

ECE 1778:

Creative Applications for Mobile Devices



Lecture 5
February 6, 2019



Today

1. Logistics
2. Assignments P3, S4
3. Project Planning, Management and Execution
4. Group Interaction
5. Proposal Presentations Specification – next week
6. Peer Review of Proposals
7. TeamChooser
8. Approval-in-Principle Discussions



Logistics



Assignments

- S3 due this week – how is it going?
- P2 due yesterday – how was it?
- S4 and P3 now posted
 - Both due in two weeks
 - Providing space for proposal work this week
- S2 has been graded
 - Quite well done

Assignment P3

Making PhotoSharing more functional!

Assignment P3

- More capabilities and features of photo sharing app
 - Learn about database composite queries
- 1. Add captions to photos before upload
 - Including using Neural Network to generate captions!
 - Pre-existing network and code pretty much, don't worry
- 2. Anyone can add comments to your photos
- 3. Display only your photos **or** everyone's



Video Example of Assignment P3

<https://drive.google.com/file/d/1pMK9svMTQk2qrh6rgpcS1X2TSsVMymNk/view>



Assignment S4

Creativity, Sensors and Your Project

Assignment S4

- Goal: Practice coming up with ideas & evaluating them
 - Based on 1) Current technology 2) Future possible technology
- Four parts:
 1. Reprise field description, including a reflection of how it fits in with what you've learned so far.
 2. Give short summary of project. (What? Again? Why?)
 - Provides the context for next parts



Parts 3 and 4

3. Given the set of sensors on a phone, generate and evaluate an idea to enhance your project.
 - Sensors: accelerometer, gyroscope, camera etc. (from Lec #2)
 - “Generate” – brainstorm, think freely
 - “Evaluate” – give strengths and weaknesses; sense of compute
 - Ideas might help project, but don’t have to become part of project
4. Given some **possible future** capabilities of technology in a phone, do the same thing.
 - Future tech: 3D gesture sensor, ultrasound, brain activity, blood pressure, eye tracker, object & depth detector



Project Time Line



Project Stages

1. **Forming Groups**
2. **Project Approval-in-Principle; GitHub Repos Created!**
 - Email me your GitHub ID (& project name) if you're not connected
3. **Project Proposal/Plan**
 - Document Due February 11th
4. **Proposal & Plan Presentations**
 - Slides Due February 12th, all present on February 13th
 - **NOTE EXTRA Lecture Wed February 13th, 6-8pm, SF 1101**
 - I will order Pizza; please email me food preferences
5. **Lecture on User Experience & Presentations February 27th**
6. **Spiral 2 & Spiral 4 Presentations**
 - 2: March 6/13 4: March 20/27
7. **Final Presentations**
 - Weeks of April 3/10
8. **Final Report Due April 17th**



Project Planning, Management and Execution



Your Project Planning

- When finished, will have given you a well-defined final goal
- Should also have broken up work up into pieces
 - The block diagrams required in proposal

Soon: Start Executing! How?

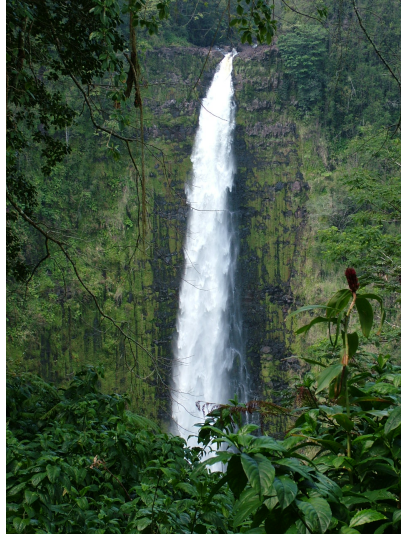


Focus: Spiral/Agile/Incremental Method

- Get smallest part of Project working as soon as possible.
 - Exercise it, revise it, and grow it
 - Use your common sense to see if it is working, and if your goals need to be adjusted
- You must identify what first 'working' useful version should be soon



Waterfall vs. Spiral Methods of Development

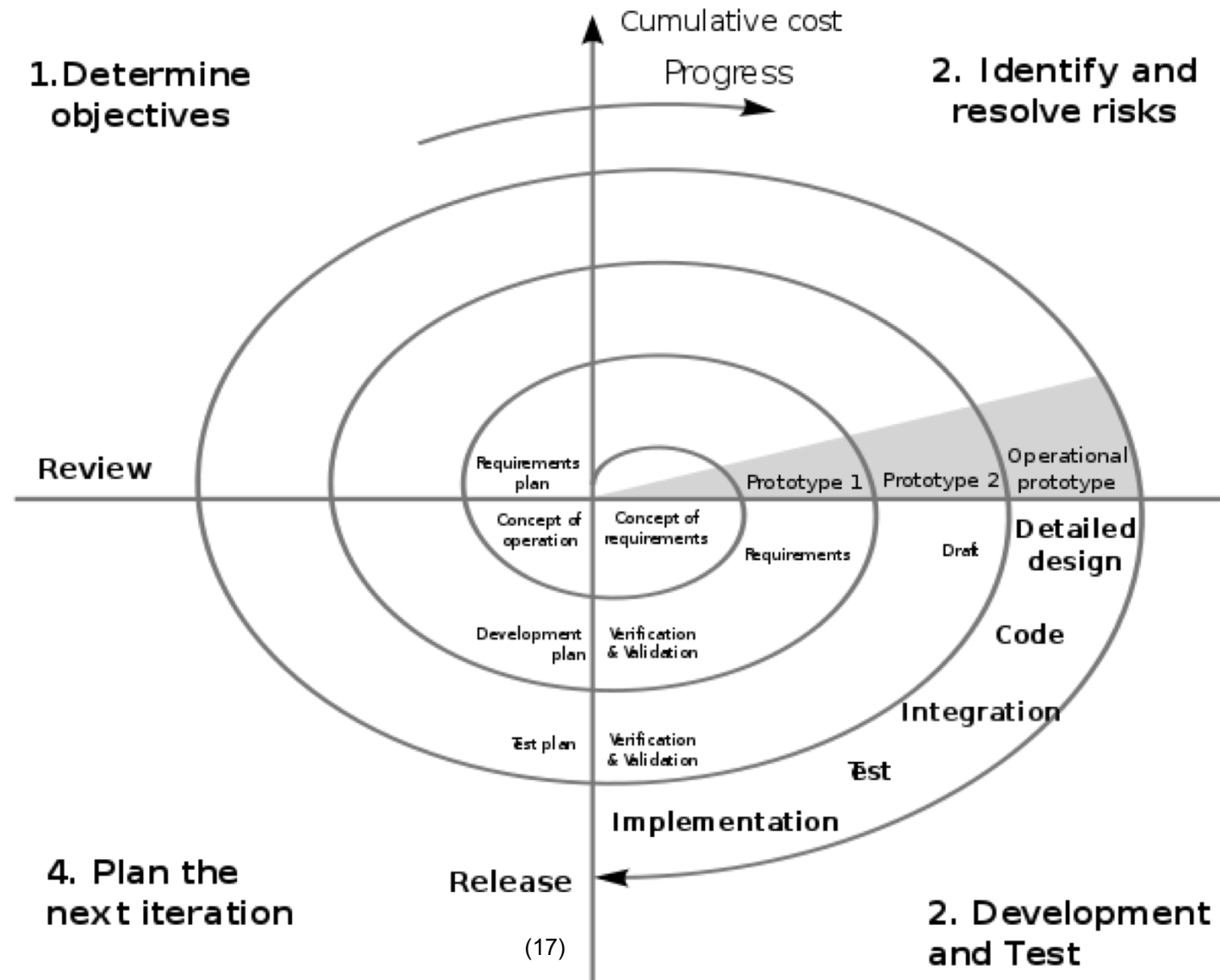


v



- Waterfall means plan everything out, documenting carefully, then build
- But software really needs to be exercised to see how well it works ➡ Spiral
- Particularly true for user interface oriented software
 - but essentially true in all projects!

Boehm's Spiral Model



Agile Software – Key Concepts

Agile Software Values: Choose

- **Individuals and interactions** over processes and tools
 - **Working software** over comprehensive documentation
 - **Customer collaboration** over contract negotiation
 - **Responding to change** over following a plan
-
- while there is value in the items on the right, we value the items on the left more
 - From http://en.wikipedia.org/wiki/Agile_software_development



A Great Seminar on Ultra-Agile

- By my colleague, Professor Michael Stumm
 - Co-founder of two companies, including **Oanda**
- **“How Facebook Software is Made”**
<https://youtu.be/CmcE1pvfWHc>
- Given in 1st year programming class ‘plenary’ lecture
 - A few years ago
 - I have pointed CEOs of companies to it
 - Agile approach presented in the extreme



Spiral Method of Development

- To emphasize how important this is, the next key milestone in the course, is **Spiral 2**
- **Spiral 1** is what you plan to get working end of week – Feb 27
 - You should describe what this will be in your proposal/plan presentation next week – functionality and features achieved; you're **not** presenting this.
- **Spiral 2** is what you get working by March 5
 - The complete set of (additional to Spiral 1) features and functions
 - You **are** presenting this!

Week	Date	What
1	Feb 27	Spiral 1
2	March 6	Spiral 2
3	March 13	Spiral 3
4	March 20	Spiral 4
5	March 27	Spiral 5
6	April 3	Final
7	April 10	Final

You'll Present Spiral 2 on March 6

- March 6 is four weeks from now, a long time
 - You'll want the Spiral 1 working well before!
 - You should think now what your Spiral 1 is going to be
 - You will include your projections/plan for Spiral 1 and Spiral 2 in the plan you **present** next week



Key Coming Steps in Project

1. Identify a Spiral 1 and Spiral 2

- Take your block diagrams, and break down into tasks
- Tasks will tell help you decide what to shoot for in Spiral 1 and Spiral 2
- Be prepared, of course, to adjust goals as you go along

2. For the tasks that need to happen

- Estimate how long they will take
- If too long, re-do goals
- Estimation is difficult; have to try; failure OK; can ask for help
- Assign Tasks and deadlines to Each Team Member
- Record them on Github



Project Execution

- You're in a team, and you need to find an effective way to coordinate the team's work
- Agree
 - Who is doing what
 - When work will be done
 - Explicitly, in writing on Github or Google Doc
- Have weekly or more frequent meeting; every 3 days?
 - If not in person, use internet video of some kind



Rule 1 for Effective teams:

- Make commitments,
 - check on commitments (task execution) each meeting
- Don't be unpleasant or nasty if commitment's not met, work together
 - However, don't 'look away' from it – face it and make a plan
 - Figure out if task was too ambitious
 - Re-work goals/commitments to be done next
- Do have expectation that contributions of each team member are equal

What About Disagreements?

- You're in a team, you're likely to have disagreements
- If this is your first project experience of this kind, this can be stressful
- **Resolution of disagreements is a crucial skill**
 - Take this as a opportunity to learn how to do it

Issues and Relationships

- There are often two things going on when there is conflict or disagreement:
 1. Specific issues that give rise to a problem
 - Factual/strategic differences of opinion
 2. Relationship between people
 - Trust, respect

Modified from: <http://www.execstrategies.com/Facilitator/ConflictResolutionStrategies.htm>



Relationship Focus

- Trust is at the root of all good relationships
 - Personal and professional
 - Must establish common goals and work towards them together
 - **Trust is created when everyone believes that everyone else has the same goals**
- 1. Maintain a fair, respectful communication style
 - with careful listening
- 2. Expect and accept another's right to disagree
- 3. Realize the value of disagreement
 - it can lead to something better



Proposal/Plan Presentations

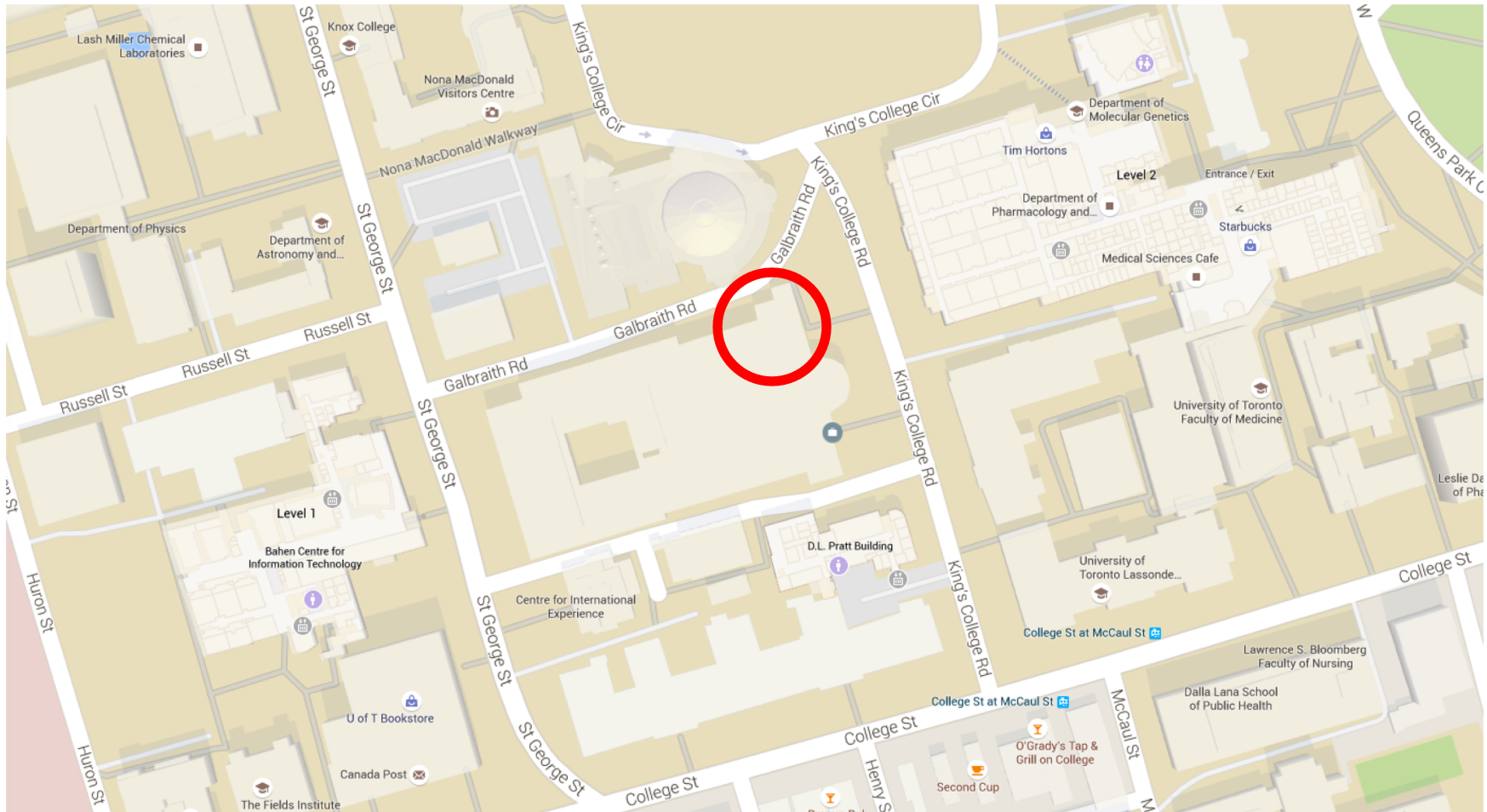
Next Week on February 13

Wednesday Morning, 10am-12 (usual)

Wednesday Evening, 6pm-8pm **SF 1101**



Location of SF 1101 (Sandford Fleming)



Plan Presentations on February 13th

- Formal Presentation
 - Using PowerPoint (preferred), Keynote, PDF
- Morning (usual), Evening 6-8pm, SF 1101
- You will have to attend both lectures, because you'll either be presenting, or doing a **peer review**
 - Unless you expressed a **hard** constraint to me, that you cannot attend one of these
- One member of group should submit the presentation on Quercus Assignment “**Project Plan Presentation**”
- Due Tuesday February 12 at 6pm; 0.5 marks off for each hour late.



Time Limit

■ 6 Minute Time Limit

- I will start timer that makes annoying sound when done, and expect you to be finished within 10 seconds after that.
- **Omit needless words**

■ Five Minutes for Questions/Discussions

Proposal/Plan Presentation Contents

- **Similar to written Proposal/Plan:**

- **Use this outline:**

1. Goal (What & Why)
2. Mock-ups (pictures) of What User Will See
3. Top-level Block Diagram of Code briefly explained
4. Statement of Risks/Issues
5. **Spiral 1 and 2 targets -> Different from written**
6. Specialist Statement
 - 1 minute, for Specialist to say what their contribution will be

Notes on Time Limit & Clarity

- Time Limit is both serious and important
 - To this course and your ability to communicate going forward

Questions:

- How many slides can there be in 6 minutes?
- How much can go on a slide?
- Are pictures good things in presentations?
- Do you start with the details or the big picture?
- What place does jargon have in a short presentation?
 - What is Jargon?



How Do You Know if Presentation is Good?

- Practice it, standing up, in front of:
 - First, no-one
 - Then, a few others
 - Not too much, though, either, as it shouldn't sound memorized
- Time it
 - if too long, cut it
 - get to the point quicker
- Gulak's law: "You can describe anything to anyone in any amount of time"
 - Just have to pick the right level of abstraction



How Do You Know if Presentation is Good?

In Practice:

- Listen to what you are saying
- Does it make sense **listening with the ears of the audience?**

Who is Your Audience?

- A mixture of technically-literate and people with expertise in some another area [different from your own!]
- Make sure the lay people know **what** you're doing - the goal
- OK to go somewhat technical after that, but don't assume we're all expert in every sub-field of Computer Engineering and Science



Peer Review

Feedback for Others
Critical Thinking for You



Class Presentations

- A key part of what happens in this course is the contribution you make to other's projects
- You will do many presentations in this class
 - Indeed, one side-effect of this project course is some real practice in giving high-quality, concise & clear communication
 - Most presentations will be 5-6 minutes in length
 - Must be geared so that most people in the class will understand



Peer Review

- Want everyone to come, listen & provide useful input
- Expectation that you'll listen and provide thoughtful feedback and suggestions to other's presentations

Specific Course Deliverable:

- For each of Proposal, Spiral 2, and Spiral 4 you'll be asked to write a review for one other group;
 - these will be graded
- Means you'll need to be here for every lecture, not just when you're presenting.



Assignment of Group to Review

- On Monday February 11, I will send you an email telling you which group you will review.
 - You won't be reviewing in the same 2 hour slot that you're presenting

Peer Review for Proposal

Short answer questions, Due Friday Feb 15th @6pm.

- Late penalty -0.5 marks for every hour late
- Hand in under Quercus 'Proposal Peer Review' assignment

Briefly answer these four questions

1. State the goal of the project in your own words
2. Which parts of the proposal did you understand, and what parts could be more clear? Why?
3. What was the best thing about the project proposed?
4. What one thing could be improved the most? How?

My App: TeamChooser

Solving a Problem in Pick-up Team Sports

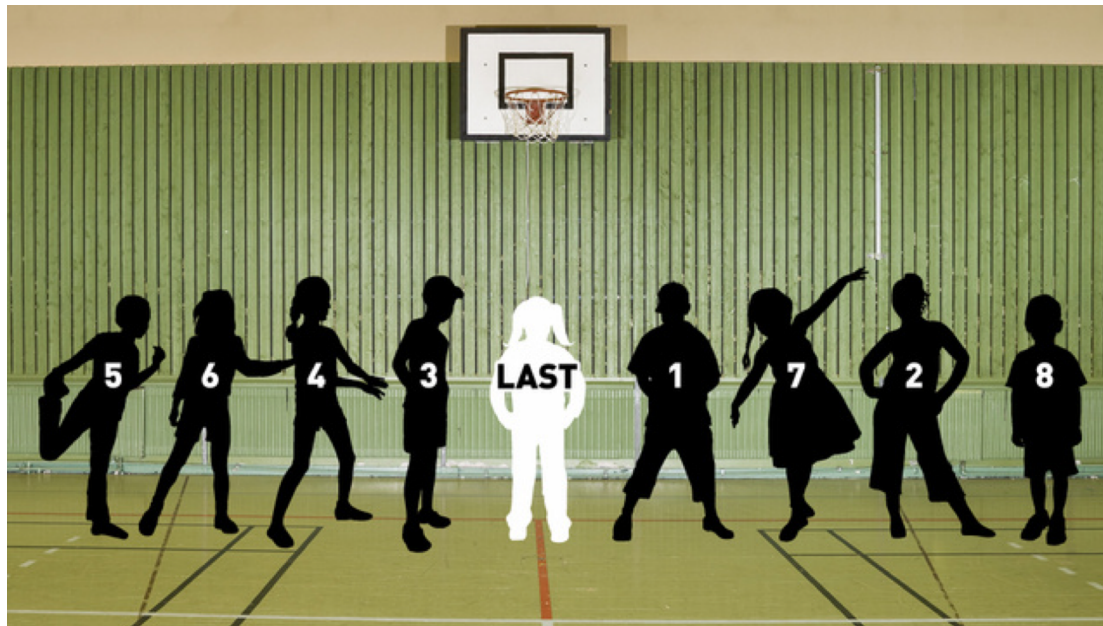


Kids Who Play Want Games to be Fair!



So Do Adults!

- When playing friendly games there is a need to choose who is on which team
- A common method is to have team captains, and they alternate choosing people, in a very public way
- How many people have been picked **first**? 😊
- How many people have been picked **last**? ☹️



I've Been Playing Hockey for Many Years

- A friendly game, but still have problem choosing teams:
- Classic Canadian method:
 - Put players' sticks into middle
 - One person randomly throws sticks to either side!
 - Random outcome!
- I once chose teams for a few years in friendly game
 - People complained a lot!



Play in Two Different Friendly Games

■ Wednesday Game: terrible chooser (**Agar**)

- People always complaining
- Games often lopsided, much distaste
- no-one else took over, though (didn't want the hassle?)



■ Sunday Game: excellent chooser (**Paul**)

- Paul had a natural ability to pick great teams!
- Even when teams didn't look right, many more times than not, the game was fair
- Became known as the '**algorithm**'



The Solution: TeamChooser

- Wouldn't it be great if an App made the teams?
 - No one to yell at
 - Possibly give better teams
- Who needs this?
- Every pick-up hockey, soccer, basketball game around!



TeamChooser: How It Works

- Enter every player in advance of game day
 - Player's name
 - Preferred position (offence or defense)
 - **A rating, from 1-10, as to how effective player is**
 - Rating is the trickiest part
- On game day – select all players present
- Push **'Make Teams'**
 - And voila, two evenly matched teams



Do Demo! Entering Players

Carrier 2:01 PM

Done Add Players

AmdurWedFri has 99 players

Name

Level (0-10) (e.g., 5.4)

Offense Defense

Pre-assign ☒

Light Dark

Save Delete



Selecting Present & Making Teams

Carrier 2:00 PM

14 players selected (D:4 O:10)

[Back](#) **AmdurWedFri** [Make teams](#)

Surpreee Nattan	
Offense	
Jack	✓
Offense	
Jamie	
Offense	
Jason	✓
Offense	
Jessie	✓
Offense	
Joachim	
Offense	
Jonathan Rose	✓
Defense	
Jordan D	
Defense	
Jordan T	✓
Offense	
Josh	
Offense	

[Edit...](#) [Unselect all](#) [Select all](#) +

9)

Carrier 2:00 PM

[AmdurWedFri](#) **Teams** [Freeze](#) [Tweak](#)

LIGHT A:6.1 D:1 DA:7.5 O:3 OA:5.7

Jason

Craig Boutilier

Jessie

Brendon

DARK A:6.3 D:1 DA:6.3 O:3 OA:6.3

Jonathan Rose

Connor

Frank

Jordan T



Example Game

Dark Team

Light Team

DARK 5.6 D:5.0 O:5.7 COUNT: 6

LIGHT 5.6 D:5.4 O:5.7 COUNT: 7

Cole Zem

Brian Dov

Pavel

Raj B

Matt Zale

Rich Zemer



Gurpreet Rattan

Final Score in that Game

- A Victory for Team Chooser!



Team Selection Method ('Algorithm')

Step 1: Sort Players in Order of Rating, Highest to Lowest

Step 2: Alternate Team Assigned Going Down List

Team A

6

Team B

5

4

3

2

1

Team Selection Method

- Gets more complicated when add features!
 - Balance offense and defensive player count
 - Pre-assigns
 - Balance quality of offense and defense
- Many discussions from CS and ECE Professors over algorithms in hockey game!



Entering Players

Carrier 2:01 PM

Done Add Players

AmdurWedFri has 99 players

Name

Level (0-10) (e.g., 5.4)

Offense

Defense

Pre-assign ☒

Light

Dark

Save Delete



Selecting Present & Making Teams

Carrier 2:00 PM

14 players selected (D:4 O:10)

[Back](#) **AmdurWedFri** [Make teams](#)

Surpreet Nattan	
Offense	
Jack	✓
Offense	
Jamie	
Offense	
Jason	✓
Offense	
Jessie	✓
Offense	
Joachim	
Offense	
Jonathan Rose	✓
Defense	
Jordan D	
Defense	
Jordan T	✓
Offense	
Josh	
Offense	

[Edit...](#) [Unselect all](#) [Select all](#) [+](#)

5)

Carrier 2:00 PM

[AmdurWedFri](#) **Teams** [Freeze](#) [Tweak](#)

LIGHT A:6.1 D:1 DA:7.5 O:3 OA:5.7

Jason

Craig Boutilier

Jessie

Brendon

DARK A:6.3 D:1 DA:6.3 O:3 OA:6.3

Jonathan Rose

Connor

Frank

Jordan T



Does it Work?

- Yes!
- I've been using it with friends in roughly 600 hockey games and it has often done a good job.
 - We've tweaked it's algorithms here and there
 - Added some features
 - Occasionally very unbalanced games, bad luck?



On iPhone App Store Since May 2010


iTunes Preview

OverviewMusicVideoCharts

TeamChooser

By NP Press

Open iTunes to buy and download apps.



[View in iTunes](#)

ⓘ This app is designed for both iPhone and iPad

Free

Category: [Sports](#)

Updated: Aug 21, 2015

Version: 1.7

Size: 4.4 MB

Language: English

Seller: Jonathan Rose

© 2015 Jonathan Rose and Paul Eisen

[Rated 4+](#)

Compatibility: Requires iOS 7.0 or later. Compatible with iPhone, iPad, and iPod touch.

Customer Ratings

We have not received enough ratings to display an average for the current version of this application.

All Versions:

★★★★ 6 Ratings

[View More by This Developer](#)

Description

Do you play friendly pickup sports, like hockey, soccer or basketball? Would you like help choosing which players to be on each team, so that everyone enjoys the game? Then TeamChooser is the app for you! TeamChooser will work for pretty much any two-team game you can think of: rugby scrimmages, volleyball,

[NP Press Web Site](#) [TeamChooser Support](#) [...More](#)

What's New in Version 1.7

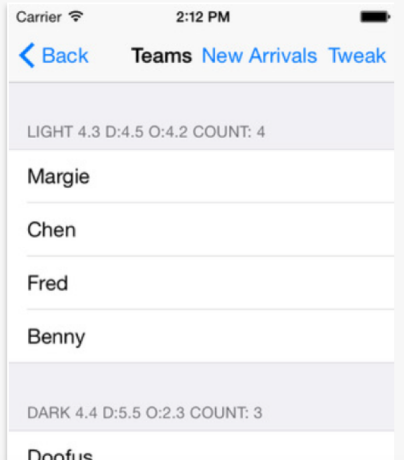
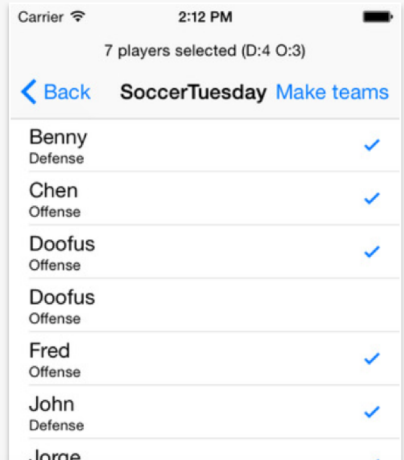
Great new features:

1. Late Arriving Players feature – when new players arrive after teams have been chosen and players have already dressed, this feature allows the new players to be placed on teams, and no more than 2 previously

[...More](#)

Screenshots

iPhone | iPad



- Free!
- 4000 Downloads
- Mostly in US/Canada, but a few in UK, Ireland, Japan, Norway, Romania, Portugal, Australia, Denmark, Finland

Lesson Learned

- From last time: Ratings of players, key part of engine, **must be kept secret!**
- Can add password to App so no-one can grab phone and look at their ratings or anyone else's



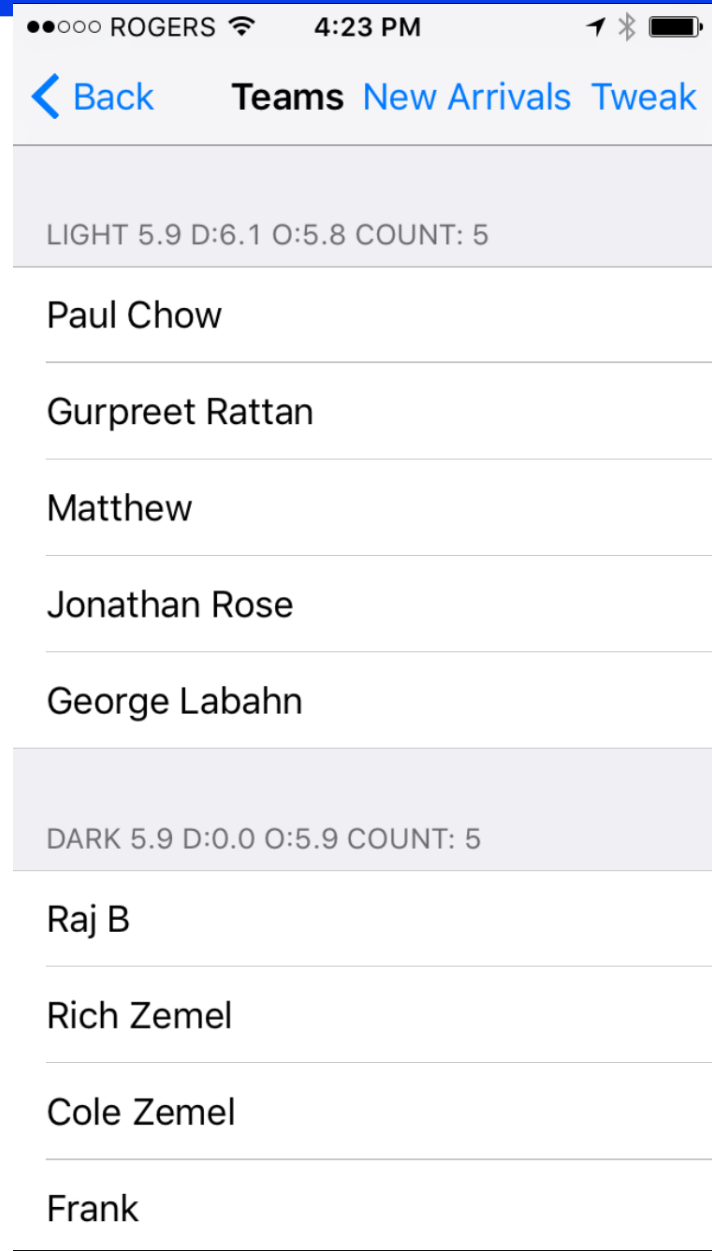
Sad Outcome: Agar

- The day after the first use of TeamChooser on Wednesday
 - Recall very poor chooser – Agar
 - Folks joked and called it the iGar.
- Agar **never played again on Wednesday!**
 - Still plays hockey, but not with team he played with for decades



Feature: No-One Chosen Last!

- The order that people are listed (and spoken out loud by user) is randomized
- There is no way to infer rating



Improvements Needed

- **Really** needs a backing website
 - To support a business model of advertising, promotions related to sports
- Much discussion about using results of games to determine better ratings
 - Rating players is the most difficult part of using
 - Explored last year as part of personal ML learning
- Don't really have time to support
 - Have continued to improve the algorithm
 - Added Late Arrival Feature
 - Recently added key stats



Downloads Over the Last 30 Days

■ Is delightful to see people using!

App Store Connect App Analytics ▾

 TeamChooser ▾

Jonathan Rose ▾
Jonathan Rose



Overview

Metrics

Sources

Retention

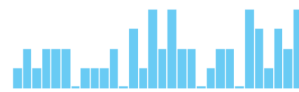
About App Analytics Data ?

<  Last 30 Days (Dec 27, 2018-Jan 25, 2019)



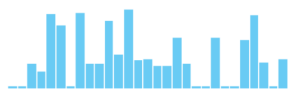
1,110
Impressions

▲ 30%



55
Product Page Views

▲ 25%



4.48% (Daily Average)
Conversion Rate ?

▲ 0.25%



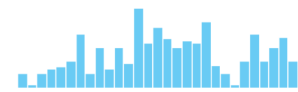
39
App Units

▲ 8%

\$0
Sales

\$ (Daily Average)
Sales per Paying User ?

%



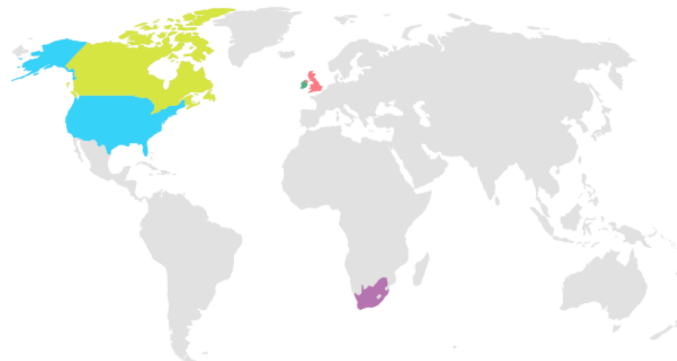
6.91
Sessions per Active Device
Opt-in Only

▲ 0.19%

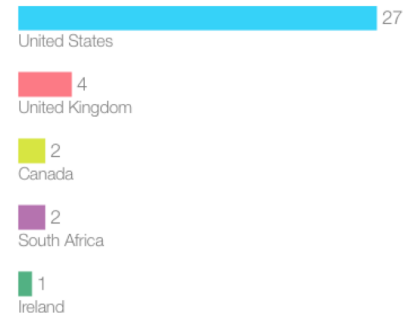


3
Crashes
Opt-in Only

▲ 50%



App Units by Territory ▾



Is Anyone Using it Who Bought It?

- Instrumented both with Apple Analytics & Firebase Analytics
 - Very easy to insert into any app
- Reports:
 - # of users sessions, amount of time spent on app
 - Specific pages/events, as you wish from each user
 - Location of user, if already use GPS (no other ID).
 - **Anything I wish to report!**



Session Report from Apple Analytics

App Store Connect App Analytics ▾

 TeamChooser ▾

Jonathan Rose ▾
Jonathan Rose



Overview

Metrics

Sources

Retention

About App Analytics Data ?

APP STORE

Impressions

Product Page Views

SALES

App Units

In-App Purchases

Sales

Paying Users

USAGE

Installations

Sessions

Active Devices

Active Last 30 Days

Crashes

COMPARE TO

None ▾

SAVED VIEWS +

Conversion Rate

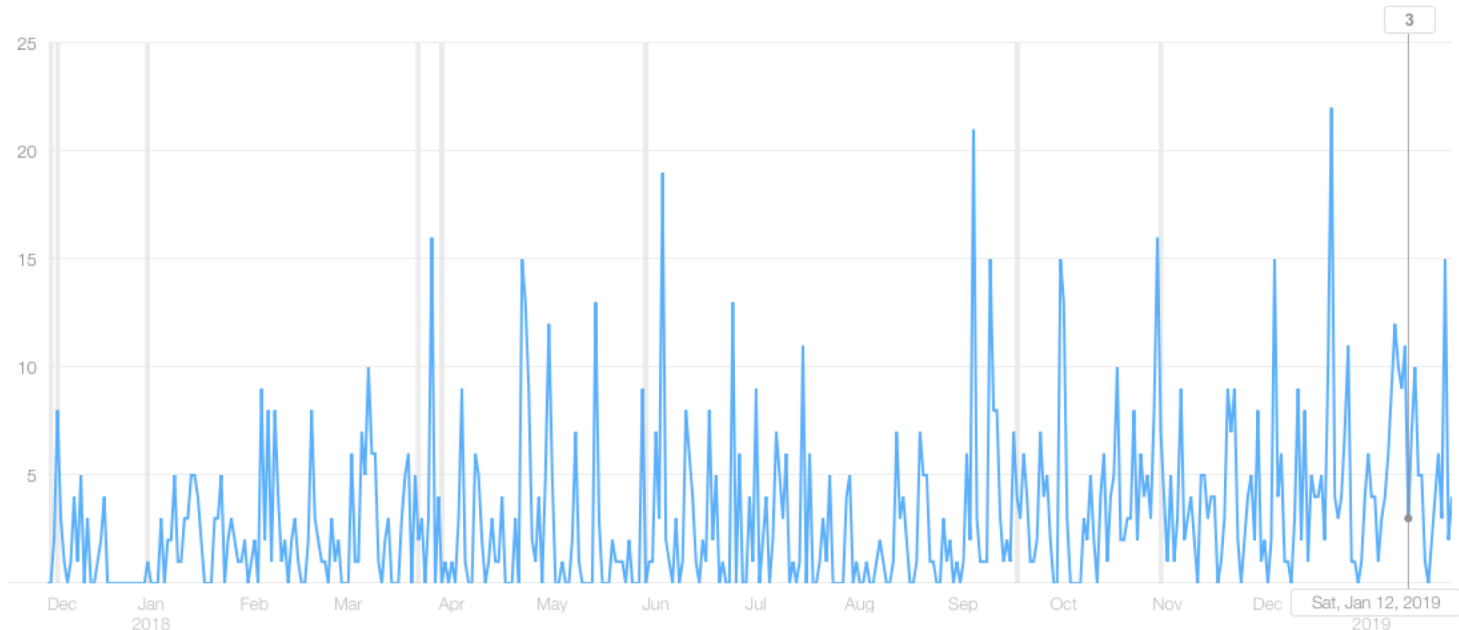
View By ▾

Add Filter +

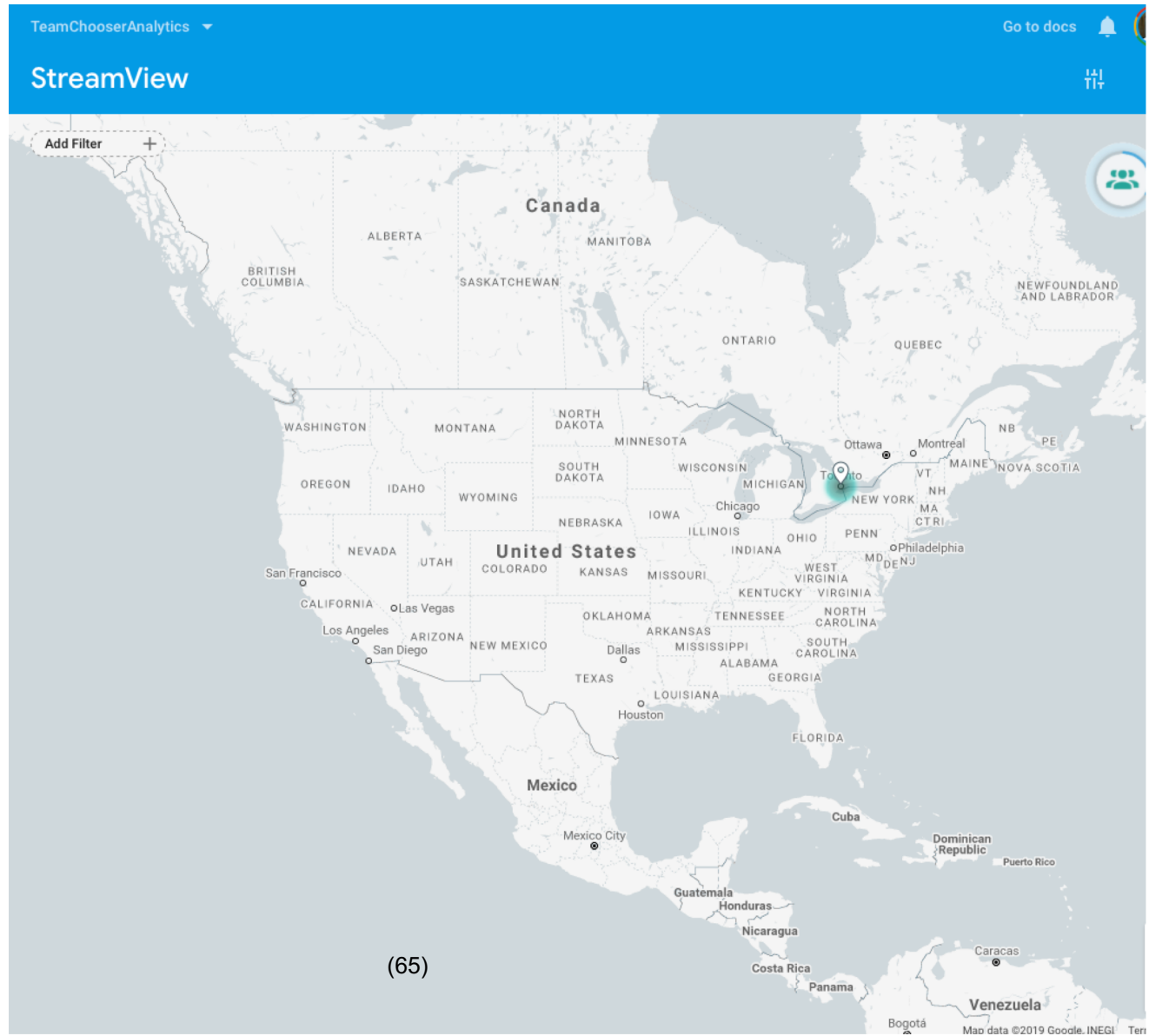
<  Dec 1, 2017-Jan 25, 2019

1,290 Sessions
Opt-in Only

Line ▾ Days ▾ 



Stream View – Live!



Event Logs

- ▶ Dashboards
- ▶ Usage
- ▶ Audience
- ▶ User Acquisition
- ▼ Events
 - Event Summary
 - User Paths
 - Event Logs**
 - Funnels
 - Search Event Name:
- ▶ Errors **NEW**
- ▶ Technical
- ▶ Manage

EVENT LOGS

Global Event Logs

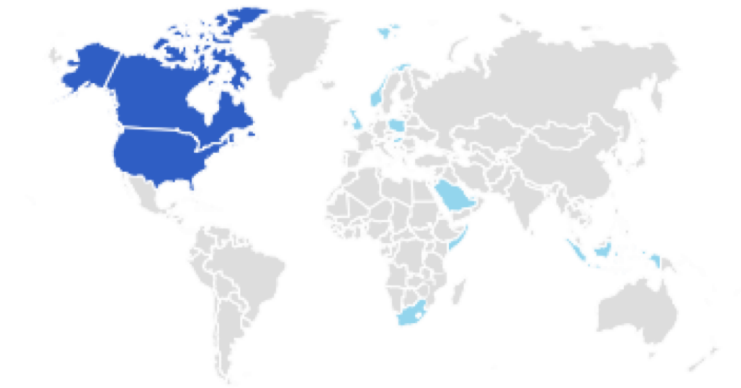
Page 1

Session Time	Version	Details
01/19/14 21:02:57 EST	1.6 (iPhone)	Apple iPhone 4s
1) Teams Made		
01/19/14 12:27:20 EST	1.6 (iPhone)	Apple iPad 2
1) Adding Players Mode		
2) New Player Added		
01/19/14 12:24:27 EST	1.6 (iPhone)	Apple iPad 2
1) Teams Made		
01/18/14 15:54:27 EST	1.6 (iPhone)	Apple iPad 2
1) Teams Made		
01/18/14 15:54:11 EST	1.6 (iPhone)	Apple iPad 2
1) Teams Made		
01/17/14 16:03:22 EST	1.6 (iPhone)	Apple iPhone 4 (GSM)
1) Teams Made		
2) Teams Made		
01/17/14 15:58:44 EST	1.6 (iPhone)	Apple iPhone 4 (GSM)
1) Adding Players Mode		
2) New Player Added		
3) Teams Made		
01/16/14 16:14:47 EST	1.6 (iPhone)	Apple iPhone 5 (CDMA)
1) Teams Made		

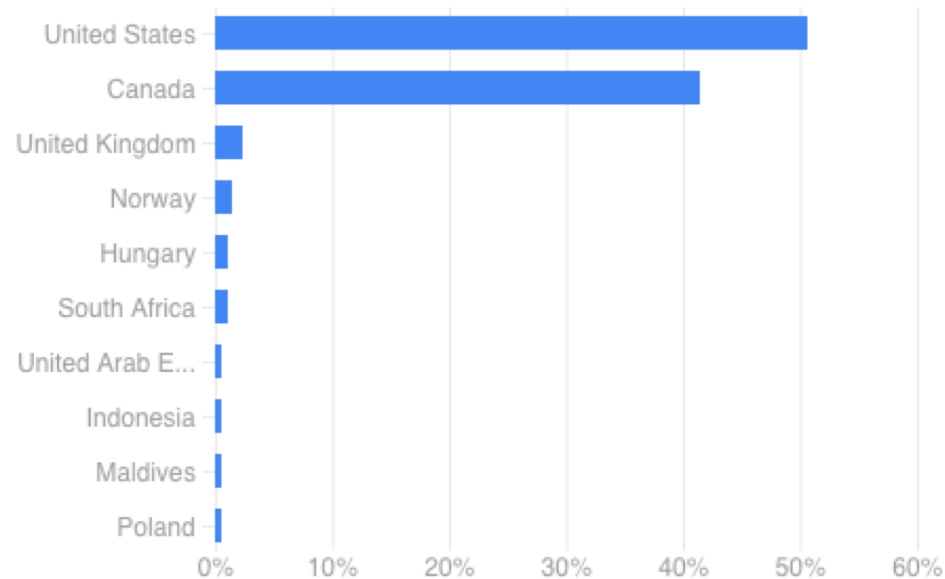


Geography

Location ②



Country/Region



Selected Approval-in-Principle Discussions



Discussion

- Would like to review the proposals submitted this week, and engage in a discussion
 - To help all of you with your planning & execution

- Be prepared to stand up, and describe your proposal
 - What & Why
 - Describe the idea, and its motivation
 - Thoughts on a Spiral 1 and 2



Current Project Names

Money Jars	Acuity Tracker
ELSA	ExpoSocial
TruMove	Intellihaling
CIRCCulate	MyeloPath
MuseGo	You Are Your Voice
NeuroTest	iHear
Protalk	BrainPain
Brocoli	Eloquence
Probo	

BrainPain

- What: Our app targets the general population (who are not elite athletes) with two main goals: 1) to help non-elite athletes improve their awareness on concussions, and 2) to provide them with a sample exercise to help manage vision-related symptoms of the injury (i.e., an exercise, measurement, and feedback on exercise performance).
- Why: Concussions are often thought of as an exclusively sport-related concern, but people sustain this injury in a many different contexts ? from transportation, to the workplace, to seniors homes, to the playground and beyond. Awareness on injury identification and management is particularly lacking in the non-elite sport world, and we need a way to address the gap for this population.
- Expertise Link: PhD candidate in Exercise Sciences, researching concussions (policy, awareness/education, sex and gender considerations, management, risk factors and prevention). Helping to run a concussion exercise program at U of T as part of my research.

ExpoSocial

- **WHAT:** The goal of the app is to provide individuals with an efficient and accessible way to help decrease their social anxiety.
- **WHY:** There is a rise in mental health concerns in the general population and access to mental health professionals is often difficult. Social anxiety is one of the most common concerns people deal with yet the associated shame and stigma often prevent people from seeking help. A therapy app that provides users with 24/7 access to helpful tools and resources will allow people to take steps towards improving their social skills thereby decreasing their social anxiety.
- **Specialist Expertise:** training to be a clinical psychologist, currently completing a Masters in clinical psychology