My Generation:
Advances in Utility Network Visualization

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This class discusses the results of an Advanced Infrastructure Analysis Technology assessment recently conducted by Autodesk Consulting for a major electric and gas utility, with over 15 million customers. A key focus of the engagement was the evaluation of emerging mobile and visualization technologies of potential benefit to the clients gas transmission and distribution network operations for both the short term and long term replacement of current mobile solutions. In this class we will demonstrate a number of Autodesk products including InfraWorks, ReCap and PLM 360, and will highlight current advances in emerging technologies, including reality capture and augmented reality. We will discuss the business requirements identified, the current limitations and advantages of each solution, and the final short term and long term recommendations presented.
Key Learning Objectives

After completing this class, attendees will be able to:

- Describe best practices for getting started with InfraWorks, ReCap and PLM 360
- Understand how InfraWorks, ReCap and PLM 360 might benefit the utility workflows
- Recognize the various limitations of current product solutions
- Understand the future direction of reality capture and augmented reality technology
Energy Utilities: An Industry in Transition

- Field personnel make up a large portion of the typical utility workforce
- Connection with field workers is vital
- Retiring workforce (55-60) and planning for replacement is top utility management concern
- Mobile worker and mobile technology now top-of-mind in utilities
- Technology for the Next Generation utility field worker
Utility Mobility Trends

IDC Energy Insights
- 40% of EMEA utilities expect to increase their workforce mobility over next 12-18 months
  - Embracing mobility to significantly enhance productivity
  - 26% already have mobility strategies in place

PA Consulting
- Being smart with the mobile utility
  - Reporting 23% increase in service-level agreement compliance
  - 10-20% improvement in field force productivity
  - By addressing efficiency, reliability, safety
Business Value Benefits – Mobility

- Both quantitative and qualitative benefits can be realized through the implementation of mobile technologies.

Potential Quantitative Benefits
- Labor productivity / knowledge transfer
- Reduction in number of field visits
- Reduction in redesign and rework
- Business process improvement / standardization

Potential Qualitative Benefits
- Transform service delivery
- Quality
- Safety
Utility Vision

By 2020, leading utilities will have a complete, accurate, and dynamic 3D model of their infrastructure, including overhead and underground facilities, related equipment and parts, and mobile assets.
Technology Adoption Roadmap

- **Late Majority**
- **Early Majority**
- **Early Adopters**

**3D BIM**

**Cloud Data & Services**

**Reality Capture**

**Augmented Reality**

Immediate Technology Planning Recommendation


Longer Term Technology Prototype and Research Recommendation

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<table>
<thead>
<tr>
<th>Recommendation Timeframe</th>
<th>Issue</th>
<th>Applicable Tech Trend</th>
<th>Expected Benefit</th>
<th>ADSK Solution</th>
<th>Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Term (Immediate)</td>
<td>Current Mobile App. Replacement Planning</td>
<td>Cloud Services</td>
<td>Centralized administration</td>
<td>BIM360 or PLM360 (TBD) products</td>
<td>COTS meets 70% + of required functionality, lower support cost</td>
</tr>
<tr>
<td></td>
<td>Android not a supported IT platform</td>
<td></td>
<td>Collaboration hub for resource balancing</td>
<td></td>
<td>Mgmt. dashboards</td>
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<tr>
<td></td>
<td>Android security</td>
<td></td>
<td>Insulate from tablet OS changes</td>
<td></td>
<td>Enable integration with dynamic scheduling cloud-based services offered</td>
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<tr>
<td></td>
<td>Not in control of entire process inception to end</td>
<td></td>
<td>Secure managed IT infrastructure</td>
<td></td>
<td>Potential for better USA North integration in future</td>
</tr>
<tr>
<td></td>
<td>Field crew scheduling</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Geographic boundaries</td>
<td></td>
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<tr>
<td>Short Term (1-2 years)</td>
<td>Need crew feedback loop to perfect map and asset data</td>
<td>Reality Capture</td>
<td>Capture of “as-built” facilities in 3D using existing photos</td>
<td>Infraworks/123D Catch Product (TBD)</td>
<td>Automated asset location data</td>
</tr>
<tr>
<td></td>
<td>(GPS advances)</td>
<td></td>
<td></td>
<td></td>
<td>R&amp;D opportunity</td>
</tr>
<tr>
<td>Medium Term (2-3 years)</td>
<td>Need crew feedback loop to perfect map data</td>
<td>Reality Capture</td>
<td>Capture of “as-built” facility locations</td>
<td>BIM360 product (TBD)</td>
<td>Perfect asset location data</td>
</tr>
<tr>
<td>Medium Term (2-3 years)</td>
<td>Inaccurate Maps</td>
<td>Reality Capture</td>
<td>Accurate drive-by capture of “as-built” OH facilities</td>
<td>Lidar fitment vehicles</td>
<td>Lower cost and rapid OH facility locations and identification</td>
</tr>
<tr>
<td></td>
<td>“Mapped for Convenience” issues</td>
<td></td>
<td></td>
<td>ReCap product</td>
<td>R&amp;D opportunity</td>
</tr>
<tr>
<td>Long Term (3-5 years)</td>
<td>Provide rich contextual information closer to point of work</td>
<td>Augmented Reality (AR)</td>
<td>Access to back office IT system asset information to improve decisions</td>
<td>Infraworks product</td>
<td>Advanced AR solution and focal point of Autodesk product development</td>
</tr>
<tr>
<td></td>
<td>Poor map legibility</td>
<td></td>
<td>AR is GUI of future</td>
<td></td>
<td>R&amp;D opportunity</td>
</tr>
</tbody>
</table>
Conclusions

- A number of advanced technologies are available to transform mobile technology tools for field personnel.

- Planners should consider the rapid pace of technological advancement to begin to plan 1-3 year timeline for production system deployments.

- The Cloud is well suited for rapid deployment and support of utility mobile solutions and is available today for immediate adoption.

- Reality Capture and Augmented Reality (AR) are the key technology trends that will transform mobile field worker solutions in asset intensive industries…will become the “user interface” for applications.