correction: On April 30 we stated that GolfTraxx has "10,000 courses with course flyovers" (where we provide links to hole and/or course flyovers). The correct number is 1,000.
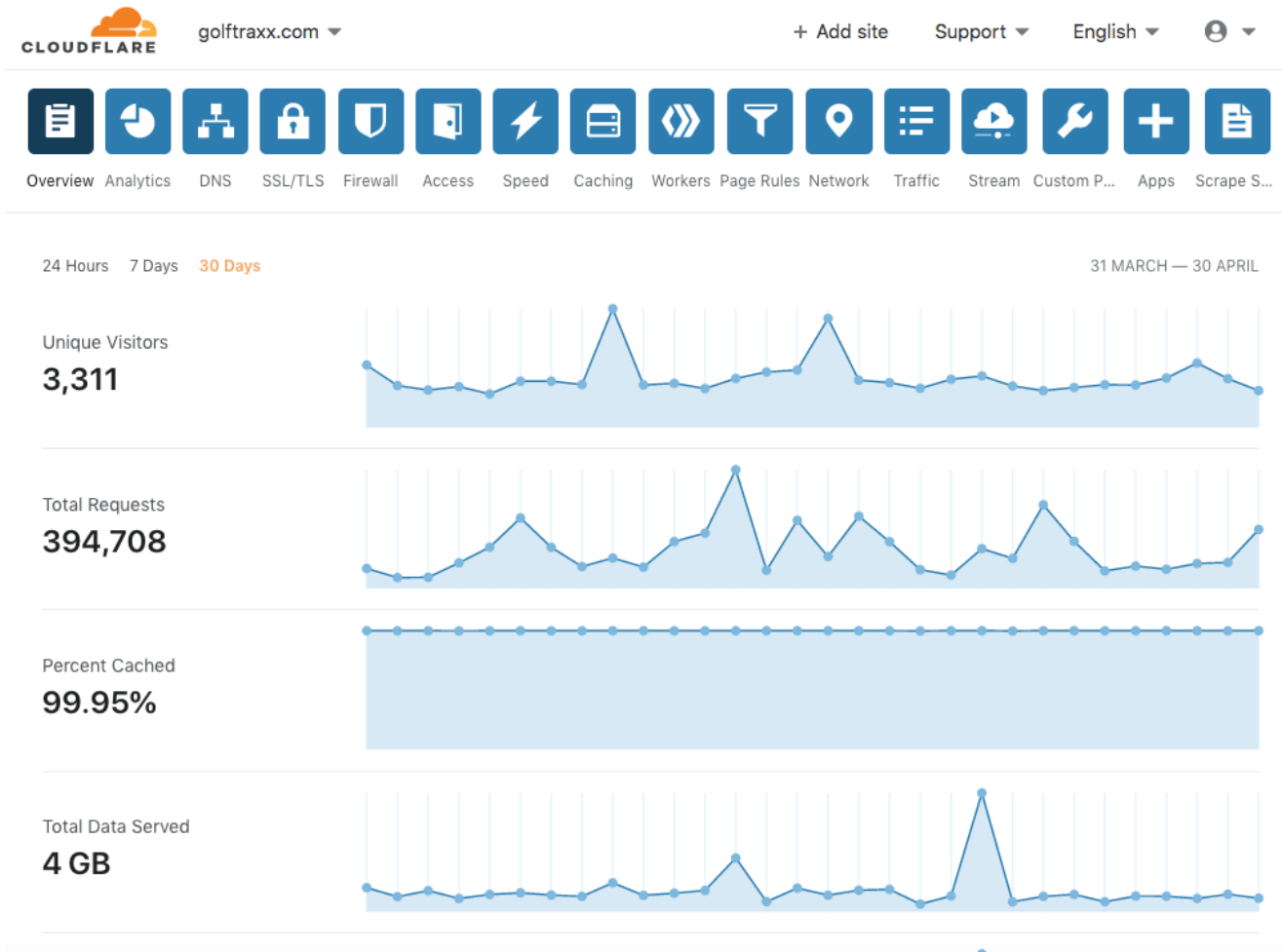
April 30, 2020 **Q & A Session with Golftraxx Founder, Frank DeBenedetti with latest updates on GolfTraxx, RTK, Precision Golf , his new Patent Pending technology, and his vision for the future of GolfTraxx**

Q: *Frank Thanks for agreeing to talk with us. Since our last meeting back in December, 2019, we see Golftraxx has been pretty busy adding courses.   How many courses are in your database now?*

A: It's a pleasure. Just this month we reached a milestone that 14 years ago when I started this venture, I wasn't sure we could EVER reach. 40,000 golf courses in over 100 countries are now in the Golftraxx database. We believe this is now close to 97% of the world supply of golf courses.

Every single one of these courses is at least partially mapped, in as much as we now use Google's reverse geo-code API's to return the coordinates for each property in the database. The reverse-geocode API is how we are able to provide course layouts in our maps, even where we have not yet completed hole-by-hole mapping for the course. Over 32,000 of these courses now have scorecards and hole-by-hole GPS coordinates. Over 1,000 courses now also feature course flyovers.   It is our plan to feature course and/or hole flyovers for every course in the database over the next 6 months.

From the very first versions of our our product, we were light years ahead of our competition, and dare I say, our latest product and site features are right on track to do the same thing AGAIN. We reached another milestone this month is that we had our very first 400,000 page views month here at golftraxx.

Q: *Wow! That's some pretty INCREDIBLE growth... both in terms of courses in your database and site visitors and page views. How was this possible in the midst of the COVID-19 outbreak?*

For the past year, we have been working to become as close to 100% green as possible, and to reduce our carbon footprint as close to zero as possible, and I saw a remote workforce as central to that vision. We are also planning to re-locate our operations to a location where all of our electrical consumption here in the US is generated by wind-turbines.   This remote workforce strategy has turned out to be a fortunate strategy as it has allowed us to continue working through the worldwide crisis, albeit 100% remotely, despite receiving no revenues, we continue to make great progress. I also believe some of the growth came, similar to Netflix due to folks being able to stay home to look at more courses.

Q: *So besides the additional courses you have added to the database, and course and hole flyovers you're implementing worldwide, what else has been happening at GolfTraxx?*

A: One of the projects that's been on the back burner for many years has been the notion that we need a better way to ensure that the addresses for courses and the GPS coordinates for that course are consistent. Ancillary to that notion was, of course, finding ways to eliminate the "shiftiness" of the Google Earth imagery overlay itself, so that the coordinates in our database more closely correspond with **terra firma** and were not subject to whims or satellite orbit path deviations or other "shiftiness."

The solution which I can now FINALLY discuss publicly is our *patent pending* **wireframe-hub spoke** design. In **wireframe-hub spoke**, the reverse-geocoded address coordinates are mapped concurrently with each set of course coordinates, and then ranked based on the proximity between the courses address coordinates and the green coordinates. This allows us to immediately see and update any courses where the address does not correspond with the coordinates.

Secondly, **wireframe-hub spoke** instantly calculates precise distances in yards and precise headings from the address coordinates for the property (or from any other RTK-verifiable points) to the other course coordinates stored in our database, which makes the distance calculations and headings themselves measurable and verifiable.

Editor's Note: For those unfamiliar with RTK GPS receivers and the relevance to precision GPS coordinates, Minnesota DOT prepared a remarkably thorough and easy-to-understand report:

http://www.dot.state.mn.us/research/reports/2018/201810.pdf which is also available here:

https://golftraxx.com/201810_DOT_MN_RTK_assessment.pdf

For a quick demonstration of the improvement in precision versus GPS (1.5 meters versus 10 centimeters), check this link:

https://www.youtube.com/watch?v=C_iQFFGgXPA (watch the number of centimeters shown in the device versus those shown in measuring tape: approximately 1cm accuracy)

Another demonstration shows the difference in precision in a drone (equipped with both GPS and RTK GNSS) in return to home:

https://www.youtube.com/watch?v=TwhCX0c8Xe0

When the above accuracy-demonstration videos were made, GNSS receivers were substantially more costly. There was a question of whether the price differential was justified. For flying a drone if considering ONLY x, y (latitude, longitude) then as the video shows, there's not much advantage. BUT, if considering (x, y, AND z) where z is altitude, the RTK receiver adds substantially more accuracy than that available through GPS.

And, in addition, the cost of GNSS receivers has dropped substantially:

https://www.youtube.com/watch?v=Z_C33io_8S4

In addition, thanks to a whole host of now-available and low cost/free RTK subscription services and public base stations, RTK has become widely available here in the US and its reach is expanding rapidly internationally.

https://www.gpsworld.com/finally-a-list-of-public-rtk-base-stations-in-the-u-s/

We have a created a short YouTube video on the GolfTraxx YouTube channel to demonstrate how our patent pending **wireframe-hub spoke** works. In it you can actually see the calculations being done as reverse-geocoded addresses are returned by the Google API:

Third, utilizing "extras" for the course (points visible within the imagery), a concept we coined 14 years ago, whether those "extras" be in-ground fairway yardage markers, or street corners, or swimming pool corners, tennis court corners, or driveway corners, literally *anywhere* where it is possible to obtain RTK coordinates, **wireframe-hub spoke** instantly calculates the precise distances and headings to the all of the course coordinates in our database.

Fourth, **wireframe-hub spoke** instantly calculates the delta or "offset" between visible points in the Google Earth imagery and the RTK-verified points. This allows the precise location of that extra to be determined (to within 1-2 centimeters), and for the coordinates associated with that "extra" to be updated in our database. However, **the BIG WIN is that all <u>nearby</u> coordinates stored in our database can also be instantly "trued-up" by the exact same amount required to true up the visible "extras" in the imagery to their RTK-verified positions**.

Q: Wow GolfTraxx!!   A patent?! That IS Exciting News! Can you explain for our non-technical viewers what that means for GolfTraxx and its users?

Over the past decade we have discovered that some of the Google Earth Maps had errors as large as 10-15 yards in some areas where the Google Earth mapping overlay itself needed to be adjusted. When I met with Google in 2008, they told me that what Golftraxx was doing would help them improve their mapping. The placemarks we have been adding in our course maps using Google API's have provided Google a way to "true up" their Google Earth maps to known positions. Now, with RTK-verified viewable locations, that level of precision can finally reach the <u>less-than-one-inch</u> level of precision.

Think of the Google satellite imagery as an overhead transparency, that can be laid directly over terra firma, and think of terra firma as the overhead projector stage. If placed precisely enough, then there is no variance between the coordinates stored in the Google transparency layer and those of terra firma itself. However, as demonstrated by Google for the past 12 plus years, every time shifts in their satellite imagery occur, it introduces a variance or "error" between what their transparency shows as the coordinates for the position and what the position of terra firma actually is.

These variances are often referred to as offsets. The precise distance or coordinate required to "true up" the coordinates shown in the imagery for the location with the actual coordinates for the location. Our patent pending **wireframe hub spoke approach** calculates the distances and headings automatically between ANY visible RTK-verified (or RTK-verifiable) point and the other point stored for the course in our database, allowing every single one to be trued up precisely as the RTK point itself. The BENEFIT is that the calculations from where a player is standing to the the target pin become more precise by eliminating error caused by the Google transparency layer heretofore.

To identify and map the RTK-verifiable "extras" themselves and then confirm corresponding RTK-verified locations, we WILL need the cooperation of the user community in identifying, mapping, and capturing these RTK-verifiable locations.

Until the present, whenever Google decides on their own accord to make those adjustments to maps, we would see the placemarks of groups of courses in the same geographic area shift several yards when viewed in Google Earth or Google Maps. Of course, we never receive any notification that it was going to happen...it would just happen.   There are still courses in out database to this day that reflect those "shifts" in the underlying imagery.

Q: Thanks for clarifying this for non-technical users. That IS Exciting News! Where are you heading next from here?

Well, with all the excitement about the patent I forgot to mention our worldwide deployment of weather on our site. We have implemented that just in the past few weeks as well.

Also as a follow-up to the last time we spoke, I had mentioned that we were in the process of implementing stats tracking. The stats we are now collecting for rounds played can now be uploaded to golfers profiles through Facebook integration with our HTML 5 application and some of our prior versions serve as the basis for us to provide "post-round analysis and recommendations" for improving your game." Think of it as taking a playing lesson, where the pro goes with you on the course and makes recommendations that can save you considerable amounts of shots by playing smarter golf during that round and in future rounds. Our stats analysis will help golfers identify weaknesses in their game and give actionable feedback to help improve their games.

Q: So 14 years later you are still supporting those prior versions?

Those devices still run our software AND they're REALLY CHEAP, so why not? I have heard of Treos being purchased for $5. One of the things we recognized with advent of FCC radio devices and the imposed restrictions on GPS precisions way back in 2008 was that we needed to have the ability to receive coordinates through a means other than the internal GPS receiver offered inside $500 iPhones or Androids. Our solution back then, as many of you know, was bluetooth. Bluetooth was the recommended approach for GPS connection to achieve the **highest precision possible**. Our bluetooth approach was visionary, as RTK-enabled GPS receivers today connect to your device via bluetooth. Today, if you want the highest precision possible, a bluetooth connection to RTK-compatible receiver is what you need.

Q: *So what can you tell us about the new HTML 5 app? What's different and why did you create it?*

A: From the start, we have been a scorecard, GPS distances, and stats application, but not a course map application. We wanted a version that could be used by everyone, where maintenance costs would be substantially reduced by maintaining a SINGLE code base, versus for Android and IOS application revisions for every OS upgrade or release. We also wanted to integrate map imagery, and were excited about the new version of Google Map 3.3 API's, post the map corrections so that the higher precision maps would also demonstrate the quality of the course mappings we have created using Google Maps themselves. In addition, Golftraxx has always been a take-everywhere app that works even where there is no wi-fi or 3G/4G/5G and we wanted to preserve that feature in out next gen version.

One of the other things we learned and focused on, even from our earliest versions was that "too many clicks spoil the soup!" For on-course stats to be tracked and for scores to be kept, and ALSO for ready-golf to continue to be played, the scoring and stats capture MUST be accomplished with the fewest clicks possible. We figured that out way back in 2007 on our Garmin version, and from what we can tell, not one of our competitors has come close, even to this day. To make it happen, we select your club for you based on the distances you hit your clubs, and we determine your lies, and your clubs, and your chips and putts, and whether you hit fairways or greens in regulation based on location, such that 80-90% of your shots required just ONE click per shot to capture scoring AND accurately record your playing stats.

Of course the Google Earth imagery embedded in our html 5 app and in our website speaks for itself and is the big new feature. It accurately depicts where you are on the course, and where landmarks and hole features are relative to you in stunning imagery.

HTML5 also now provides support for "Where Am I?" which enables us to provide dynamic lists of hundreds of nearby courses that can be selected to play a round of golf in a few seconds, and provide turn-by-turn directions through Google Maps to arrive at the course.

These were some of the have-to-have qualities we wanted to offer in our html5 version of golftraxx.

Q: *Wow! And you were able to do all this in HTML5?*

A: Yes, I am quite pleased with the HTML 5 app we have brought to life for golfers worldwide in this newest version of golftraxx against some remarkably stacked odds against us. Of course, it relies heavily on the database that we created 12 years ago and continue to update with additional courses and further tuning. As you have already heard we have been under hacker attacks non-stop for the past several months, deleting data, changing site pages, and wreaking havoc. But through all that, our users stayed quite happy.

Month-over-month we are achieving record numbers of page views on the site, even after excluding the hacker traffic. This past month we received over 400,000 page views on the site, a new all-time high. Just like the earliest versions, the course can be downloaded to your browser ONCE and then the entire round played without ever re-connecting to the internet. Shots are captured in a single click including club selection, lie, distance to target. GIRs, Fairways Hit, Chips, and Putts are all tracked automatically.

Q: Where are you heading next from here?

A: Besides the flyover videos, we are continuing with our **scorecard update project** which is now close to 15,000 updated course scorecards and adding links to golf course course websites. It is our hope that all 40,000 courses in the database will have had editor review within the next 6-12 months.

"Extras" for courses from around the world continue to be added to courses in the database. This is an on-going process.

Every single new courses that's been mapped and/or scorecard-ed will be available to every device platform within the next 60 days.

We are planning a relaunch of the iPhone and Android versions of our software, with more to follow soon on both. This time we'll be ready, with courses in every corner of the earth ready to be downloaded and experienced. We are considering different strategies for how that software will be distributed.

CloudFlare content caching has been incredible in terms of enabling us to provide imagery instantly to our site visitors, so of course our site visitors can consume more content in shorter periods of time since pages of amazing imagery are delivered instantly. Our site stickiness is still **over 62 pages/per visit**.

There are 209 countries in the world with golf courses. While close to 50 of the remaining 100 countries not yet in our database are "single-course countries, it is our goal to have courses in every

single one of the 209 golfing countries in the world. Our new website makes it easy to navigate in a single click to any continent or country in the world, to see the list of courses we have in each country or state or zip, and to view the scorecard and course maps for each course in our database thanks to Google Maps API 3.3 mapping technology. Even where the courses have not yet been mapped you can now see the course layout for each of the 40,000 courses in the database.

Q: *With all the new features you have brought into the Golftraxx website and application, some might say that Golftraxx is becoming the "Google of Golf Worldwide" Any comments?*

A: Yes, I am quite pleased with our recent strides forward. It is clear that the market is taking notice. These strides have come as the result of considerable effort and sacrifice of the team and I am grateful to each and every one for their contributions. On average each month, between 1,500-2,000 hours go into making golftraxx a better site for the world.

Q: *Has Google been back in contact with you since 2008?*

A: Unfortunately, as you may already know if you've been following our Press Releases, the only contact made by Google towards us have been those actions they took which I reported to the FBI and the California Attorney General.

1. Google bot delivered SQL-injection attacks
2. Google-created links to thousands of our course scorecard edit pages used by our content editors
3. Subsequent Pakistani requests for those scorecard edit pages also numbering close to 20,000 per month.
4. Google's declination to respond to our filed complaint

In addition there have recently been:

5. Unusual activities on my laptop and home network, reported by my ISP where dozens of unauthorized devices were added to my home network, and by the company providing support and service on my computer equipment whose software was hacked, which was discovered for the very first time anywhere on MY laptop...No other client of their many thousands of clients have they EVER seen their software modified after installation. I am waiting for the report from the firm, but their engineers first question was HOW is it possible that they were able to modify our PRIVATE source code? What level of access to the OS is required to do this?

Q: *Frank, Thanks for taking the time to speak with us. Best of luck with everything in this blossoming venture!*

Frank DeBenedetti
GolfTraxx.com