what3words

Lucia D'Onofrio

December 2016

What is being organized?

What3words is a geocoding system that allows for the easy classification, easy retrieval, and easy access of geographical locations all over the world. This organizing system uses a unique combination of three words chosen from a list of 25,000 words to identify any square of 3 meters by 3 meters in a grid of 57 trillion squares overlaid on the Earth. For example, in our commonly used geocoding system, South Hall's complete address would be *South Hall, UC Berkeley, CA 94704, United States.* In the what3words system, this location can be simply identified with the three-word combination *haven.flying.gifted*. Once any location is identified through these three words, the system can still easily convert the location to GPS coordinates.

Why is it being organized?

The main interactions what3words wants to enable are easy classification and retrieval of geographical locations in the world. Interestingly, a quick search online shows that there are many geocoding systems that are more than capable of classifying and retrieving locations in the world. The geohash system for example divides the world in polygons just like what3words, and it is more efficient than what3words, as it can identify a 40-millimeter polygon with a string of 12 characters, usually fewer characters than those of three English words. However, what is remarkable about what3words that distinguishes this system from other geocoding systems is its focus not just on the smooth functioning of the system, but also, and most importantly, on the efficiency and effectiveness of interacting with the system from a user perspective, helping the average person access the information easily. What3words does so by creating simple addresses to memorize and communicate, avoiding numbers and using common words in its address creation. By providing this type of addressing, what3words strives to help developing countries, where illiteracy rates are often high and postal code systems do not reach the entire territory.

How much is it being organized?

As mentioned above, what3words uses a unique combination of three words from a list of 25,000 words to organize its resources (i.e. the locations). Given its intent of being easy to memorize and communicate, what3words is available in different languages, providing multiple resource descriptions for any one resource: as of now, every one of the 17 trillion squares can be identified with three words in English, French, Swahili, Mongolian and nine other languages. As one of the

interactions the system is facilitating is easy access for the average person (achieved through ease of memorization and communication), what3words faces a constraint, whereby the system cannot use one unified language. While using one language would simplify communication between people from different countries, it would also hinder the ability for people who do not speak that language to easily memorize and thus access the words.

To allow for easy access, the system is quite complex in its algorithm's organizing principles. To assemble the 25,000-word list, what3words sorts words found in the language's main dictionaries based on length, distinctiveness, frequency, ease of spelling and pronunciation, while also removing offensive words and homophones. The system is also programmed to assign word combinations that are similar to one another to far away locations, so that even small errors can be easily captured. The system is designed to minimize memorization errors, which results in a tradeoff with understanding relative location. Relative location seems to be an important organizing principle in most geocoding systems, whereby looking at two locations, if the numbers in the address are close together (e.g. postal codes, latitudes and longitudes), the user knows that the locations are relatively close. This organizing principle had to be rejected, being incompatible with one of the objectives so important to this system – ease of memorization.

When is it being organized?

What3words is a fixed and universal system. The entirety of the space on Earth has already been encoded in the what3words grid. While the grid is static, the system keeps expanding as languages are added over time, and yet, once a location is identified with three words in any one language, those three words in that language will always refer to that location, and the system will become fixed once again. Since the system strives to facilitate easy access, changes to the organizing principles and the elements of the system are not desirable. The system had to be ideated and released in its entirety, without the option to add patches. This constraint allows the system to ensure 100% reliability and avoid confusion, while also avoiding the need for version control. Yet, it also makes any potential error in the algorithm and the system extremely costly.

How or by whom is it being organized?

Three-word combinations are assigned to a specific square in the grid through an algorithm, and the grid is overlaid on the Earth. Since what3words is a proprietary system, the algorithm has been developed by people who work for the startup, whether these are data scientists, engineers, or business strategists. Since the algorithm creates 25,000-word lists for many languages, presumably what3words runs surveys or hires consultants to assess whether the algorithm functions well across languages. Some of the requirements might need a lot of training

and fine tuning for any one language before the algorithm can reliably make decisions. It might be relatively easy to automatically asses how frequently a certain word is used, by querying online newspapers, books, and blogs for example. However, whether a word is easy to spell or pronounce by the standards of the language being analyzed cannot be determined simply by running automated queries. In these cases, user testing or consulting work by linguists seems necessary. Some of the algorithm's organizing principles seem to impose constraints on the speed and automation of the process, and yet they ensure that the interaction this organizing system wants to facilitate – easy access – is achieved.

Other considerations

An interesting question that could determine the success and expansion of this organizing system throughout the world is whether it can be compatible with other geocoding systems. What3words has already been adopted as the official geocoding system for government mail delivery in Mongolia. Many of the streets in Mongolia's territory are not named, the population density is extremely low, and a quarter of the population is nomadic.[1] All of these factors make it desirable to switch to the what3words system, which can immediately provide names for all the locations in the country at a relatively low cost, money-wise and, importantly, time-wise. While for Mongolia there is an incentive in switching from its old non-functioning system to a new one, for countries whose address and postal code system is not as troublesome, a complete switch would be incredibly costly. In order for what3words to keep growing, it seems fundamental to find a way to allow this system to co-exist with the current one, so that in an ideal world people would be able to use either system when looking up an address in Google Maps or sending mail.

[1] Wong, Joon Ian, "Mongolia is changing all its addresses to three-word phrases," *Quartz*, June 13, 2016, http://qz.com/705273/mongolia-is-changing-all-its-addresses-to-three-word-phrases/

Consulted websites:

"About," *what3words*, http://what3words.com/about/

Filloux, Frederic, "An address for every place in the world, using just three words," *Quartz*, November 30, 2015, http://qz.com/561727/an-address-for-every-place-in-the-world-using-just-three-words/

Rhodes, Margaret, "Three-word phrases – and a map – can find anyone anywhere," *Wired*, June 30, 2016, https://www.wired.com/2016/06/startup-wants-replace-address-three-word-phrase/

Meyer, Robinson, "The app that wants to simplify postal addresses," *The Atlantic*, June 22, 2016, http://www.theatlantic.com/technology/archive/2016/06/the-most-interesting-story-about-postal-addresses-you-have-ever-read/487160/

Wong, Joon Ian, "Mongolia is changing all its addresses to three-word phrases," *Quartz*, June 13, 2016, http://qz.com/705273/mongolia-is-changing-all-its-addresses-to-three-word-phrases/

Given how costly it would be to switch to a new geocoding system for a city such as New York or San Francisco, where addressing works relatively well, I am comparing three geocoding systems, the current system (with address and postal code), what3words, and geohash (discussed in the case study and further explained below), and analyzing potential pros and cons from the perspective of someone living in one of these cities. In this example, our persona is Sarah, a twenty-nine-year-old woman living in New York:

Geohash is a geocoding system that allows for easy categorization of locations all over the world. A geohash address is a string of alphanumeric characters chosen from a list of 32 (the base-32 characters), representing a rectangle within the world. In a world map, at the highest categorization level, the system covers the whole world with 32 rectangles, which are represented as one-character long strings. At the next categorization level, 32 rectangles within each of the original 32 rectangles are assigned a character, and any of the 1,024 rectangles within this categorization level can be found with a two-character long string. This process can technically go on to infinity. By the twelfth level, with only 12 characters, the system has already reached precision to 40 millimeters.

Use case	Current system	what3words	Geohash
Send a letter to Paul, one of Sarah's close best friends (assuming he is in the US)	High chance that Sarah will have to look up the address in her phone (at least to look up the zip code); there is also a high chance that the user will not have stored the address in her phone's contacts considering how long it takes to write it down and will have to text Paul to ask him	High chance that Sarah will remember the address; if not, high chance that she has stored the address in the phone's contacts since writing it down is extremely easy	Very high chance that Sarah will have to look up the address in her phone given that it is a string of meaningless numbers and letters; writing down the address is easy however so there is a high chance that Sarah will have stored it on her phone
Look up the location of the Smithsonian	Sarah can infer the approximate distance to the Smithsonian from where she currently is thanks to the relative location provided by the zip code or the neighborhood the museum is part of (ignoring the fact that in Manhattan streets and avenues follow a sequential numbering system, which would make understandng relative location even easier)	Sarah would not be able to infer anything about the location of the Smithsonian relative to where she currently is	Sarah would be able to infer the relative location of the Smithsonian and its distance to where she currently is extremely well, given the nested nature of the system
Receive a save-the-date	Simply by scanning the save-the-date, Sarah can identify whether she will have to book a flight or a train or rent a car as she can look at country and state information	Sarah would not have any information on the wedding location just from looking at the save-the-date; she will have to search it on the what3words app	Sarah will not have a clear idea of the country and state the wedding will be in, but she will still be able to get an idea of how far the location is relative to hers
Find an office in one of Manhattan's skyscrapers for a work interview	Sarah will be able to look at the address and orient herself within the building and its different spaces; she will also be able to orient herself in the third dimension and identify which floor to go to	Sarah will be able to identify different spaces within the building thanks to the system's precision (assuming a room is at least 3x3 meters); yet, she will not be able to orient herself in the third dimension and identify the floor	Sarah will be able to identify different spaces within the building thanks to the system's precision; yet, she will not be able to orient herself in the third dimension and identify the floor

Use case	Current system	what3words	Geohash
Send medical aid kits and donation to a remote orphanage in Bolivia	Given the many unnamed streets in Bolivia, Sarah will likely have a hard time finding a way to correctly address the package and there likely will be issues with receiving the items at the correct location	It will be easy for Sarah to identify and write down the address of the location she wants to send the package to and it is likely that the items will arrive in the correct location in Bolivia	It will be easy for Sarah to identify and write down the address of the location she wants to send the package to and it is likely that the items will arrive in the correct location in Bolivia
Insert valid address in Lyft that is off by a letter compared to the address needed	Lyft might be drop the pin far away compared to where Sarah wanted to go but it might not be noticeable at a first glance	Lyft would drop the pin so far away from where Sarah wanted to go (likely a different country) that it will be noticeable for her right away	If the spelling error is in the first few characters of the string, Sarah will be able to tell as Lyft will drop the pin in a different continent/country; if the error is in the last few characters, Sarah might not be able to tell right away
Send package to client in Italy	Sarah will likely insert the address on the package in the wrong order compared to what is customary in Italy, and depending on how off the address format is from what is customary in Italy, the package could or could not arrive	Sarah will not have any problem writing the address in the correct format on the package but an extra step will need to happen (translating the address) once the package arrives to Italy	Sarah will not have issues writing the address in the correct format and no extra step will be necessary once the package arrives in Italy
Lost in an excursion in the Appalachian woods	Without internet connection (which is likely in the Appalachian woods), Sarah will not be able to insert the location of the B&B she is residing at on her phone map app and visualize it	Without internet connection, Sarah will still be able to insert the B&B's location on the what3words app and visualize it on the map	Without internet connection, Sarah will still be able to visualize the B&B's location on the map

Based on this table, it seems like the biggest challenges in the daily use of what3words are understanding relative distances and determining floors within a building. The first challenge could be addressed by adding layers to the what3words system that could show the neighborhood, city, state, and country the location is in. This information is superfluous as it is technically already included in the system itself, so it could be used or not as the user pleases. The second challenge is harder to address since in this case the system lacks this information all together, so this would not simply be a feature that is nice to have for the users, but a feature that shows a shortcoming in the system.