Creating Infinite Possibilities.

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Empowering Smart Communities with a Digital Twin

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SCTE CABLE-TEC EXPO 22
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2022 Fall Technical Forum
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Agenda

The case for a 3D digital twin

Key Components of a Smart Community Planning and Engineering Solution

Technical Considerations and Specifications

Conclusions

The case for a 3D digital twin

MSO advantage for Smart Community & IoT deployments – for example Cox2M

- Pervasive blanket coverage with high bandwidth, low latency network
- Experience with the utilities, counties, cities, municipalities; opens door to P3 engagements

Traditional approach to HFC design & construction not the same as FTTX and IoT

- 2D GIS/CAD maps with poor accuracy and outdated information simply not adequate
- Field walkouts take a long time and have a high cost – and don't return a complete digital model
- FTTX and IoT projects require a lot of precise information that is not readily available

Three-dimensional details of entire communities are required for planning & engineering

- Must include overhead infrastructure, surface and road features, buildings, tress, etc.
- Needs to be current or at least very recent

Key Components of a Smart Community P&E Solution

3D model of the real world

- Data at scale covering 100% of the city, community or AOI (area of interest)
- Combination of imagery, LiDAR and vector x/y/z digital models
- Asset, feature & attribute identification

High precision and accuracy

- FTTX connections, wireless coverage, and device placement all need a very fine level of detail
- High resolution imagery and dense point clouds provide the baseline data

Immersive online digital environment

- A “virtual field” user experience on any connected device
- Facilitates agile project team collaboration and productivity

Integration with GIS and design tools

- Simple industry standard interfaces for data and UI/UX

Timeliness of information

- Data must be captured when and where needed and returned quickly

Technical Considerations and Specifications

Commercial Data Capture Options

Data Capture Options	Type(s)	Method	Frequency	Resolution and/or Accuracy	Level of Effort
Fixed Wing Aerial	Ortho & oblique imagery, LiDAR	Low altitude at slow speed, grid pattern flight plan	On a set schedule	30- to 150-megapixel imagery, 50 to 100 points-per-square-meter LiDAR, 0.1 to 1.0 meter positional accuracy	Low
Drone	Oblique & 360^0 imagery, some LiDAR options	Flown with ground-based pilot, requires permit or authorization	On demand	30-megapixel imagery, 500+ points-per-square-meter LiDAR, 0.2 to 0.5 meter positional accuracy	High
Street Level	360^0 & ortho imagery, LiDAR	Vehicle mounted, follow public and private roads, parking lots, etc.	On demand	30- to 100-megapixel imagery, ~1,000 to 2,000 points-per-square-meter LiDAR, 0.1 meter positional accuracy	Medium
Backpack/hand-held	Conventional & 360^0 imagery, LiDAR options	Heavy backpack, trolly or hand-held device	On demand	10- to 20-megapixel imagery, 1,000+ points-per-square-meter LiDAR, 0.2 to 1.0 meter positional accuracy	High

Data Analytics is Essential

Emerging area of tech innovation

- The better the source **imagery** and **LiDAR** data, the better the analytics-based asset, feature and attribute extraction
- Machine learning and AI is evolving and improving continuously
- A blended approach of automated, semi-automated and human-guided processes delivers the **best** and **most complete** results
- Extraction libraries, or "data dictionaries" vary based on the specific use case

Common Data Extractions

Pole Details	Overhead	Ground Features	Right of Way
Pole Base & Top	Span	Cabinet	Edge of Pavement
Material	Midspan	Manhole	Back of Curb
Cross Arm	Lowest Vertical Clearance	Handhole	Sign & Structure
Guy Wire POA	Power Vertical Clearance	Vault	Traffic Signal
Guy Wire Anchor	Primary Conductor	Pedestal	Bus Shelter
Equipment POA	Comms Cable	Wall	Sidewalk
Streetlight POA	Streetlight	Fence	ADA Ramp
Power POA		Building	Lane Markings
Comms POA			


WE1RT27E
Selected: 1
Hidden:
Database
Group 1
Outliner
Features (23871)
Utility/Telecomm
Pole (241)
Pole_Height (243)
POA
Transformer (51)
Guy_Wire_Anchor (36)
Luminary_Extension (138)
Span (250)
Vertical_Clearance (243)
Vault (1134)
Substructure (372)
Cabinet (34)
Tree (3212)
Conductor (251)
Span_FLR (71)
Circumference (237)
Tree_Line (14)
Hazard_4ft (102)
Hazard_Pt_4ft (328)
Hazard_12ft (365)
Hazard_Pt_12ft (2776)
Hazard_Vertical (57)
Hazard_Pt_Vertical (316)
FLR (1467)
Crossarm (120)
Crossarm_Rot (120)
BoC (254)
Traffic_Light (38)
Attribute Editor
Pole
id 4479441867831594057
featureType Pole
defID 7805233433544586725
Parent 0
routeID 522156957043702291
routeName Telecomm and Utilities
startFrame 33692
stopFrame 33692
createDate 1/27/2021 7:56 AM
createUser kcasey
updateDate 4/8/2021 10:04 AM
updateUser kcasey
Lean_Amount 9.19
Lean_Direction 359.98
Height 42.62
Circumference_Heigh 3.724
Pole_Height_Count 1
Circumference_Count 1
W
NW
N
3D data analytics platform
Imagery & LiDAR extraction
High performance & productivity

Conclusions

MSOs are well positioned for Smart Community projects and P3 engagements

Smart Community projects require a detailed 3D digital twin as per collaboration with Cox2M and local governments

Technology has advanced: imagery + LiDAR + data analytics is now proven to replace 80-90% of "boots on the ground" field data capture

The 3D digital twin solution must:

- Be flexible and work on-demand as needed at large scale
- Provide positional accuracy and very high resolution
- Offer comprehensive data analytics and automation
- Integrate easily and effectively with GIS and CAD tools

3D Digital Twin Impact & Results

- ✓ Accelerated timeline
- ✓ Less field work
- ✓ Higher quality data
- ✓ Lower overall risk
- ✓ Fewer mistakes
- ✓ Cost management

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Thank You!

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