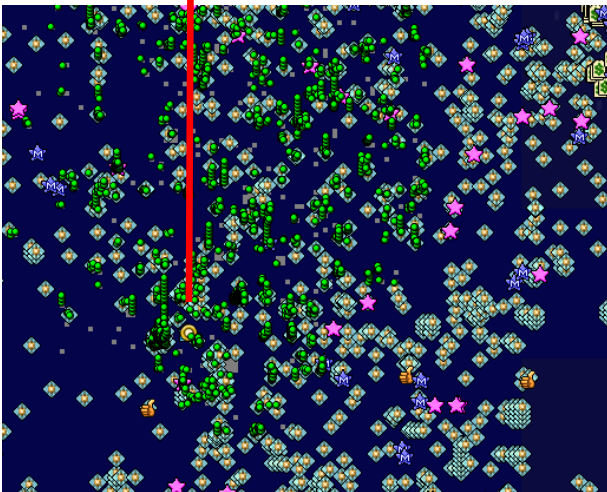
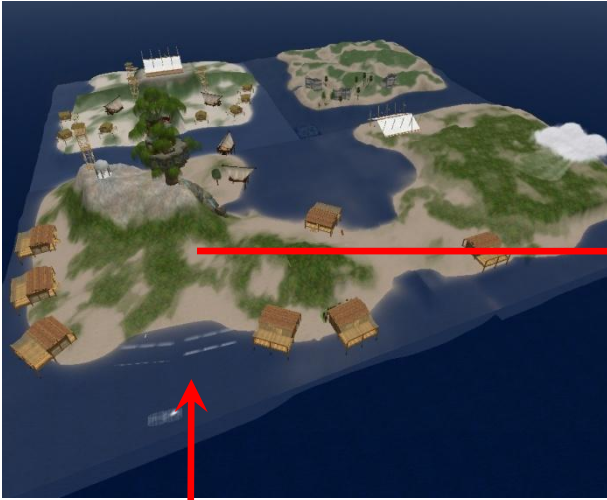




# Heterogeneous Dispositions to Cooperate and the Effects of Communication in a Second Life Collective Action Dilemma

Kevin McCabe, Peter Twieg, Jaap Weel

# TerraEcon in Second Life



Second Life is  
3D, **Visualize**  
immersive, **Feels real**  
user-created, **Build once use often**  
persistent, **Start where you left off**  
and, online. **On your computer**



# A Typical Economics Problem

## Managing the **Commons**

Elinor Ostrom, Governing the Commons, 1990,  
Cambridge University Press. **Self Governance**

A Resource under Common Control

Benefits are Non-Excludable

Can result in individual **Free Riding** behavior

When individuals don't do their **Fair Share**  
Of the **Work**

Mechanisms for supporting cooperation

Sorting: Into Like Minded Groups

Communication: Of Intentions

Monitoring: Of Actions

Progressive Punishment: Of Non-cooperators

Rewarding: Cooperators

**\*Learned from Field and Laboratory Research**

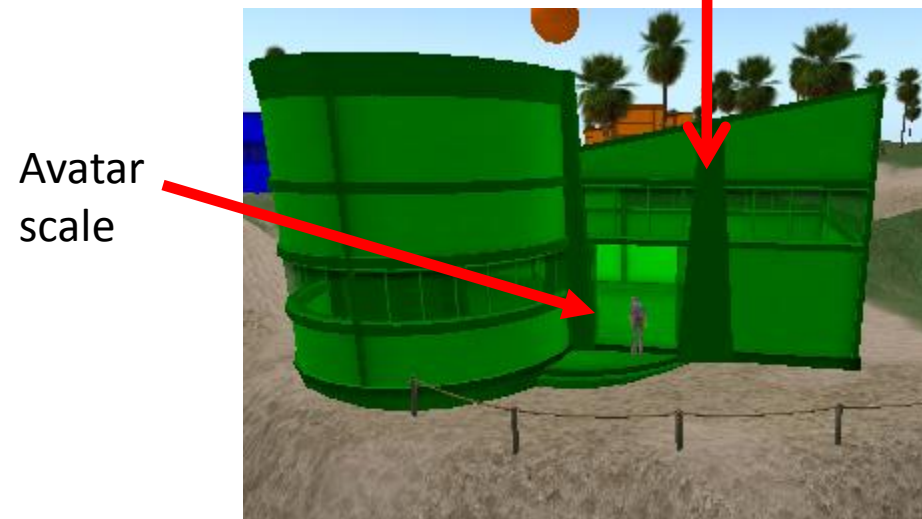
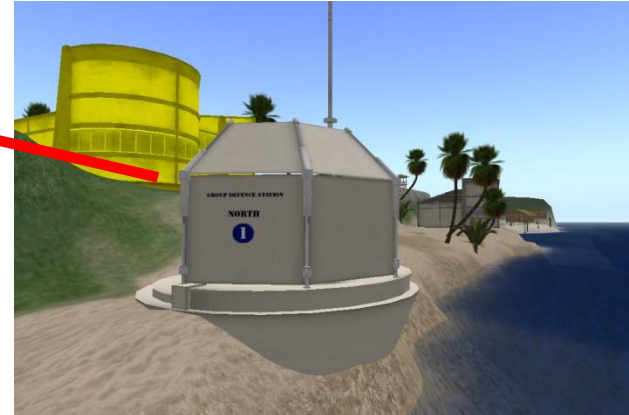
# Arial View of Hurricane Island



# GEORGE MASON UNIVERSITY | Implementation



Weather Defense Station



Avatar scale



Inside A House

# Hurricane Island Commons

Islanders **homes earn them money**. (40 cents per minute) But their homes can be damaged by hurricanes.

The more damaged their home, the less money they earn. A home with 50% **damage** only earns 20 cents etc.)

While islanders can **repair** their homes they prefer not to (because it takes a lot of time) and while they are repairing they don't earn money.

Instead, islanders can choose to **defend** their homes at one of the **Weather Defense Stations** scattered throughout the island.

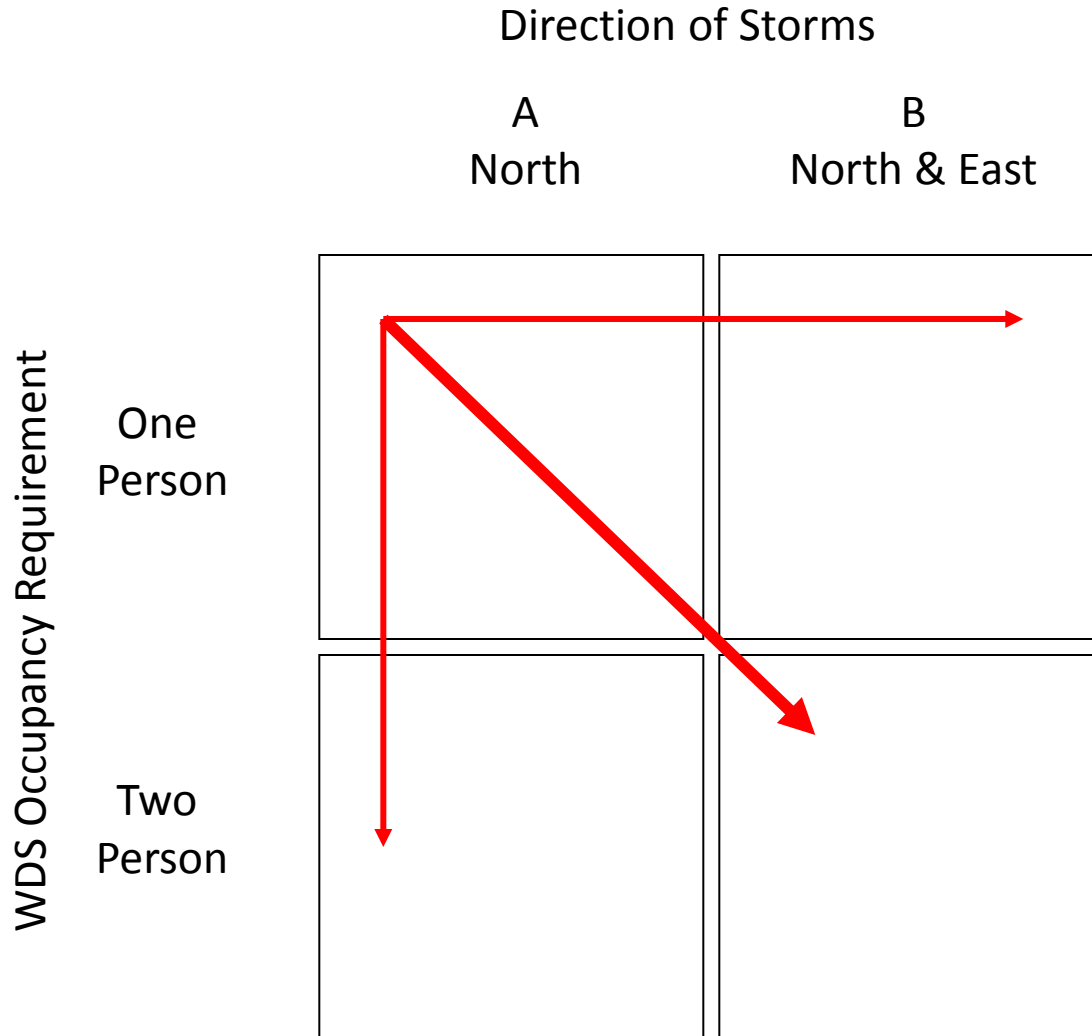
The **good news** is that the Weather Defense Stations are a **public good** and also defend other islander's homes. To the South or West of the WDS.

The **bad news** is that islanders don't earn money while they defend, thus they have an incentive to **'free ride'**, that is, let someone else defend their homes.

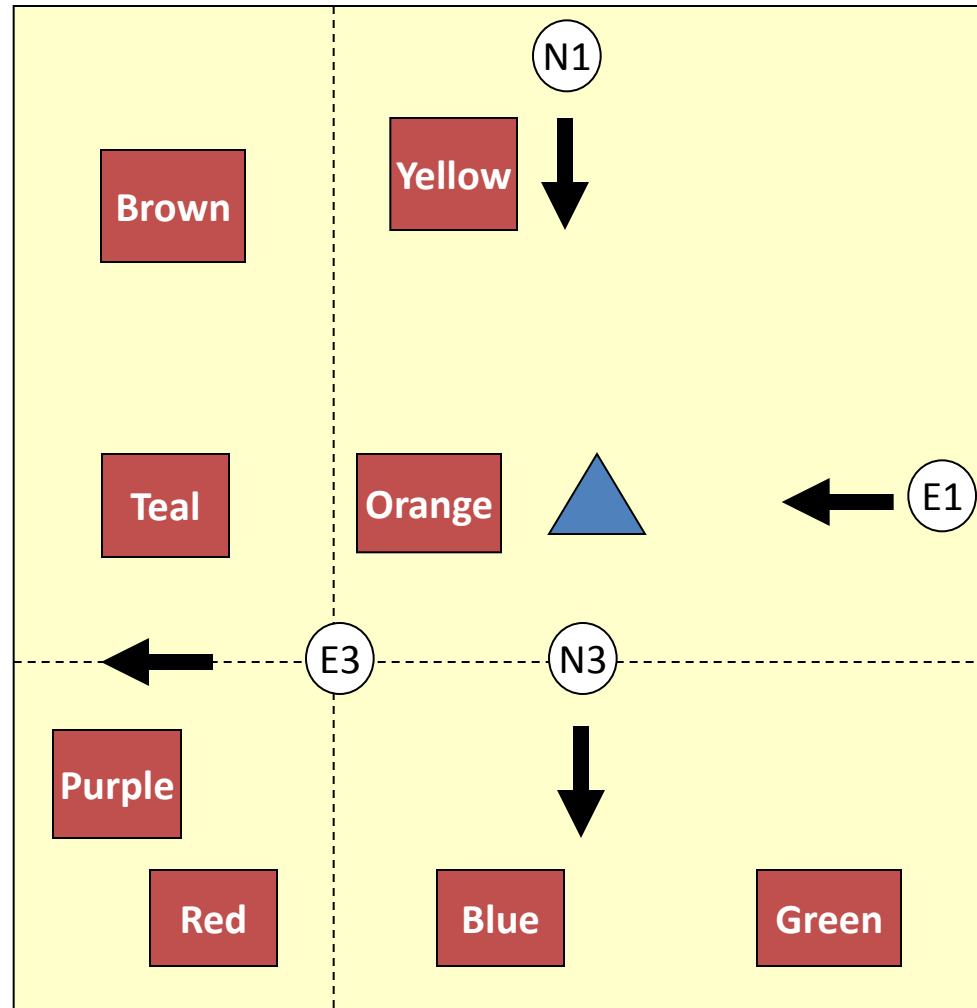
So, how can the islanders overcome their free riding problem and earn more money?

# Experimental Design

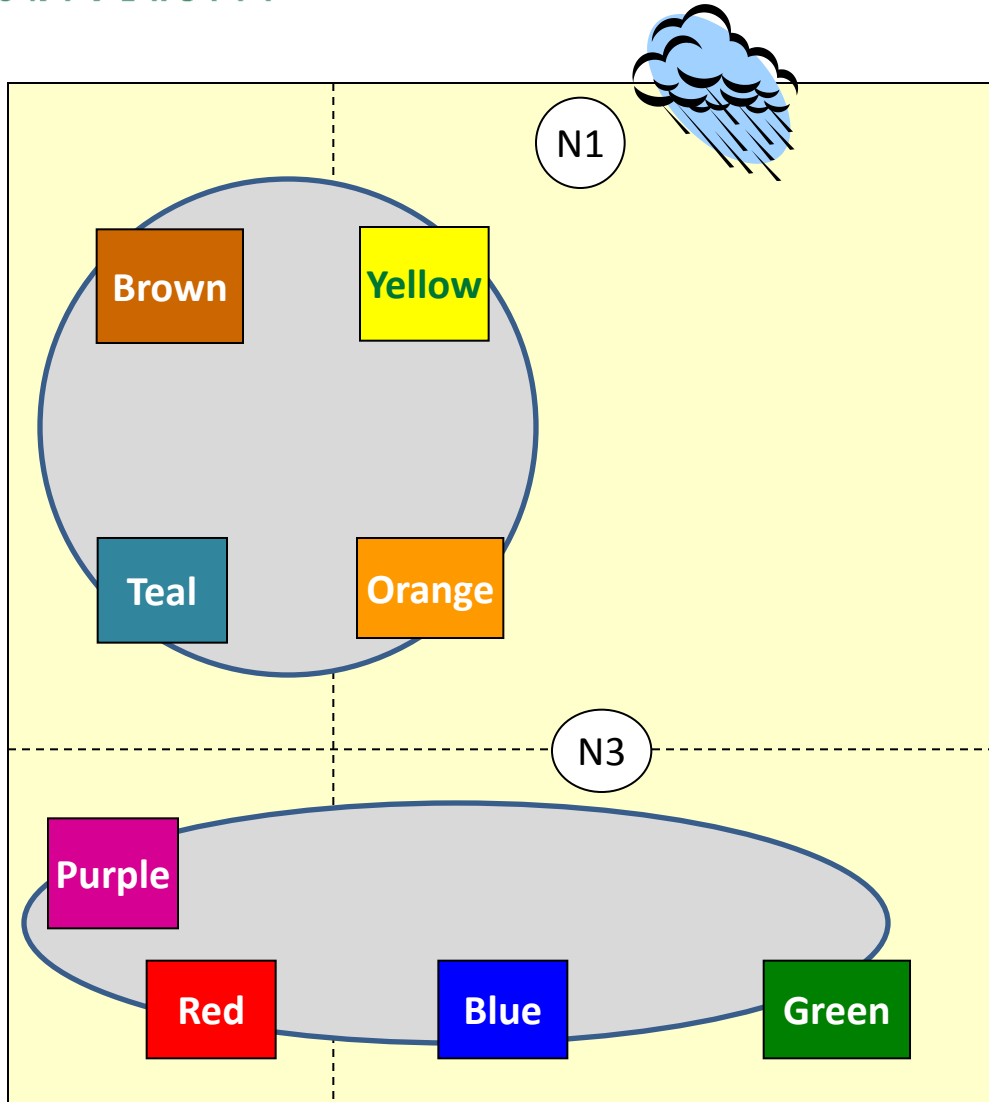
(Increase Complexity)



# Schematic of Island



# Game Theory Predictions

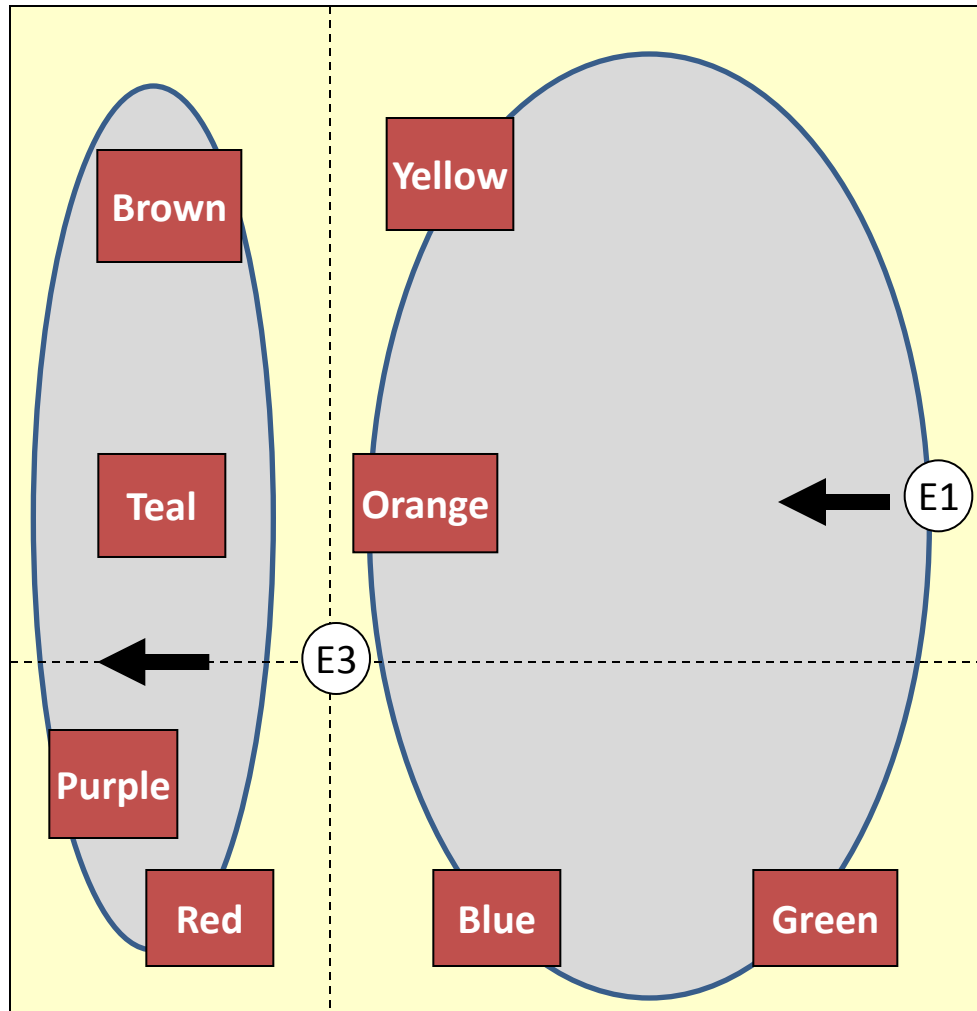


But then avatars in the upper Two Thirds each have an incentive to defend at N1.

In equilibrium the Avatars in the upper Two Thirds should choose to defend everyone.

Avatars in the Lower Third each have an incentive to defend at N3.

# Game Theory Prediction for Eastern Storms



In equilibrium the Avatars in the right Two Thirds should choose to defend everyone.



# Procedures (Slide 1 of 2)

1. Eight GMU Undergraduates Recruited Per Session.
2. Paid \$14 to show up for Two Days (Wed. and Fri.)
3. Day One
  - Signed Informed Consent
  - Logged Into Second Life with Avatar (color name)
  - Taught how to use SL interface (30-45 minutes)
  - Read Instructions for Experiment
  - Put Into a Three Storm Trainer

## 4. Day Two

Logged into Second Life with Different Avatar

Read Instructions for Experiment

Put into a Eighteen Storm (trials) Session for Additional Money

Storm Sequence for each trial (repeated eighteen times)

3 Minutes Clear Weather

1 Minute Storm Warning

1 Minute Storm

Paid \$14 Show Up + Second Day Earnings (4 cents per Linden) in cash.

# Experimental Sessions

Direction of Storms

A  
North

B  
North & East

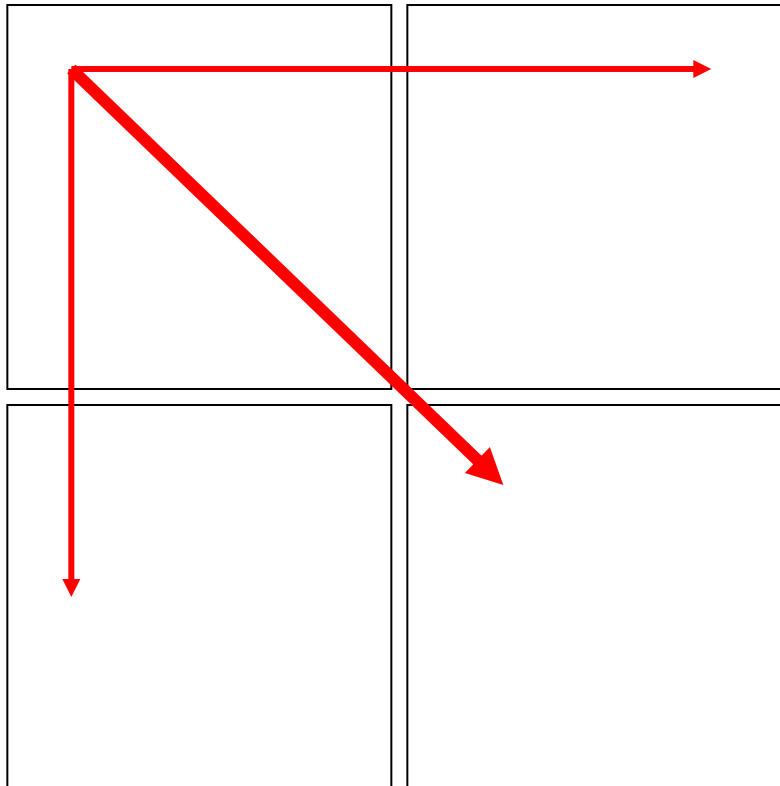
A  
North

B  
North & East

One  
Person

Two  
Person

Occupancy Requirement



4 sessions  
32 subjects

A1

4 sessions  
32 subjects

B1

4 sessions  
32 subjects

A2

4 sessions  
32 subjects

B2

# Labor Allocation to WDS

## Number of Times Manned N1

	YBTO North	PRBLG South
A Treatments	55%	45%
B Treatments	92%	8%

Y=Yellow, B = Brown, T = Teal, O = Orange

P = Purple, R = Red, B<sub>L</sub> = Blue, G = Green

## Number of Times Manned E1

	YOB <sub>L</sub> G East	BTRP West
A Treatments	0	0
B Treatments	79%	21%*

\* Of these 21 times it was manned by P or R.

# Chat Snippets for Successful A1

[16:00] Red Teodosio: so same order as yesterday?

[16:00] Blue Beorn: yellow brown teal orange red blue purple green this is the order

→ **Planning**

[16:00] Purple Philly: yup same order

[16:00] Teal Tyran: first yellow

[16:00] Yellow Rizooto: sure sounds good

[16:00] Teal Tyran: yup

→ **Agreements**

[16:00] Yellow Rizooto: since im so close, im gunna leave a little late so dont be too alarmed if im not there immediately

→ **Information**

[16:08] Purple Philly: yellow since u can c the wds..juz let every1 know if the preson has reached wds or not

[16:08] Orange Oakleaf: cool

[16:08] Yellow Rizooto: he's there

→ **Monitoring**

[16:08] Brown Brandi: reached

→ **Social reward**

[16:08] Purple Philly: cool

[16:08] Orange Oakleaf: good job brown

[16:08] Blue Beorn: cool

**[10:26] Yellow Rizoto: how about everyone on upper half  
man n1**

**→ Plan**

**[10:26] Green Gartner: blue ,purple,red,green....we have  
to protect our houses...**

**→ Not Accepted**

**[10:26] Yellow Rizoto: everyone on lower half e1**

**→ More Plan**

**→ Group is not confirming**

[10:27] Brown Brandi: who is gonna take the east 1

[10:27] Brown Brandi: 2 teams for them too

[10:27] Yellow Rizooto: you guys work out east

[10:27] Yellow Rizooto: we got north covered

→ **Consequence of earlier plan not accepted**

[10:27] Green Gartner: n3 and e3 are important for us..

→ **Stating subgame incentives**

... second storm in

**[10:34] Yellow Rizooto: where was teal and orange**

**[10:34] Yellow Rizooto: im getting damaged**

**[10:34] Teal Tyran: i hv covered**

**[10:35] Teal Tyran: but 50**

**[10:35] Yellow Rizooto: no**

**[10:35] Purple Philly: me too**

**[10:35] Red Teodosio: im getting damaged?**

**[10:35] Yellow Rizooto: teal and orange you did not do it right**

**[10:35] Purple Philly: wher s orange?**

[10:36] Yellow Rizooto: teal and orange were both supposed to go to n1

[10:36] Yellow Rizooto: everyone needs to read there messages

[10:36] Teal Tyran: i am at n1

[10:36] Teal Tyran: but no one came

[10:36] Yellow Rizooto: orange fault **[culprit named]**

[10:37] Teal Tyran: orange are you there

[10:37] Teal Tyran: we all loose

[10:37] Teal Tyran: \coz of you **[blame]**

[10:37] Red Teodosio: earth to orange lol **[??????]**

**Still relatively good natured**

[10:38] Teal Tyran: who is next

[10:38] Teal Tyran: ?

[10:38] Yellow Rizooto: so if its a north storm yellow and brown get it [**Directing to plan**]

[10:38] Brown Brandi: nope [**rejecting plan**]

[10:38] Teal Tyran: y brown [**Remember Teal defended**]

[10:38] Brown Brandi: let the last team do their work first

**Brown is angry, Teal and Orange are a team!**

# Thank You

