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AR/VR in ArcGIS

Matthias Schenker

VR - Virtual Reality

Being there

AR - Augmented Reality

Interacting with outside world

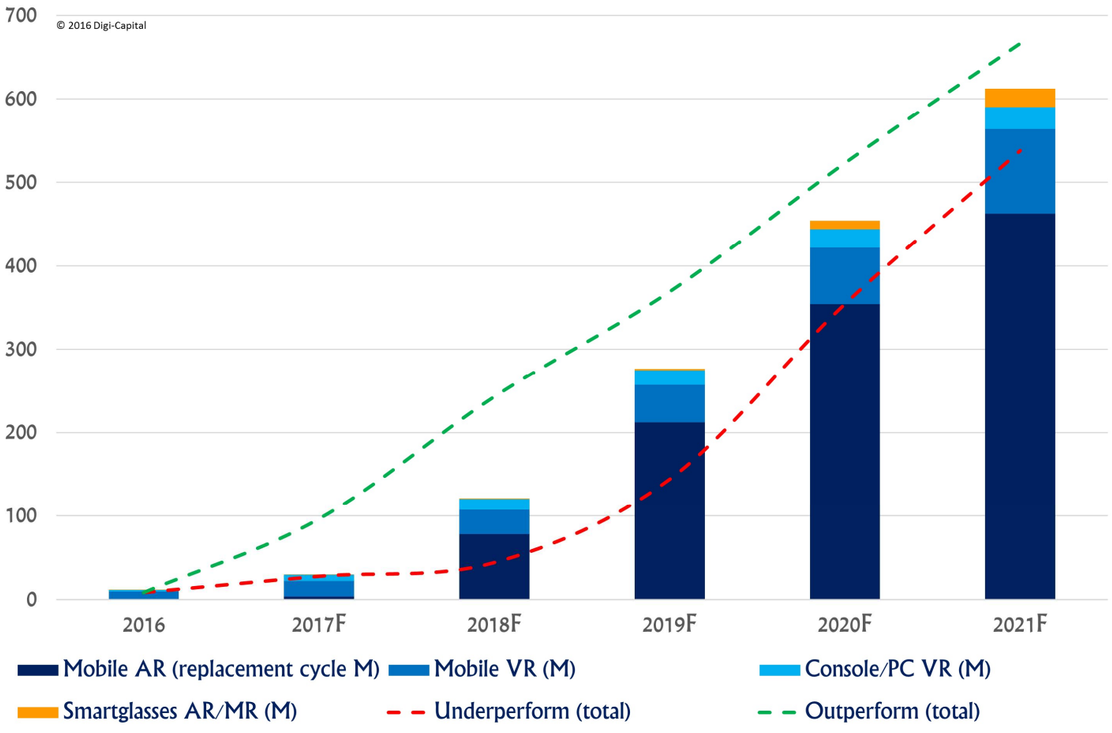
MR - Mixed Reality

Mixed presence

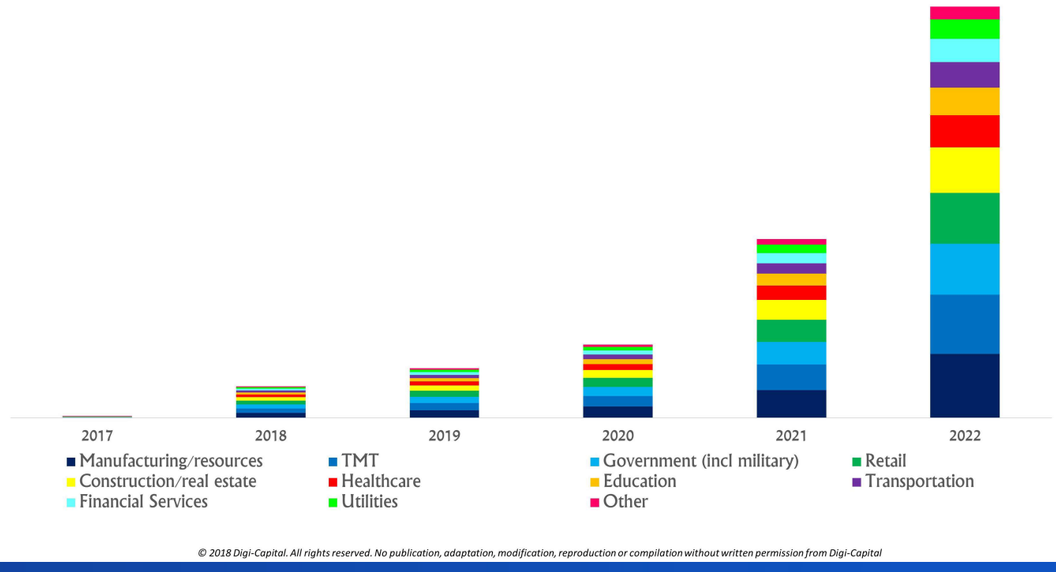
Microsoft HoloLens & Magic Leap

AR/VR Market Trends

Revenue by year and platform

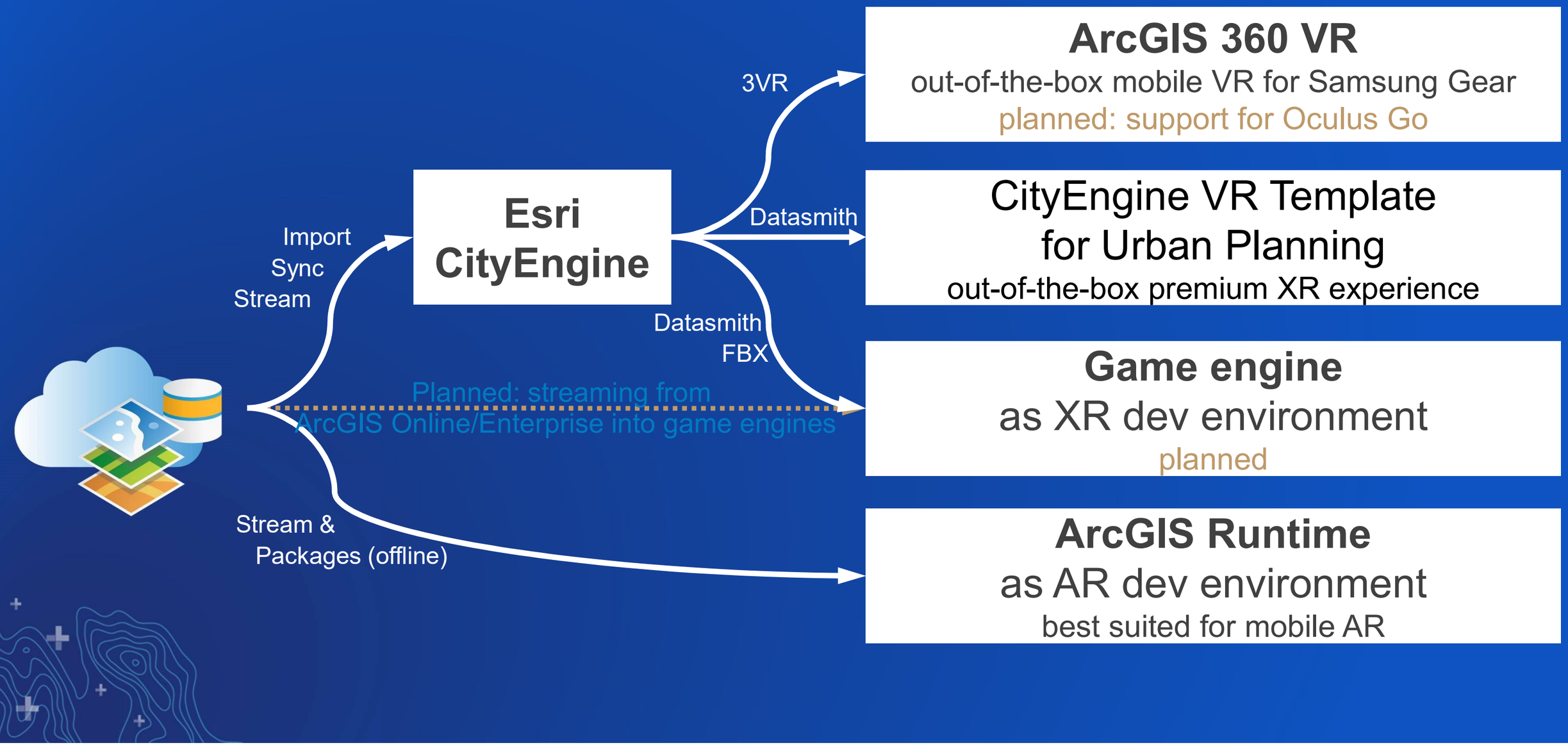


Enterprise use of AR by industry



* Statistics from Digi-Capital

XR with ArcGIS



Augmented Reality in the ArcGIS Runtime

- ArcGIS Runtime is AR enabled for iOS and Android devices
- Customization, configuration, and calibration
- Combination of:
  - Low-level API features
  - Open source Toolkit components to help build on top of the base API provided
- New AR view component
  - Build on the existing SceneView and 3D capabilities
- Use AR view with device sensors such as a compass and camera

AR Toolkit

- Native iOS - Toolkit repo on GitHub
- Native Android - Toolkit repo on GitHub
- iOS and Android through .NET/Xamarin - Toolkit repo on GitHub

What are ARKit and ARCore?

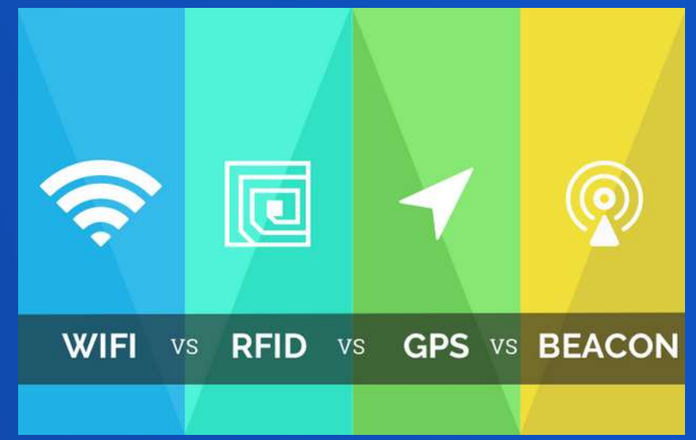
`ARSceneView` uses a ArcGISRuntime `SceneView` in Combination with an ARKit or ARCore view

- Google and Apple's respective Augmented Reality frameworks
- Use the smartphone's camera to add interactive (virtual) elements to an existing environment

Motion Tracking with ARCore/ARKit

Absolute Accuracy:

- GPS: ~10m
- Wi-Fi: ~2m
- Beacon: ~1m
- RFID: ~1m



Relative Positioning with ARCore/ARKit

- Camera information
  - Visual Place Recognition, Local Feature Descriptors
- Inertial Measurements

Enable your app for AR using AR Toolkit

1. Install AR Toolkit (and Runtime SDK)
2. Add an ARSceneView to your app
3. Configure privacy and permissions
4. Now you're ready to add tabletop AR , add flyover AR , or add world-scale AR to your app.

Supported Scenarios

- Flyover
- Tabletop
- World-scale

On screen, flyover is visually indistinguishable from normal scene rendering.

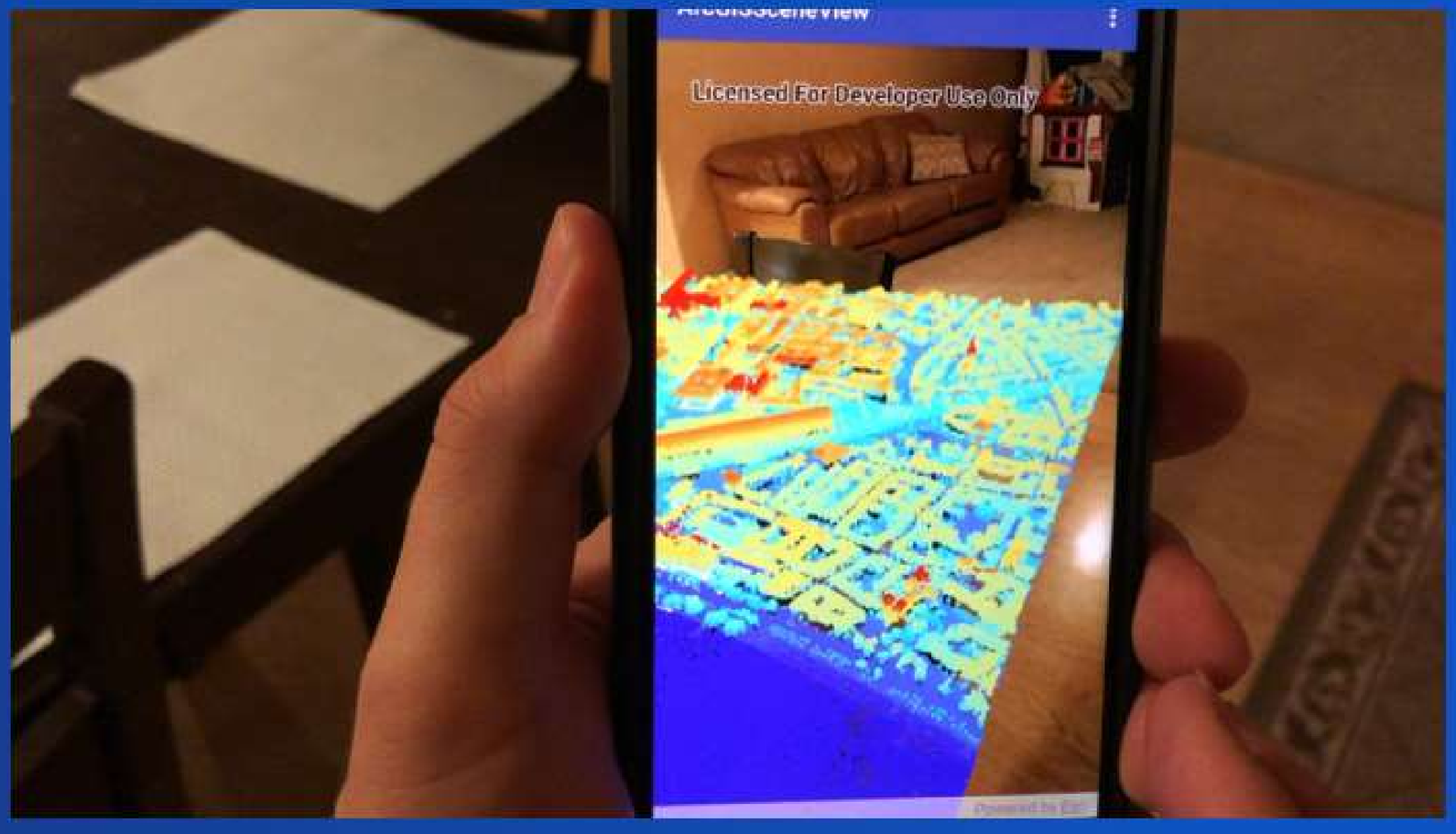
In tabletop, scene content is anchored to a real-world surface.

In world-scale AR, scene content is integrated with the real world.

Flyover

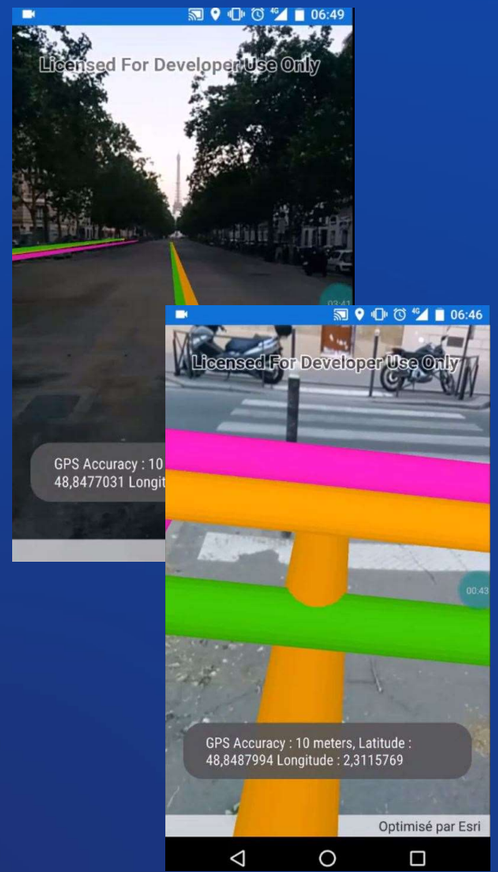
- Use augmented reality (AR) to quickly explore a scene
- e.g. Explore a city by walking through it virtually

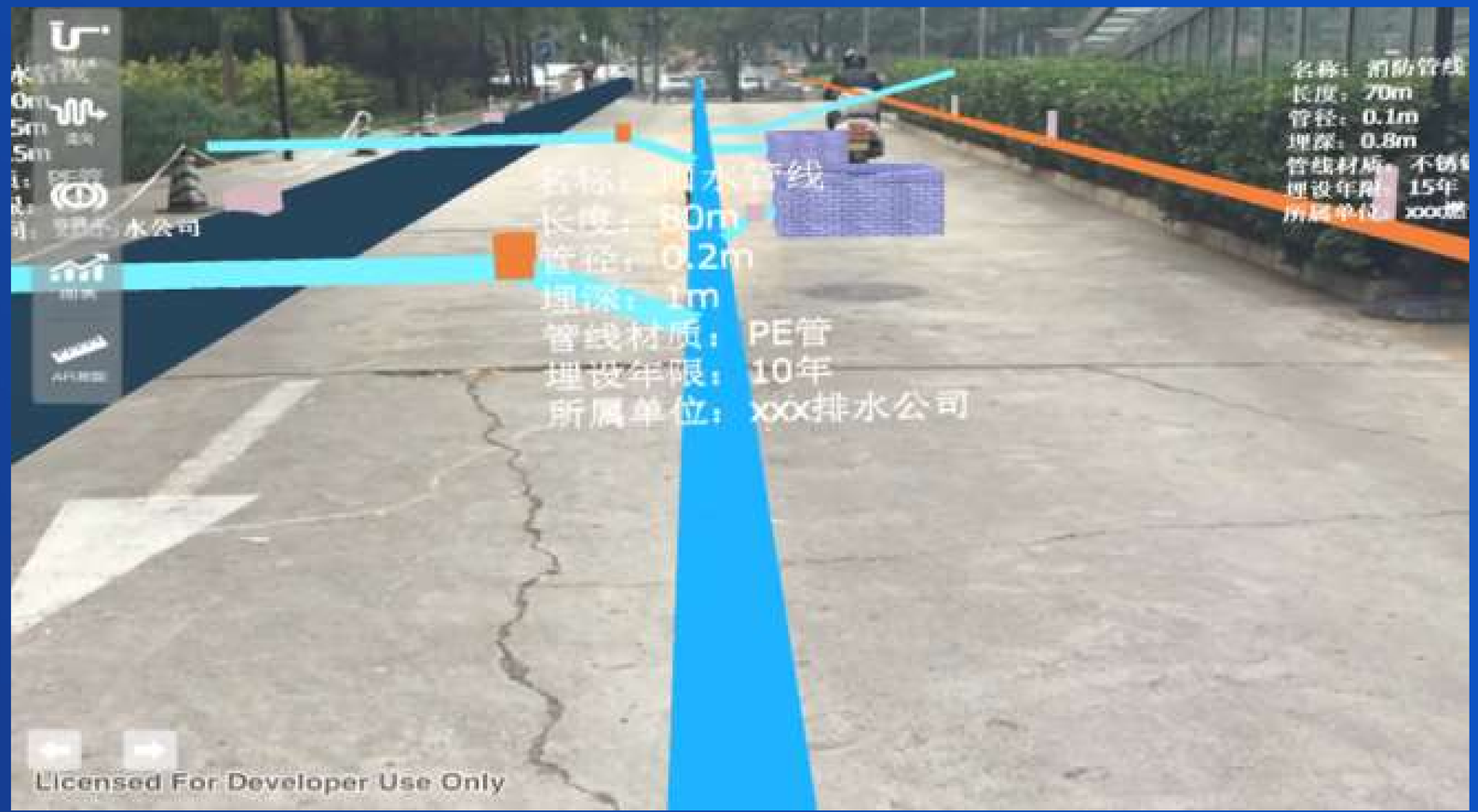
Tabletop: AR data exploration



World-scale: AR navigation

World-scale: AR field operations





ArcGIS Runtime features to “deal with”

- Scene view space effect control
- Scene view atmosphere effect control
- Surface transparency
- Scene view navigation constraint

ArcGIS Runtime features to “deal with”

AR pattern	Origin camera	Translation factor	Space effect	Atmosphere effect	Base surface	Navigation Constraint
Flyover	Above the tallest content in the scene	A large value to enable rapid traversal; 0 to restrict movement	STARS	REALISTIC	Displayed	
Tabletop	On the ground at the center or lowest point on the scene	Based on the size of the target content and the physical table	TRANSPARENT	NONE	Optional	Will interfere if the user attempts to look at the scene from below
Worldscale	At the same location as the physical device camera	1, to keep virtual content in sync with real-world environment	TRANSPARENT	NONE	Optional for Calibration	Allow subsurface navigation to use underground

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