Industry Address: Geo-enabling the 4th industrial revolution ... and the next agricultural revolution
INDUSTRIAL REVOLUTION
TRANSFORMING INDUSTRIES AND INNOVATION

INDUSTRY 1.0
Mechanization, steam power, weaving loom
1784

INDUSTRY 2.0
Mass production, assembly line, electrical energy
1870

INDUSTRY 3.0
Automation, computers and electronics
1959

INDUSTRY 4.0
Cyber Physical Systems, internet of things, networks
TODAY
GEO4IR in Italy – Geospatial data capture solutions help reduce light pollution and energy use
### Cities of Padua Province, Italy

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Province Population 2014</td>
<td>940,090</td>
</tr>
<tr>
<td>Capital</td>
<td>Padua</td>
</tr>
<tr>
<td>Established</td>
<td>1183 BC</td>
</tr>
<tr>
<td>Total surface area</td>
<td>92.85 km²</td>
</tr>
<tr>
<td>City Population 2014</td>
<td>214,125</td>
</tr>
<tr>
<td>City Population density</td>
<td>2,300 persons/km²</td>
</tr>
<tr>
<td>Number of jobs</td>
<td>50,000</td>
</tr>
<tr>
<td>Famous for</td>
<td></td>
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<tr>
<td>- Home to Dante</td>
<td></td>
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<tr>
<td>- Galileo's Observatory</td>
<td></td>
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</tbody>
</table>

City of Padua, Italy

Source: United Nations | Statista

Urban Activity Accounts for 80% of Energy Consumption and CO₂ Emissions
EU committed to 20% reduction by 2020 through Sustainable Energy Action Plans (SEAP)

Cities needed to measure and monitor CO$_2$ emissions from streetlights

Hired Gemmlab to census streetlights in several towns

Original census: 4 operators using Juno handhelds

Challenge was:
- Collecting mass data, for a reduced cost
- Processing data quickly
- Resource requirements

Baseline Needed: Lack of Authoritative Data for Built Environment
Evolved census: 2 operators using vehicle mounted Trimble MX2 and Trimble AP20 GNSS – Inertial System
  - Supported by Junos (when manual collection necessary)

Office staff use
  - Trimble POSPac to improve GPS accuracy
  - Trimble Trident for object classification and extraction

Rapid and authoritative (8cm) street lighting baseline inventory for policy analysis
  - GIS and CAD deliverables
  - Census 40% more efficient
GEO4IR in Asia – Using Geospatial analytics to improve building safety
5 to 10% of Residential Housing Estimated to Have Illegal Vertical Builds

- Limited ability to detect infractions
- Undetected illegal Vertical Builds

Cause:
- Safety Issues
- Emergency Response Issues
- Loss of City Revenues
  - Fees
  - Fines
  - Taxes
Geospatial Analytics Enables Rapid Identification of Vertical Build Infractions

- Trimble eCognition used for analysis
- Trimble teamed up with city (3 resources total)
- City provided initial datasets
  - Elevation
  - LiDAR
- 1 week from scoping to ground truthing analysis
Geospatial Analytics Enables Rapid Identification of Vertical Build Infractions

- Resulted in mass analysis for rapid infraction detection of illegal vertical builds
- Information offered to adjacent departments to
  - Action inspections
  - Amend safety issues
  - Reclaim revenues
GEO ... for the 4th Ag Revolution (GEO4AgR) – Using Geospatial analytics to increase food production
Using imagery to improve agriculture
UAS in agriculture – using our solutions and knowledge to help increase the productivity of food production

Use case
Precision farming
0.2 km² / 5 cm GSD
Decision making is improved by providing the farmer with timely, consistent and accurate data.
Farmers can use this information to identify and target under performing areas
Leveraging accurate imagery the farmers can manage at the individual tree level