Concerning our target users

* Low-income country that already has basic network infrastructure (so not extremely underdeveloped)
* Subsistence farmers that *own a cell phone* and *is able to manoeuvre an OS in a “supported language”*
* Capable of using SMS (typing, reading), so not completely illiterate…
* There are 3.3 billion cell phone subscriptions worldwide (far less than 100% coverage)
  + Possibly outdated though, another source says “there are more people who have access to cell phones than people who have access to toilets”
* <https://www.nytimes.com/2008/04/13/magazine/13anthropology-t.html>
* <https://www.forbes.com/sites/federicoguerrini/2014/04/23/could-smartphones-save-millions-from-illiteracy/>
* <https://madrascourier.com/insight/is-illiteracy-a-barrier-to-mobile-phone-use/>
* <https://www.researchgate.net/publication/266595198_Text_is_not_the_enemy_How_illiterates'_use_their_mobile_phones>

Ideas

* What Google Translate has is more than enough
  + Google Translate offers support for nearly all *lingua francas* used in the world, and even some creoles. *Lingua francas are sufficient!*
  + It is unlikely that there are cell phone manufacturers targeting markets whose language *even Google Translate* *fails to support*
    - We’re not trying to outsmart cell phone manufacturers, or expand the reach of our service beyond that reached by the cell phone market.
* Language documentation is a linguist’s job, before it is a tech person’s
  + It is pointless to think about languages that have not even been *documented*. No cell phone will have an interface suitable for speakers of such languages.
  + It is unlikely such people groups even have access to communications, and even if they do, they will have *studied the lingua franca first* (so they will be able to type, etc.)
* A need to distinguish between voice and SMS (BE AWARE OF THIS IN OUR DESIGN)
  + It is common for people to speak over the phone in one language and type in another
    - E.g. Malaysians speaking over the phone in Chinese but texting exclusively in English
  + See next point
* A need to reach illiterate phone users (yes, they exist)
  + i.e. they do not text and exclusively use phone calls on their device
    - See study above, “how illiterates use their mobile phones”
      * Whenever they receive an incoming text, they *CALL* the sender (for they cannot read it)
      * “One participant wondered whether it would be possible to forward a message to a service and listen to the content on the phone through a human or machine voice”
* To think: do we need to incorporate *voice recognition* at all? (easier if not) (speech-to-text)

Tech

* Google Cloud Translation API
  + <https://cloud.google.com/translate/docs/>
  + Easy to add to a Java IDE with Maven
  + NOT FREE, $20 per 1,000,000 characters\*
    - But there is a hack: <https://ctrlq.org/code/19909-google-translate-api>
    - Or: <https://github.com/matheuss/google-translate-api>
  + Only handles text
* IBM Watson
  + Text to speech
    - Very limited set of languages, less than that of Google
  + Speech to text
  + Free trial with usage cap (e.g. 100 minutes of speech) available
* Google Cloud Text-to-speech API
  + No free
  + **Supports only a small subset of languages available on Google Translate (14 languages)**
    - Speech-to-text is far more comprehensive in multilingual support but that’s not useful?
* More text-to-speech from Google
  + The built in text-to-speech Android app; Google Translate’s “voice-output”
  + These two seem to support more languages than the text-to-speech API above (and seem to support the same exact set, actually)
  + Possibility of somehow incorporating these into our system, rather than using the API, for price & coverage (of languages) considerations?
* Twilio voice API: for IVR

Issues discovered

* Lack of existing multilingual text-to-voice products
  + Support more languages via SMS than via IVR? (But that doesn’t help deal with the illiteracy problem…)