

The background image is a virtual environment. On the left, a tall, white lighthouse with a black top section stands on a small island. In the center, a large, modern building with a prominent dome and a long, curved facade is situated on a sandy beach. The building has a glass facade and a series of arches along its length. To the right of the main building, there is a smaller structure with a circular roof. The foreground shows a sandy beach with some palm trees and a small, dark, hexagonal gazebo. The ocean is visible in the background, and the sky is a mix of blue and orange, suggesting a sunset or sunrise.

Virtual Conferences (and climate change)

Crista Lopes

UC Irvine

Personal Context

- Academic (2002—now)
 - Life split between California and Portugal (always)
 - Member of SIGPLAN Executive Committee (2012—2017)
 - Developer of OpenSimulator (2008—now)
-

Personal Context

- Academic (2002—now)
 - Median: 3 long distance flights/year
 - Life split between California and Portugal (always)
 - Median: 4 long distance flights/year
 - Member of SIGPLAN Executive Committee (2012—2017)
 - Environmental and personal cost of conference travel
 - Developer of OpenSimulator (2008—now)
 - Social virtual worlds
-

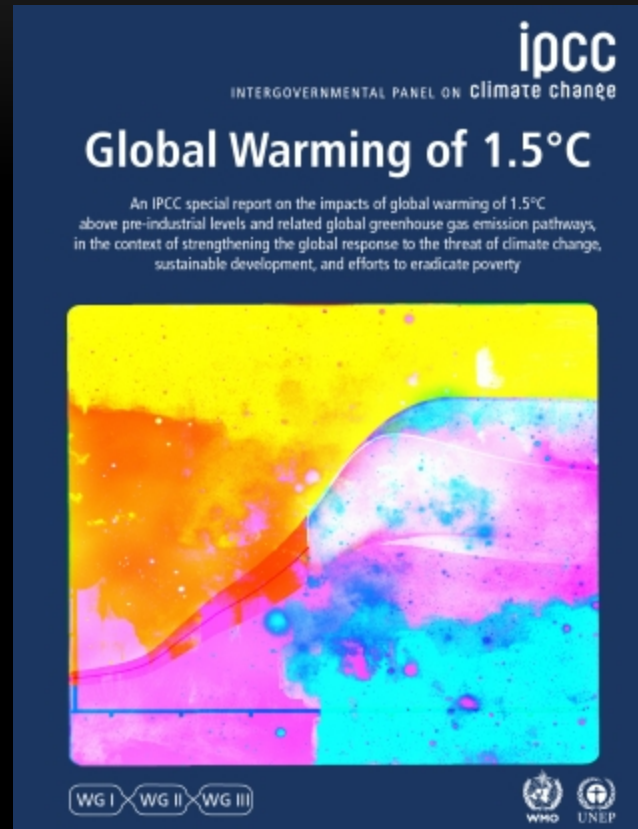
This Talk

- **Part I:** conferences and climate change
- **Part II:** the OSCC virtual conference
- **Part III:** virtual conferences for all

Part I

CONFERENCES AND CLIMATE CHANGE

Climate Change



CO₂ emissions per capita per year (tonnes)



16

9

6

4

Visualizing CO₂-e



40 year old tree
≈
1 tonne

Air travel

- Jet fuel is difficult to replace
- Roundtrip Irvine – New Orleans: 1.1 tonnes
- Roundtrip Paris – New Orleans: 2.6 tonnes

My Own CO₂-e due to air travel



Past 20 years CO₂-e estimate: 330 tonnes!



Conference Culture

- Strongly rooted in
 - tech sector
 - research communities, especially CS & E
- Conferences bring people together +
- More conferences/talks/travel → More success ?

SIGPLAN Climate Change Committee (~2016—now)

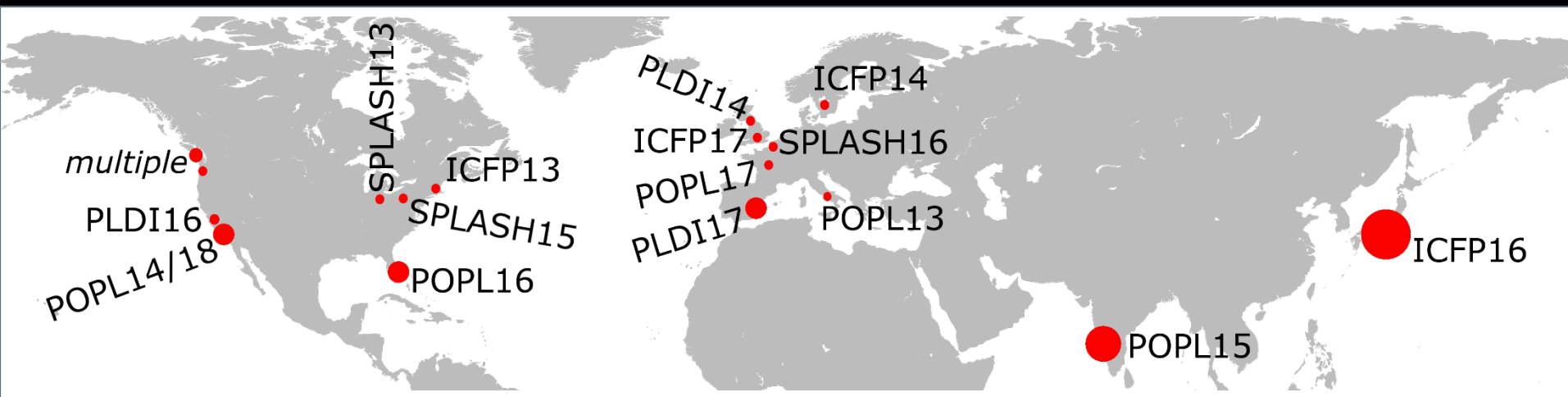
- Members
 - Michael Hicks, U. of Maryland
 - Crista Lopes, UC Irvine
 - Jens Palsberg, UCLA
 - Benjamin Pierce, U Penn (Chair)
 - Survey SIGPLAN members
 - Report about options
-

Possible Actions (from report)

- Quantify carbon footprint of each conference
 - Offer carbon offsets upon registration
 - Rethink PC meetings
 - Incremental changes to conferences
 - Deeper changes to conferences
 - Implement a carbon tax
-

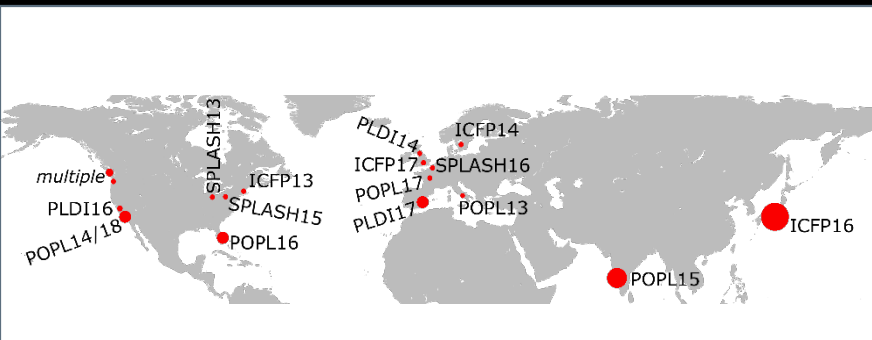
Possible Actions

- Quantify carbon footprint of each conference (*)

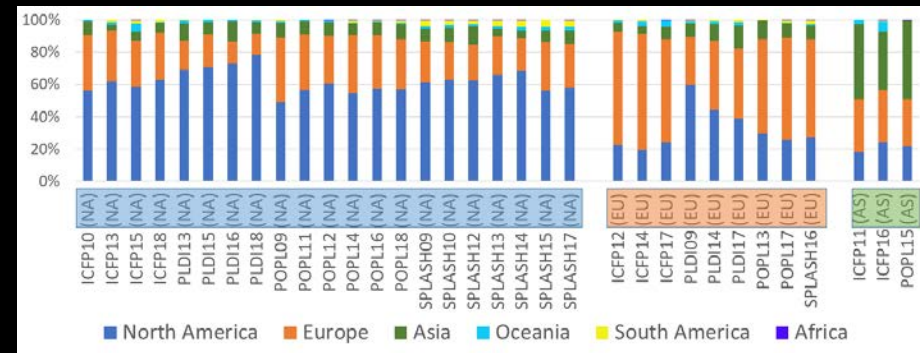


Possible Actions

- Quantify carbon footprint of each conference (*)



vs.



Hard choices!

Possible Actions

Surcharge on conference budgets based on their carbon footprint.
Put the money to good use: any of the other options.

Making carbon cost **visible** may stimulate deeper change without imposing solutions.

- Implement a carbon tax
-

Possible Actions

- Quantify carbon footprint of each conference
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-

Possible Actions

- Deeper changes to conferences
 - Eliminate them and replace them with journals
 - Mega-conferences
 - Regional conferences
 - Multi-site conferences
 - Virtual conferences
-

Part II

THE OSCC VIRTUAL CONFERENCE

OpenSimulator Community Conference (OSCC)



Auditorium, Keynote Speaker

OpenSimulator Community Conference (OSCC)



Conference Room

OpenSimulator Community Conference (OSCC)



Stage

OpenSimulator Community Conference (OSCC)



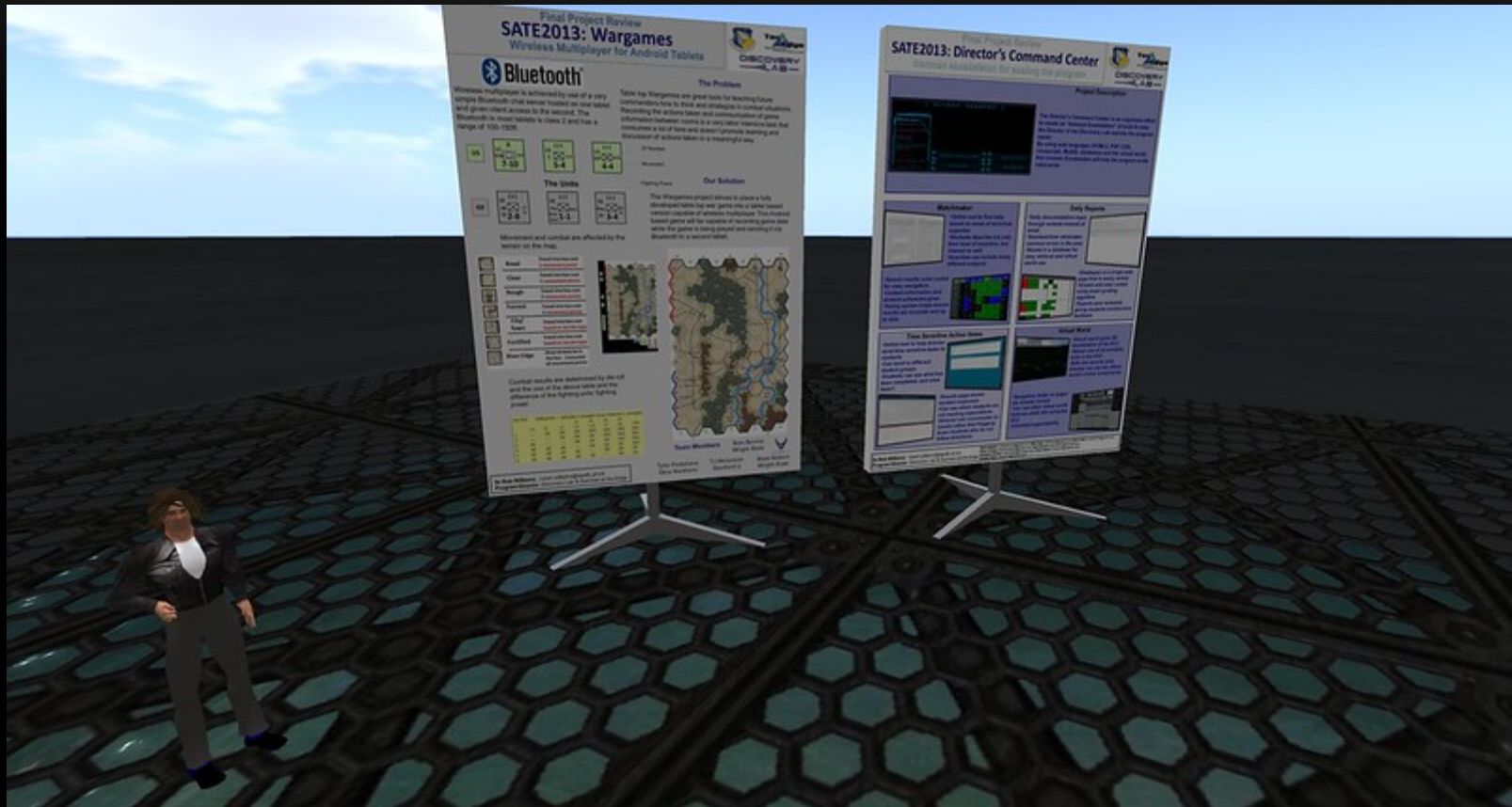
Panel in smaller room

OpenSimulator Community Conference (OSCC)



Auditorium, Panel

OpenSimulator Community Conference (OSCC)



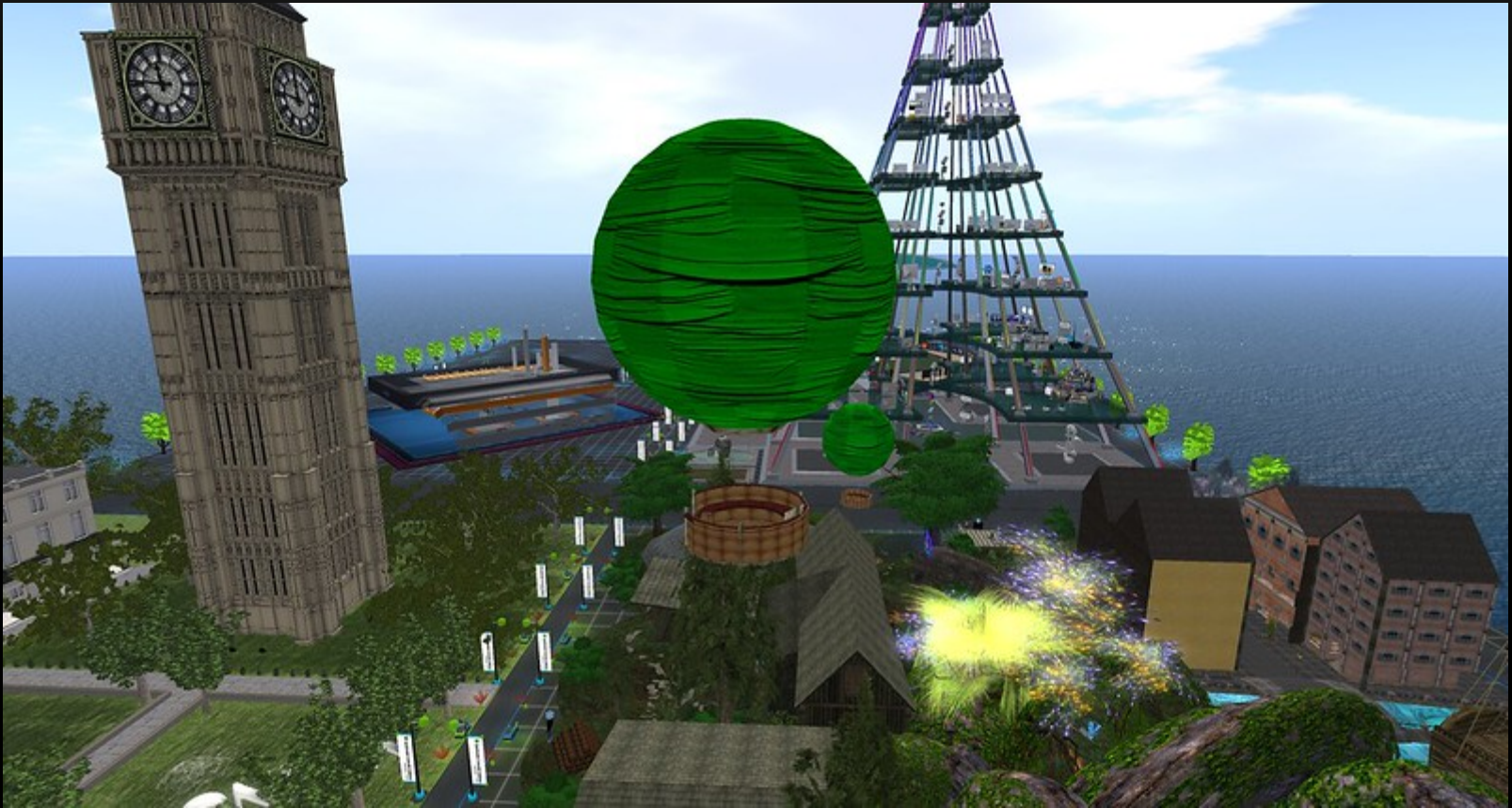
Posters Area

OpenSimulator Community Conference (OSCC)



Expo Area

OpenSimulator Community Conference (OSCC)



Expo Area

OpenSimulator Community Conference (OSCC)



Satellite Social Event

OpenSimulator Community Conference (OSCC)



Organizing Committee and Volunteers

OSCC in numbers

- 2 days
- 6 conferences since 2013
- ~500 people each year
 - ~130 max concurrency so far
- Dozens of speakers each year
- Many satellite events
- ...it's a real conference.
 - Next one: Dec 14-15, 2019

<https://conference.opensimulator.org/>



OSCC Software Stack

- Second Life™ viewer (open source, C++)
- OpenSimulator server (open source, C#)
 - Avatar-based 3D immersive and federated environments
 - Simple in-world 3D modeling, scene editing, scripting (LSL)
 - Support for COLLADA models
 - Text and voice messaging, spatial sound
 - Integration with multiple media streams
 - No video capture but support for video rendering

OSCC Hardware

- Server: Dell PowerEdge T610 (2011), 24G RAM, 12 cores, Linux (OpenSim can run on any OS)
- Viewers: regular laptops/desktops, any OS

Carbon footprint of OSCC

Virtual Conference Center: server



Participants: laptops/desktops



Carbon footprint of OSCC

Server: 12-core Dell PowerEdge

- 900 Kg / year
 - **18 Kg / week**

Participants: laptops/desktops

- 40 Kg / year
 - 240 g / 2 days
- 500 participants:
 - **120 Kg / 2 days**

Total CO₂-e $\approx$ 140 Kg

What's involved in organizing OSCC?

- Organizational aspects
 - Program / Content / Scheduling
 - Conference management
 - Web site
 - Registrations
 - Communications
 - Training
 - Session chairs and volunteers
- Technological aspects
 - Virtual conference center
 - Groups, permissions
 - Debugging, load testing
 - A/V
- “Onsite”
 - Greeters & helpers
 - Session chairs
 - A/V operators
 - Sys admin

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 - Sys admin
- Venue & Hotels
 - Conference center
 - Block reservations
 - Food & Beverage

Unique to virtual conferences

- Organizational aspects
 - Program / Content / Scheduling
 - Conference management
 - Web site
 - Registrations
 - Communications
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 - Session chairs and volunteers
- Technological aspects
 - Virtual conference center
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Planning Meetings



Conference Center: Areas

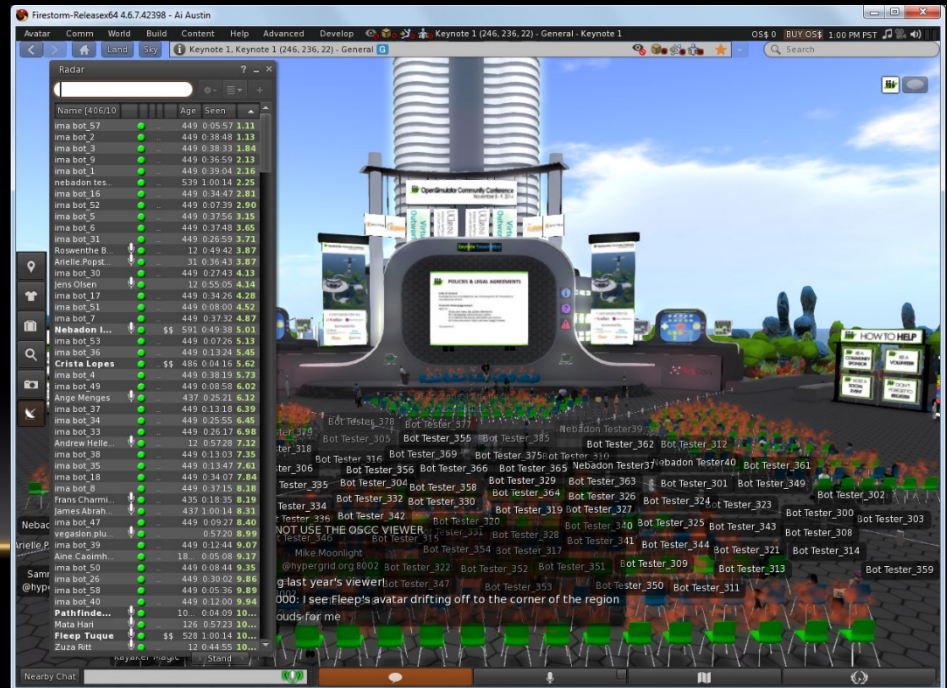
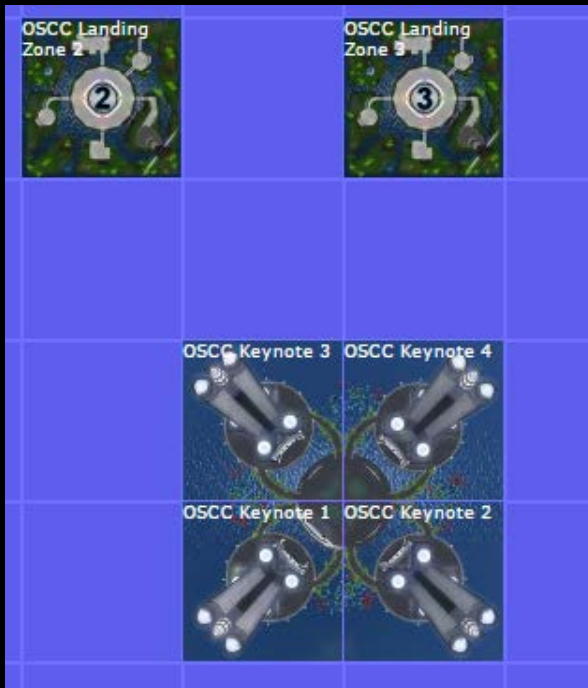


Presentations: NPIRL



Security & Performance

- Group-based capabilities: who can do what where
- Load tests before conferences
- Design space with performance in mind



Reflections from OSCC

- *A conference is a large group of people coming together at the same time to share experiences, formally and informally, in real-time.*
 - Physical space is optional
 - Mental space is key
- Technology is not there yet for the masses, but it's good enough for OSCC community
- End-to-end stack (from technology to conference operation) allows us to gauge at the future of virtual conferences

What makes OSCC successful?

What makes OSCC successful?

6. Virtual conference center: lively and happy

What makes OSCC successful?

- 5. Interaction design: details, details, details
 - 6. Virtual conference center: lively and happy
-

What makes OSCC successful?

- 4. Decentralization of identity and appearance: unlimited choices
 - 5. Interaction design: details, details, details
 - 6. Virtual conference center: lively and happy
-

What makes OSCC successful?

3. Social interaction: constant chats during talks, hallway chats, expo booths, dances, art, ...
 4. Decentralization of identity and appearance: unlimited choices
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 6. Virtual conference center: lively and happy
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What makes OSCC successful?

2. The organizing team: they know what they're doing!
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- A | 1. Program and participant engagement
 - A | 2. The organizing team: they know what they're doing!
 - B | 3. Social interaction: constant chats during talks, hallway chats, expo booths, dances, art, ...
 - B | 4. Decentralization of identity and appearance: unlimited choices
 - C | 5. Interaction design: details, details, details
 - C | 6. Virtual conference center: lively and happy
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- A | 1. Program and participant engagement
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Challenges of OSCC



Challenges of OSCC



The “Meat Space”

- Time zones
 - Breaks may not align with meal times
 - Sitting all day
 - Real life interruptions (kids, family)
 - No physical tokens for remembering event
-

The “Meat Space”

- Time zones
 - 7am-1pm PST is least bad
 - Breaks may not align with meal times
 - Have snacks and water around
 - Sitting all day
 - Longer session breaks, remind people to stretch
 - Real life interruptions (kids, family)
 - Close the door, inform family that you are at a conference
 - No physical tokens for remembering event
 - Mail-in tokens
-

Part III

VIRTUAL CONFERENCES FOR ALL

Viewer does not extend outside community

- Clunky, unintuitive interface, hard to learn
 - Only highly motivated users can use it
 - Makes certain interaction designs very difficult
- Unconstrained 3D space can be confusing
 - What should I be paying attention to?
 - Where should I go?
 - What's going on?

SIGPLAN EC Meeting 2015



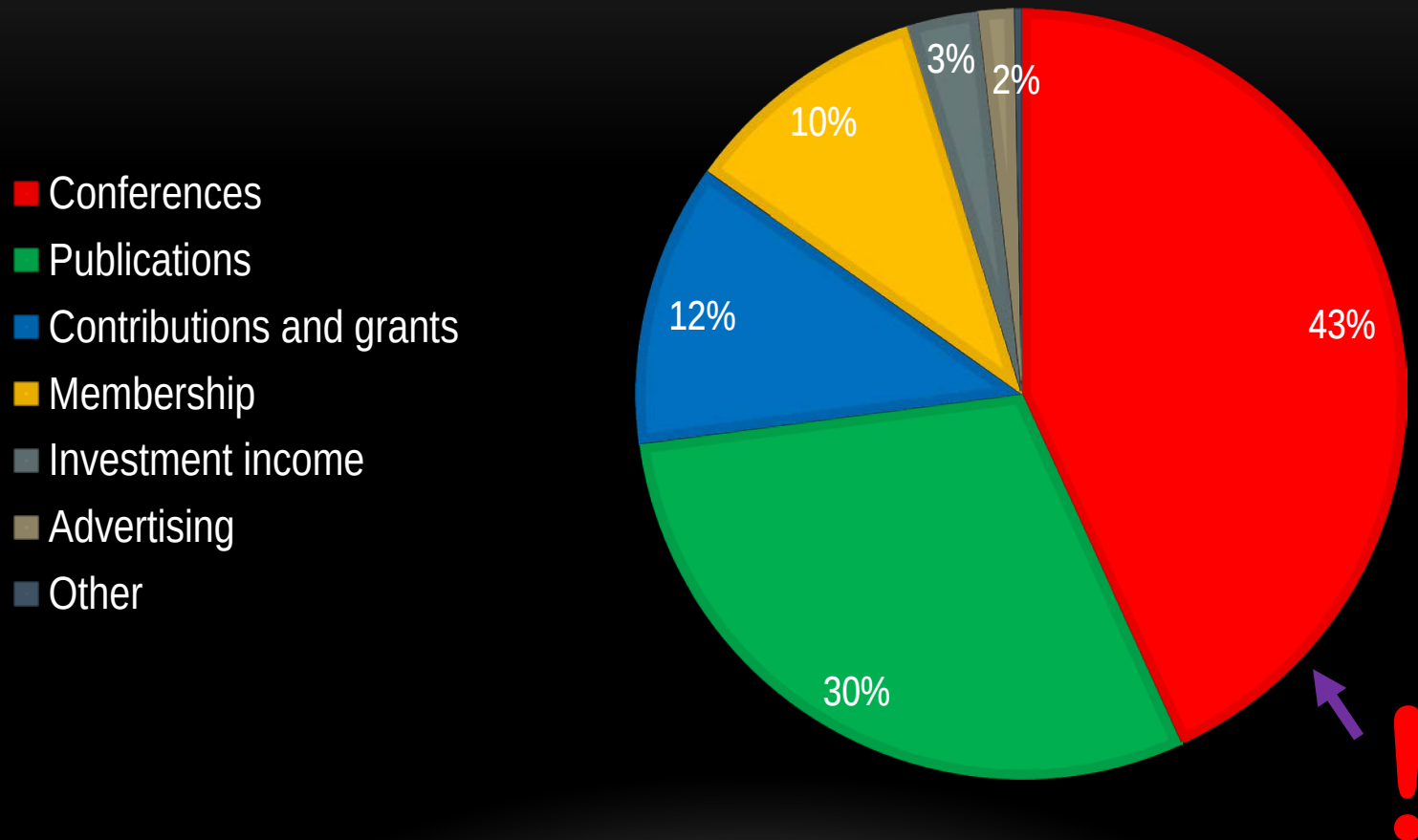
Let's do this VR thing for real!

Need better software stack for VR

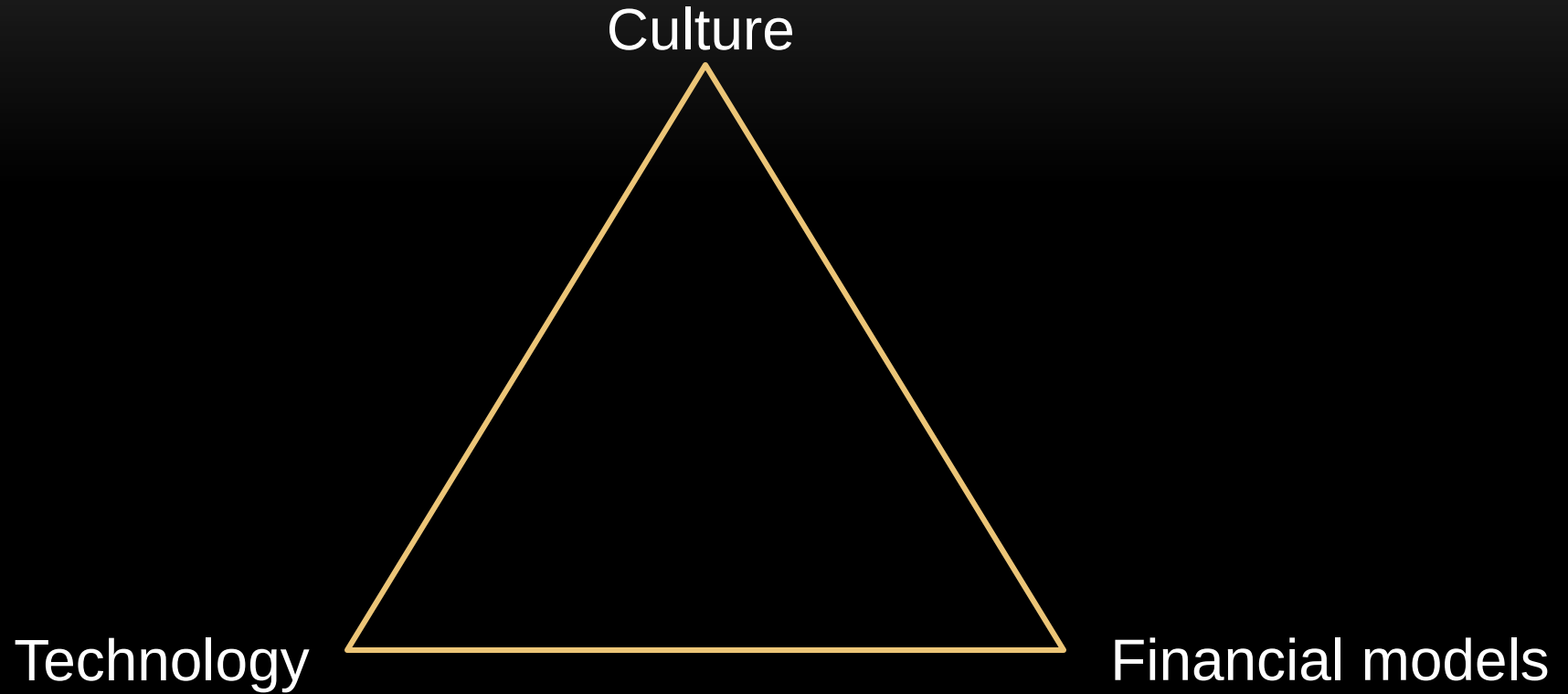
Conferences as [Non-Profit] Business Model

- ACM
- IEEE
- USENIX
- ...

Conferences as [Non-Profit] Business Model



Virtual Conferences for All



Call for Action

- Virtual conferences can **drastically** reduce carbon emissions while still bringing people together at the same time, in real-time
 - Not the same experience, but overlap. And NPIRL.
- Many work-in-progress technologies can be used in **niche communities** right now
 - OpenSim, Mozilla Hubs, High Fidelity, Google Hangouts (?)
- Organization and planning is key for success
 - Design the whole experience, not the just the technological aspects





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