Preventing Damages Before They Happen Using a Risk Model
Serious Consequences

Excavation Damage is one of the leading causes of pipeline failure.

Hitting a natural gas pipeline has serious consequences. Even a tiny gouge, scrape, dent or crease to a gas pipe or its coating may cause a leak that could lead to a catastrophic fire or explosion.
Consequences of Excavation Damage

Pipeline Incidents Since 2010
PHMSA Incident Reports

- 18 Fatalities
- 99 Injuries
- 428 Reportable Incidents
- $213M Property Damage

Other Industries

- $1.5B+ Annual societal cost
  2016 DIRT Report

- Likely the leading cause of telecommunication outages?
  $Billions

- 300 major buried facility accidents each day in the U.S.
How the Industry Has Changed

Our Regulators are Demanding More... and How National Grid Has Adapted to these Changes

- **“Don’t Get in Trouble”**
- **Basic compliance with regulations**
  - Not good enough anymore

- **“Do the Right Thing”**
- **Beyond compliance.”**
  - We initiated our Gas Enablement strategy in 2013
  - By end of 2015, National Grid had moved beyond this point

- **“Differentiate/Add Value”**
- **Align public safety to better manage risk and generate value for all stakeholders consumers, regulators & investors**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003 RP1162</td>
<td>National Grid Initiates RP 1162 Activities</td>
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<tr>
<td>2010 San Bruno</td>
<td>2013 National Grid Adopts a “Beyond Compliance” Strategy</td>
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<td>2014 East Harlem</td>
<td>2015 National Grid expands enablement strategy</td>
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<tr>
<td>2015 Horseheads Order</td>
<td>“It’s not your father’s utility company anymore.”</td>
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</tbody>
</table>

**2003 RP1162**

**2010 San Bruno**

**2014 East Harlem**

**2015 Horseheads Order**
Damage Prevention Data

National Grid Total Damage History
Final 2017
New York State

- 2006: 1424
- 2007: 1154
- 2008: 980
- 2009: 875
- 2010: 823
- 2011: 770
- 2012: 764
- 2013: 858
- 2014: 841
- 2015: 958
- 2016: 869
- 2017: 831

New York State NGRID Total Damages
National Grid Damage Rate History

YTD August 2018
New York State

**Call 811**

**Flat**

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**Northeast Gas Association**
Damage Prevention Process

Call 811 → Wait the Required Time → Confirm Utility Response → Respect the Marks → Dig with Care
Damage Prevention Process with TRA

Call 811 → Wait the Required Time → Confirm Utility Response → Respect the Marks → Dig with Care

Ticket Risk Assessment

High Risk? Yes → Damage Prevention Advisors

→ Check the Marks
→ Notify Excavator
→ Meet w/ Excavator
→ Watch and Protect
“Notifying a One Call Center (811) prior to excavation in North America is the simplest and most effective means to reduce or eliminate resulting underground utility damages.”

“2017 data again showed that when a locate request (811) preceded an excavation, damage was avoided 99% of the time.”
What Causes Excavation Damage?

Focus damage prevention efforts on the increasing trends Excavation Practices and Locating Practices

Chart © 2017, Common Ground Alliance, all rights reserved
Predictive Analytics

**PIPES Act of 2016 (Section 8)**
- Ordered PHMSA to deliver to Congress a study on improving damage prevention technology, including: ... (2) an analysis of how increased use of ... **predictive analytic tools** ... could supplement existing one-call notification and damage prevention programs to reduce the frequency and severity of incidents caused by excavation damage.
- Study delivered August 2017 ([https://goo.gl/HCBw1y](https://goo.gl/HCBw1y))
- Recommendation #2: “Evaluate and implement **predictive analytic tools**, which use data to identify and proactively address high-risk excavations”
Optimain xDR Overview
Risk Algorithm

Probability of Damage
- Statistically Driven ... Provable
- Automatically learns from new data

Consequence of Damage
- Based on assets at risk (from GIS) or other geographic factors (population density, etc)
## National Grid Ticket Factors

<table>
<thead>
<tr>
<th>Location</th>
<th>NYC</th>
<th>Long Island</th>
<th>Upstate NY</th>
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<tr>
<td>EXCAVATOR</td>
<td>EXCAVATOR</td>
<td>EXCAVATOR</td>
<td>CALLER_NAME</td>
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<tr>
<td>CALLER_NAME</td>
<td>CALLER_PHONE</td>
<td>EXCAVATOR</td>
<td>CALLER_NAME</td>
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### Common Ticket Info

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### Job Description

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Worst Offenders & Best Actors

Full access to the underlying statistics
For every factor used in the model

<table>
<thead>
<tr>
<th>FACTORNAME</th>
<th>EXCAVATOR</th>
<th># Tickets</th>
<th># Damages</th>
<th># Influences</th>
<th>Infl Per 10k</th>
<th>Time-Weighted Infl Per 10k</th>
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<tbody>
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<tr>
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Are We Preventing Damages?

Are we actually reducing damages per 1k locate requests?

Are we sure something else isn’t causing the changes we’re measuring?

- Legislative changes
- On-going excavator training/public awareness

![Bar Chart: Damages With Associated Ticket](chart.png)

*2018 through Aug*
Total Damages Prevented

2016 average = 1.60 Damages Per 1k Tickets
  ◦ counting damages with a ticket only

823,946 tickets received
  ◦ during months when TRA was fully operational

At 2016 rates (by region), expect 1,287 damages on those tickets

Only 915 damages actually reported on those tickets

Prevented 372 damages over all tickets

*2018 through Aug
What if we just look at damages expected on the “TRA Tickets” (Top 10%)?

Assuming the xDR Engine has continued to perform similarly, we know how many damages should have occurred on the Top 10% of tickets (620)

340 of the 930 actual damages occurred on the Top 10% of tickets (37%)

**280 damages prevented** that would have otherwise occurred on the Top 10% of tickets

And, there’s still opportunity to prevent more if we can focus our efforts even better on those tickets!

*2018 through Aug*
RECONN Utility Services
Infrastructure Maintenance & Prevention Solutions

Company Overview:
- Based in Hauppauge, New York
- 750 + Employees
- Operating in over 20 States

Services Performed:
- Ticket Risk Assessment
- Gas Services
- Electrical Services
- GIS & Data Management Services
- Storm Restoration Services
- Subsurface Utility Designation
- Revenue Protection (Disconnect/Reconnect)
Ticket Risk Assessment (Phase I)

- Ticket Risk Assessment for every 811 ticket received
- Tickets are compiled in order of highest risk and dispatched to DPA's utilizing Reconn's Field Data Collector Application

TRA Field Services (Phase II)

- Damage Prevention Advisors Engage Excavators:
  - Communicate awareness on high risk tickets
  - Verify accuracy of gas locate marks
  - Assist in locating hard to identify facilities
  - Site surveillance to ensure safe digging practices
  - Serve as Liaison between contractor and utility

- 25,000+ Excavator Interactions (2017)