation and just drafting uncertainty
- Players undrafted will be 'deleted' and not be accessible any longer
- Sign onto ELC (entry level contract) most likely around NHL ELC of ~\$75,000

- AHL/ECHL/WCHL/ETC. (Minor league teams with each major team will have teams stats to just drafted players to encourage 'development'.)

- There will be randomized AHL and minor league / High School / College teams that will also be simulated to update prospects stats
- Trading, etc. won't occur here since trading in pre-pro leagues is uncommon.

#### - The Draft

- Similar to real NHL, each team gets a pick in each round and the lowest team 'outside playoffs' will lottery for best picks
- Picks can be traded for 'value', so teams may not draft when they normally do.
  - Value is determined by pick placement and must be close to matching, or exceeding, value in trades. This will be tricky to calibrate!