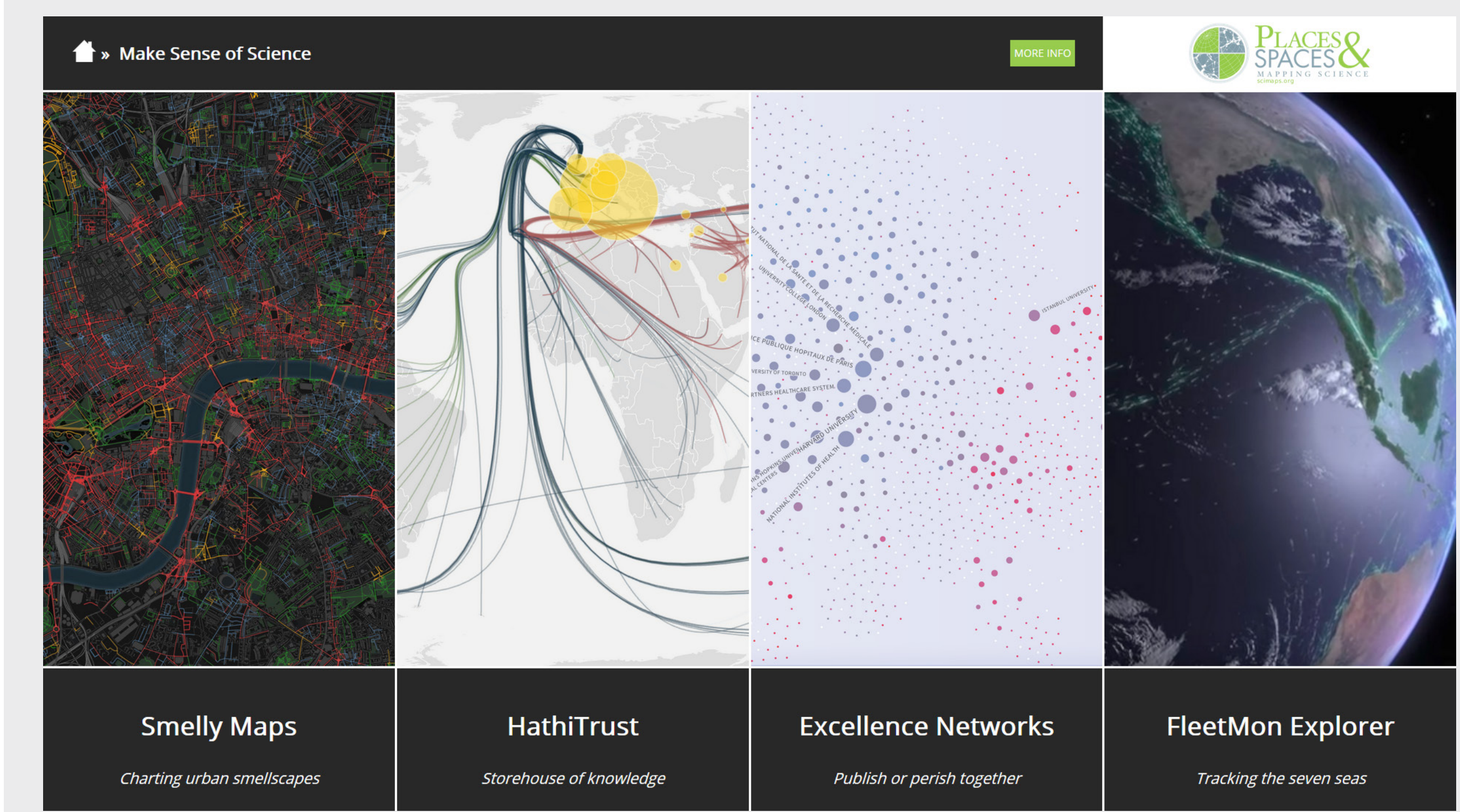


Scoping out the macroscopes: Defining and measuring success for a digital interactive

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The international *Places & Spaces* data visualization exhibit (scimaps.org) showcases creative approaches to the visualization of scientific endeavors. In 2015, *Places & Spaces* expanded from exhibiting static maps of science to including interactive data visualizations we call macroscopes.^{1,2} The macroscopes give visitors a chance to play with data and view a variety of large data sets through different lenses. Visitors interact with these visualizations via a 46" touch screen kiosk.



Screenshot of the 12th Iteration macroscopes.



Visitors engaged with the macroscope kiosk at the David J. Sencer Museum (photo courtesy of Mike Jensen).

Refining the kiosk

Using data-driven decision making to build a better exhibit

We use quick visitor surveys to help us refine the kiosk interface and to help us better understand the behavior we see in Google Analytics. Collecting data to drive our decision-making process keeps us focused on the needs of the visitor and helps our diverse exhibit team come to consensus more quickly.

Surveying a proxy audience

Question: Which tagline to use?

The exhibit team came to an impasse choosing taglines for each macroscope. We had multiple options, strong opinions, and no consensus.

Solution? We asked our target audience.

Everyone on the exhibit team suggested one tagline for each macroscope, with the requirement that the taglines accurately conveyed the content. Then we asked college students at Indiana University's main library to pick their favorite version of each tagline. We used the taglines with the highest votes.

Various options for 12th Iteration Taglines were tested with patrons at Indiana University's Wells Library. Taglines came from CNS staff and from macroscope makers' submission materials. Subjects were asked to identify the most engaging tagline for each map. Results can be found below, with top choices highlighted.

Smelly Maps:
 Crowdsourcing noses for urban planning
 Crowdsourcing Noses (1)
Charting Urban Smellscapes (1)
 Social Media in the Big City (1)
 Your Nose is a Big Data Machine (2)

Excellence Networks:
 Understanding research collaborations (1)
Successful Research Collaborations (2)
 Identify Top Research Collaborations (1)
Publish or Perish Together (2)
 Mapping Research Collaborations (1)

HathiTrust:
 Exploring 14 million publications from 2000 years (2)
Storehouse of Knowledge (3)
 The Collective Collection (1)
 A Diversity of Digital Documents (1)

FleetMon:
 Worldwide sea traffic
Tracking the Seven Seas (4)
 Marine Traffic from Space (1)
 Ship Spotting from Space (2)
 Vessel Tracking

Using Google Analytics to observe visitor behavior

Our goal was to look beyond how long visitors were spending at the kiosk, to see if they were engaging with the content and increasing their data visualization literacy.

Since the exhibit travels without staff, we have few opportunities to observe or interact with our visitors directly, but by setting the kiosk up as a website, we were able to use Google Analytics to observe visitor behavior anonymously. Many of the basic questions we had about how visitors use the kiosk could be answered through Google Analytics.

Event tracking

Event tracking helped us understand how users interact with the kiosk. We tagged particular events in order to track how often visitors performed certain actions:

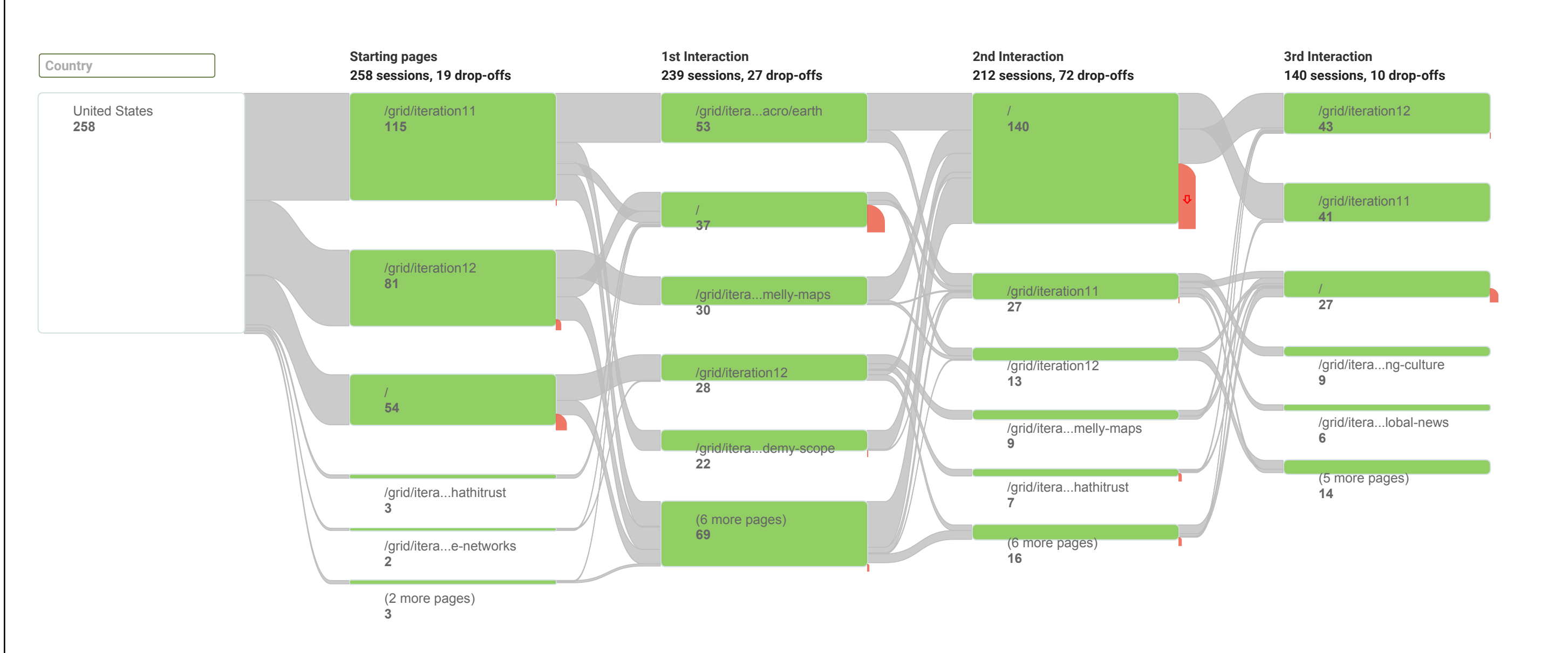
Event Category	Behavior Metric
Macroscope_launched	how many times each individual macroscope is launched
Extended_info (selected the MORE INFO button)	how often additional information about a macroscope is accessed
Iteration_selected	whether users navigate through an overview screen or go directly to individual macroscopes
Idle (idle screen activated)	how often the kiosk reverts to idle mode

Tip: Make your naming convention for event categories and event actions easy for everyone to understand.

Sankey diagram

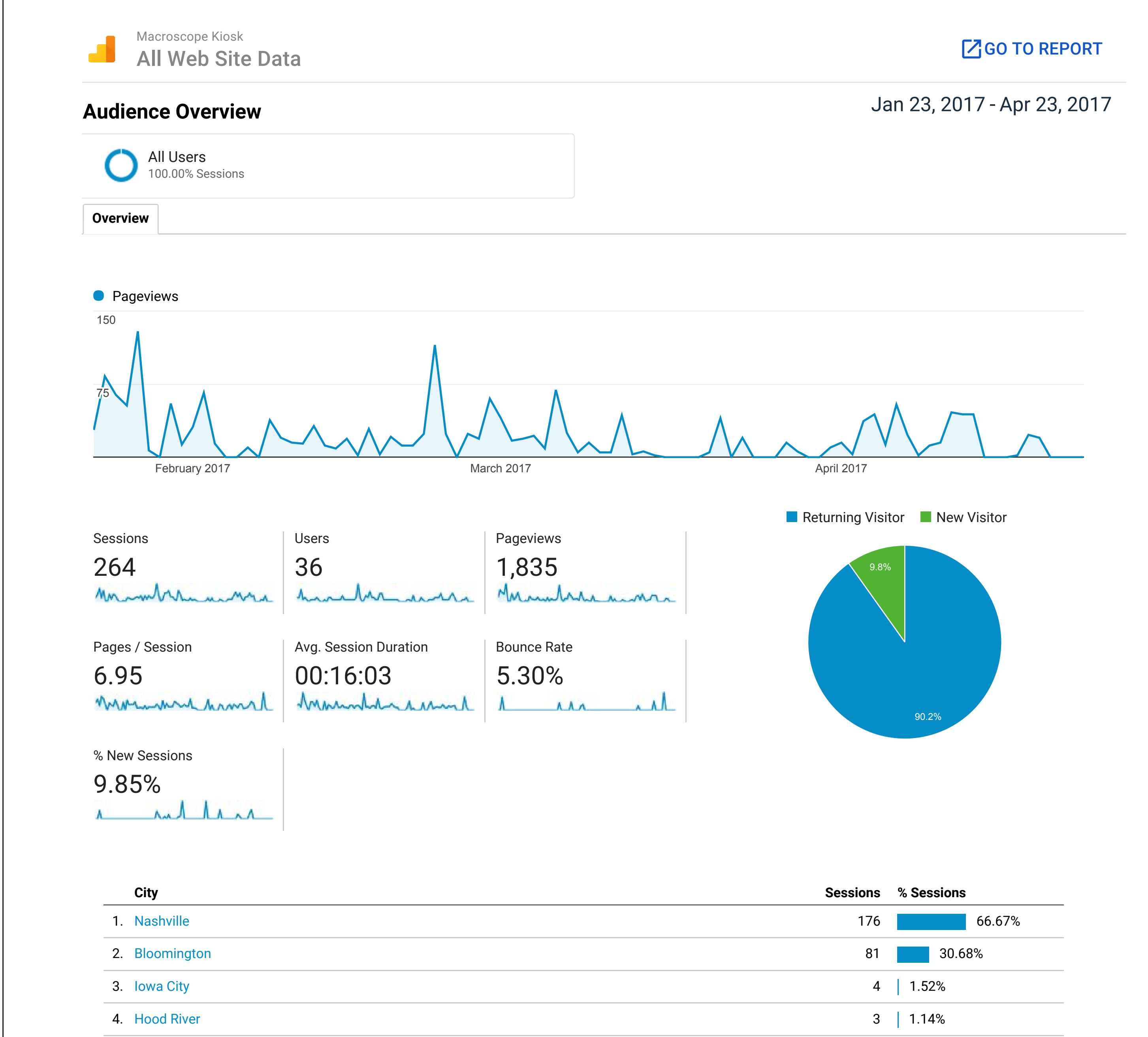
How do visitors flow through the site?

It can be instructive to see how users flow through your site. We were glad to see that visitors are visiting multiple macroscopes and that they generally enter and exit at the home page. This helps us create more accurate visitor journey maps or use cases for future versions of the kiosk.



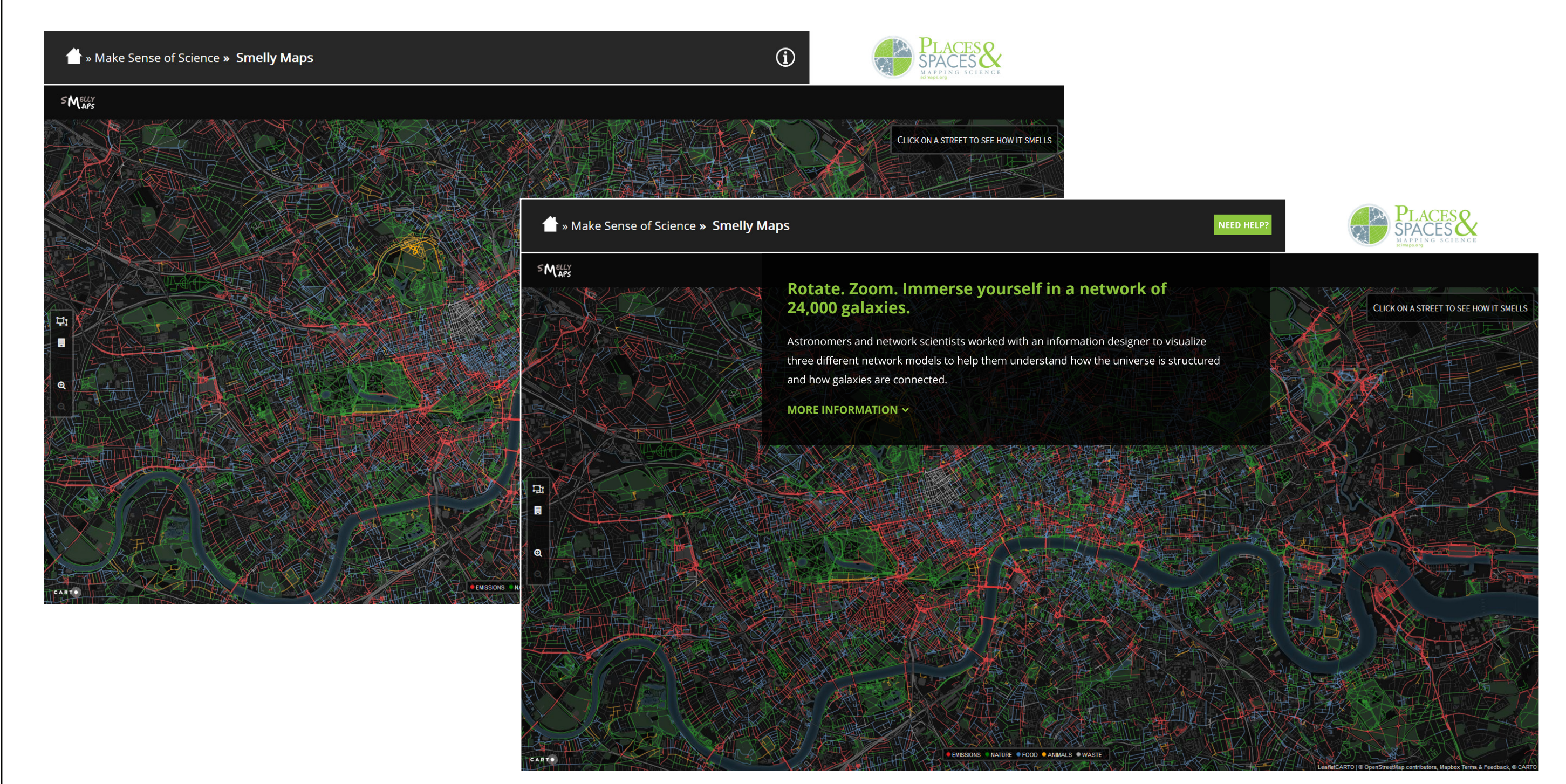
Sessions versus pageviews

Since by default a Google Analytics user session lasts until there are 30 minutes of inactivity, this method under-represents sessions if the kiosk is busy. For example, one group arrives and interacts with the kiosk for 10 minutes and leaves. The kiosk sits idle for 24 minutes before another group arrives. Since the kiosk has not been inactive for 30 minutes, Google Analytics does not count the activities of the second user group as a separate session. Because of this we find page views to be a more useful metric than sessions.



Segmenting the data

Location (found under Audience>Geo>Location) and browser type (found under Audience>Technology>Browser & OS) help us separate visitor behavior from demo behavior and testing behavior. Since we know where the kiosk is and what browser it uses, we can identify site traffic from a particular exhibit installation and filter out other use. Date range and location help us identify specific installations of a traveling exhibit so we can compare how visitors behaved at different sites.



Using paper mockups to prototype changes

Observation from Google Analytics: During a 3 month installation, visitors selected the MORE INFO button on the kiosk only 10% of the time.

Question: Are they not interested or are they unable to find it?

We created paper mockups of two versions of the interface: one showing a popup window with the additional information and one without the extra information. We asked people which version they would prefer to see when they selected a macroscope and why. We also used a paper mockup to ask people where they would look for more information on the old interface, to see if they could find the MORE INFO button.

Results: Users wanted additional information but couldn't find it.

Event tracking with a redesigned MORE INFO button shows that users are now clicking the MORE INFO button 53% of the time.

We know what they are doing, but what are they thinking?

Question: Are visitors getting the main idea that data visualization helps people make sense of data?

We conducted a small self-administered survey with visitors after they interacted with the kiosk during a user testing session at a nearby science center. The sample size was too small to draw conclusions, but preliminary results suggest that people view each macroscope as an individual experience, rather than viewing the experience of the kiosk as a whole. We look forward to conducting this survey with more visitors in the future.

References

- Börner, Katy. 2011. "Plug-and-Play Macroscopes". *Communications of the ACM* 54 (3): 60-69.
- de Rosnay, Joël. 1979. *The Macroscope: A New World Scientific System*. New York: Harper & Row



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