

# RPolyhedra: Experiences and beyond

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## Abstract

An R based library to explore and manipulate Polyhedra from different sources, with OpenGL rendering capabilities. Experiences compiling the library and taking it to the real life.

## 1 Information about the speakers

### 1.1 Personal Data

BARANEK, Alejandro

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### 1.2 Speaker information for the conference program

As part of the studies to create new ways to construct space frames, we needed to analyze polyhedra and its properties, but - although we found out that some of the most interesting and open source alternatives were not maintained and relied on formats that are not currently used, which would require an effort to process those files to produce a viable visualization. For example, Netlib's Polyhedra[1], by Andrew Hume and Visual Polyhedra[2] by David McCooey.

With that in mind, we created a standards based R package, which is available on the CRAN Repository as "Rpolyhedra" and enables users to handle and explore polyhedra with minimum effort. Furthermore, as part of the effort, we also created a web based representation[3].

## 2 Information about the talk

### 2.1 Talk classification

- Visualization, new tools and creation of mathematics exhibits
- Knowledge transfer and pedagogics

## 2.2 Talk overview

A guide through the experience of compiling information from free sources to make a tool that can be used to learn and explore polyhedra in an intuitive way, the lessons learnt and how that can improve the knowledge available to the general public. The compiled library is comprised by over 800 polyhedra from different sources, and can be easily extended to include new libraries, due to the fact that the code to scrape the included sources are shipped with the R package.

Along with the creation of the library, the talk will continue with our experiences on taking its lessons to the next level, and our experience on Augmented Reality and 3D printing which lead us to the creation of a unique node model that can be used to construct polyhedra out of drinking straws for easy prototyping.

## References

- [1] Polyhedra. HUME, Andrew and others. <http://www.netlib.org/polyhedra/>
- [2] Visual Polyhedra, MCCOOEY, David, <http://dmccooey.com/polyhedra/>
- [3] Polyhedra Explorer, BARANEK, Alejandro and BELEN, Leonardo, <https://qbotics.shinyapps.io/rpolyhedra-explorer/>