This is an overview of everything that has happened with Cesium since last year’s BOF as well as an update on current projects and roadmap.
Cesium is an open-source JavaScript library for creating 3D globes and 2D maps.

It's built using JavaScript, HTML5, and WebGL.

It's under the liberal Apache 2.0 license, so it's usable in both free and commercial applications.

Cesium was born in aerospace, so it was built with precision and accuracy in mind, whether you're on the ground or in outer space. It also has first-class treatment of time and tuned for dynamic data.

It's popularity has grown so that it is now used in a diverse array of fields, such as real-estate, city planning, sports, environmental science, and more.
I’m going to hit on some of the most significant developments since the last SIGGRAPH. This includes features in our monthly train schedule releases, which have worked out really well for us, the significant community growth we’ve seen, both in contributions, forum discussions, and website visits. Changes to the WebGL ecosystem (thankfully for the better). The Google Earth deprecation, which is by far the biggest non-Cesium-specific news for us. And finally, the future roadmap and some brand new demos that we just released this morning.
We reintroduced a high-level API to abstract away a lot of the difference between various primitives as well as make it easy to express time-dynamic data. Previously the Entity API existed mainly to support data source plug-ins, but not it’s the preferred API for most application. The above code snippet is small and declarative, but creates the animation you’ll see on the next slide.
We also released KML Support, which itself uses the Entity API to load data. KML is a huge and inexact specification, so there’s still plenty of work to do, but what we have no is useful for a large number of use cases. You’ll see later that we plan on continuing to improve this area ahead of the Google Earth deprecation at the end of the year.
We’ve made a bunch of imagery improvements, including additional standard support, such as WMTS and MapBox, as well as added a template imagery provider to make it trivial to hook Cesium up to any set of urls with a known tiling scheme.
Probably one of our most requested features on our mailing list was an improved Camera API and better camera flights.
We added Polygons, billboards, and levels on terrain as well.
With all of that work it’s brought our code base up to 184 lines of code and tests with 6839 overall tests (which thankfully still take under a minute to run).
In addition to the changes to Cesium itself, our community has continued to grow. We’ve had more outside contributions, with 15 different contributors in the past month alone. Our forum has doubled in size since the last SIGGRAPH and is now has over 700 members and our website has been averaging around 18,000 users a month.

Finally, we’re proud to be participating in the Google Summer of Code for the second time, which I’ll talk a little more about later.
This growth has also led to us featuring many new showcases on our website, everything from traditional terrain and imagery mapping like FodarEarth, to real estate, like create.io, and even asteroid visualization, such as NASA's VestaTrek. If you’ve haven’t checked out the demos page on our website in a while, I highly encourage you to.

http://cesiumjs.org/demos.html

We literally have a backlog of dozens of apps to showcases.
Of course Google Earth migrations are some of the most high-profile showcases, since there is a rush to migrate away from Google Earth before it goes away at the end of the year.
For example, we’ve added a Google Earth Enterprise imagery provider to Cesium for groups with in-house Enterprise servers.

http://analyticalgraphicsinc.github.io/cesium-google-earth-examples/
http://analyticalgraphicsinc.github.io/cesium-google-earth-examples/ (Scroll to bottom for Milk Truck).
Less than 5 years ago, a demo like the Monster Milk Truck required a native plug-in to run. But WebGL has proven its usefulness and is here to stay.

All major browsers now have official support for WebGL and it runs almost anywhere, from phones to tablets, to desktops and even some smartwatches.

Amazingly, Cesium runs pretty well on all of these platforms, but it would be unfair not to say that some are better supported than others. Mobile support has improved dramatically in the past year, but is still probably where WebGL is the least robust. The wide variety of mobile hardware and operating systems make it difficult to test.

As WebGL support continues to improve, developers are already hard at work on WebGL 2, which currently has a draft specification. Firefox and Chrome both already have experimental support behind a flag in their developer builds. While Cesium have any WebGL 2 code in it yet, we are using several extensions that will ultimately be part of WebGL 2. Ultimately, we feel that WebGL 2 will offer better performance in Cesium more than anything else.
Not only are we proud to be part of the Google Summer of Code a second time, but we were allotted 4 slots, all of which are being put to good use.

- Ayush Khandelwal
  - GML support
- Aditya Raisinghani
  - Sandcastle refactoring
- Andre Nunes
  - GPX and Shapefiles
- Abhishek Potnis
  - LIDAR profile data from NASA’s CALIPSO satellite
A new glTF extension for improving file size.

Polylines on terrain are the last major piece of the puzzle to enable us to have terrain on by default in Cesium.

Even though Google Earth is going away, there’s still a billion KML documents out there that people need to load. Adding NetworkLink and Region support to Cesium will be a huge step taking us mush closer to 100% compatibility.

3D tiles is a brand new open specification developed by the Cesium team. Today is actually the first time we’re talking about them in public. They are built from the ground up to stream arbitrary three dimensional spatial data on the web. Everything from 3D models to point clouds to vector data and eventually even temporal datasets. Now Patrick will be up here in a little while to go into the full details, but I’m going to run through a couple of quick demos to showcase what they can do.
The open data movement continues to gain traction and we wanted to leverage that to showcase what 3D Tiles can do. So we took the New York City OpenStreetMap extract from Mapzen and turned it into 3D Tiles. The result is over 1.1 million buildings, each individually selectable with provided meta-data. This data set is huge, and I’m going to fly around NYC to each of the 5 boroughs, but you can easily get lost just meandering about the tileset.

Here’s the World Trade Center and World Financial center, and if we look in Times Square we even see the small TKTS booth that operates in the middle of it. Of course exploring this data would be hard if we didn’t have good mouse control. With the 3D tiles effort we’ve added more context sensitive controls for cesium. For example I’m at ground level right now but if I grab onto a building I can easily walk up the side to get to a better height. I can right-click on a building to make it my center of rotation and I can even grab the sky and look around. This is a true 3D map with completely freedom of movement, not an isometric view that you see with many other engines and demos.

The entire building data set is only 346 MB gzipped without geometric compression and only 247 MB with it. It’s 1,139,680 buildings in 4197 tiles overall.

http://cesiumjs.org/NewYork/
Point cloud support in 3D Tiles is still in the prototype phase, but the main takeaway here is that 3D Tiles are heterogeneous. The same code on the client that was used for 3D buildings is also being used for the point clouds. The difference is the payload of individual tiles. While 3D buildings have a none-uniform, overlapping, quadtree-like tiling scheme, the point clouds have an octree-like one, but both can be represented as a tree in the 3D Tiles format and Cesium can handle either at runtime without caring. This is very different than traditional 2D tiling schemes, like TMS.
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