Address Cleansing in Michigan
Lessons Learned

Michigan Care Improvement Registry
Address Cleansing: what is it

- **Break the address** into parts (ie. primary number, street name, city name, state name, ZIP Code, etc.).

- **Standardize** each part so that it matches the format of the official database to be referenced. (ie. South -> S, Road -> Rd, etc)

- **Validate** the standardized address against an official address database.

https://smartystreets.com/articles/address-cleansing
What is SmartyStreets

All of the above using:

- USPS Monthly Extract
- Combined with GPS Coordinate (TIGER) data and emergency systems data from USPS (LACSLink)
- Through a web REST API
Address Cleansing: what we get

- Address Status
- Standardized Expression
- Additional Metadata
Why we started with Address Cleansing

Which health department for this person?

Wayne County v.s. City Of Detroit
Wayne County
We want to know v.s. Can we know

**NO**  ○ Is it a real place

**YES**  ○ Where is it? (coordinates, census track, county, etc)

**YES**  ○ Will USPS Deliver to the location

**NO**  ○ Does the person live there

**NO**  ○ Does a business operate there
And then...

The standardized address would allow us to do even more.

Enter: The Hash
The Hash

- primary_street
- secondary_street
- city
- state
- zip
- country

MD5: 2FC916647576ADBA4AB3EFBBC1B454C5
Using the hash to talk

Address Hash
2FC916647576ADBA4AB3EFBBC1B454C5
Story Time!
Reminder Recall

- 50,738 letters sent

- Yellow labels (returned) for two reasons:
  1. Person doesn’t live there (and can’t be forwarded)
  2. Address is not known
<table>
<thead>
<tr>
<th>Reason</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward Time Expired</td>
<td>2906</td>
</tr>
<tr>
<td>Attempted – Not Known (person)</td>
<td>804</td>
</tr>
<tr>
<td>Vacant</td>
<td>204</td>
</tr>
<tr>
<td>No Mail Receptacle</td>
<td>85</td>
</tr>
<tr>
<td>Unclaimed/Refused</td>
<td>78</td>
</tr>
<tr>
<td>Temporarily Away</td>
<td>9</td>
</tr>
<tr>
<td>Illegible</td>
<td>2</td>
</tr>
<tr>
<td>Blank (Hand written note)</td>
<td>2</td>
</tr>
<tr>
<td>Bad Address (Insufficient, No such..)</td>
<td>541</td>
</tr>
</tbody>
</table>
Things Change

For the 1%

- Houses get Condemned
- Addresses Change Status (Inactive, Undeliverable)
Lessons about Stale Data

We will have stale data!

- When we don’t need speed (user interface) always hit SmartyStreets

- With HL7, we care about speed above all else. We use the cache.

- Need a process to re-cleanse things.
Lessons about Valid/Invalid

- Historically we scan the 2D Barcode and mark records

  Invalid Address

- With Address cleansing we checked closer and saw that some of the addresses were valid, but sent back because the person didn’t live there anymore:

  Valid Address

- We had to make a way to mark an address as

  “Not valid for this person” vs “Not valid address”.
Story Time!

Gladstone, Michigan
Gladstone – 4\textsuperscript{th} Ave N… E?


Public Safety

906-428-3131 Phone
906-428-1730 Fax
Dial 911 for emergencies
144 4th Ave. NE. Gladstone, MI 49837
Office Hours: Monday - Friday 9am to 3pm
Officers are on duty 24 hours a day.
Gladstone – 4th Ave N... E?

- 144 4th Ave, Gladstone, MI 49837 -> Random Spot on the street
Gladstone – 4th Ave N... E?

- Gladstone Public Safety (clicked pin)
Gladstone – 4th Ave N... E?

- Searched “144 4th Ave N” -> “Add a missing place”
Gladstone – 4th Ave N... E?

- 144 4th Ave N Gladstone, MI
Gladstone – 4th Ave N… E?

- 144 4th Ave N Gladstone, MI
Gladstone – 4th Ave N... E?

- 144 4th Ave N Gladstone, MI
Gladstone – 4\textsuperscript{th} Ave N… E?

- Google Street View
Gladstone – 4th Ave N… E?

NO, JUST NO.
Gladstone – 4th Ave N... E?
Gladstone – 4th Ave N... E?

“Use what the resident says”
- Post office
What is real?
Lessons about Ambiguity

- Let the user choose which to use
- We don’t want to be in the business of managing ambiguity
Add a new address

There's a problem with the address provided - we've marked our suggestions in red below. Please choose or edit which version of the address you want to use.

- **Original address:**
  Michael Mouse, 121 S Capitol Ave, Lansing, MI, 48912, United States

- **Suggested Address:**
  Michael Mouse, 121 S CAPITOL AVE, LANSING, MI, 48933-1520, United States

[Edit this Address]

[Save Address]
Who is Right?

Surprise!

- Sometimes USPS has incorrect information
- We saw this at the county level
MCIR Incorporates New Data

- City Name (Default v.s. City Name)
- Zip +4
- Response Codes
- Other Services! (FCC/Census data)
- Other Metadata (Flint Water Crisis)
- GPS Precision
Lessons about incorporating data

- We incorporate new pieces of data more often than we anticipated.
- We tend to think it’s the last time.
- Should have stored the whole Smarty Streets response in its raw form so we could reference it later.
- We leveraged our caching system far more than we thought we would.
Environment Changes

- Network Issues (what’s between us and them)
- Available Data (Census vs FCC)
- Randomly Long Transactions (unknown anomalies)
- Services become unreliable (Census and Previous Address Service)
Lessons about Environment Changes

- Be able to gracefully handle timeouts and long transactions
- Caching can help reduce the exposure to these changes
- Make it possible to change the implementation (Address cleansing, or additional data like Census Tract)
Why we love address cleansing

- Sending Mail
- Shipping Vaccines
- Matching data coming into the system
- Data Consolidation
- Family Grouping
- *Statistics Mapping
Smarty Streets

- Free through AIRA
- Outstanding Support
- High Availability
- Very Fast! (surprisingly fast)