ArcGIS Runtime: Working with your maps online and offline

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2021 ESRI DEVELOPER SUMMIT

Agenda

Design for Connectivity

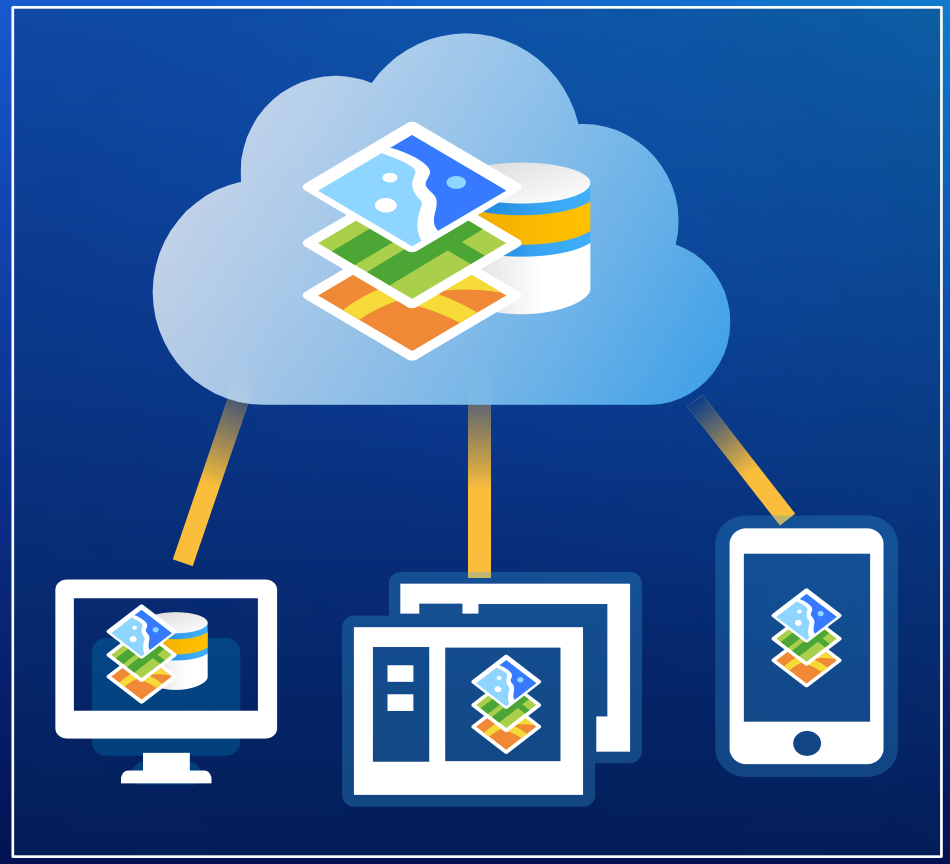
- Make connectivity part of your application strategy

- Always connected
- Always disconnected
- Occasionally connected
  - Temporary interruptions due to connection problems
  - Deliberate remote working
  - Plan work as if in disconnected environment
  - Offline business data can be supported by auxiliary online data

- Consider update strategy

Maps

- Central concept in ArcGIS
- Authored using the ArcGIS system
- Can be consumed by multiple applications
- Updates can be shared
- Contains
  - Operational Layers
  - Symbology
  - Popups
  - Basemap Layers
  - Metadata



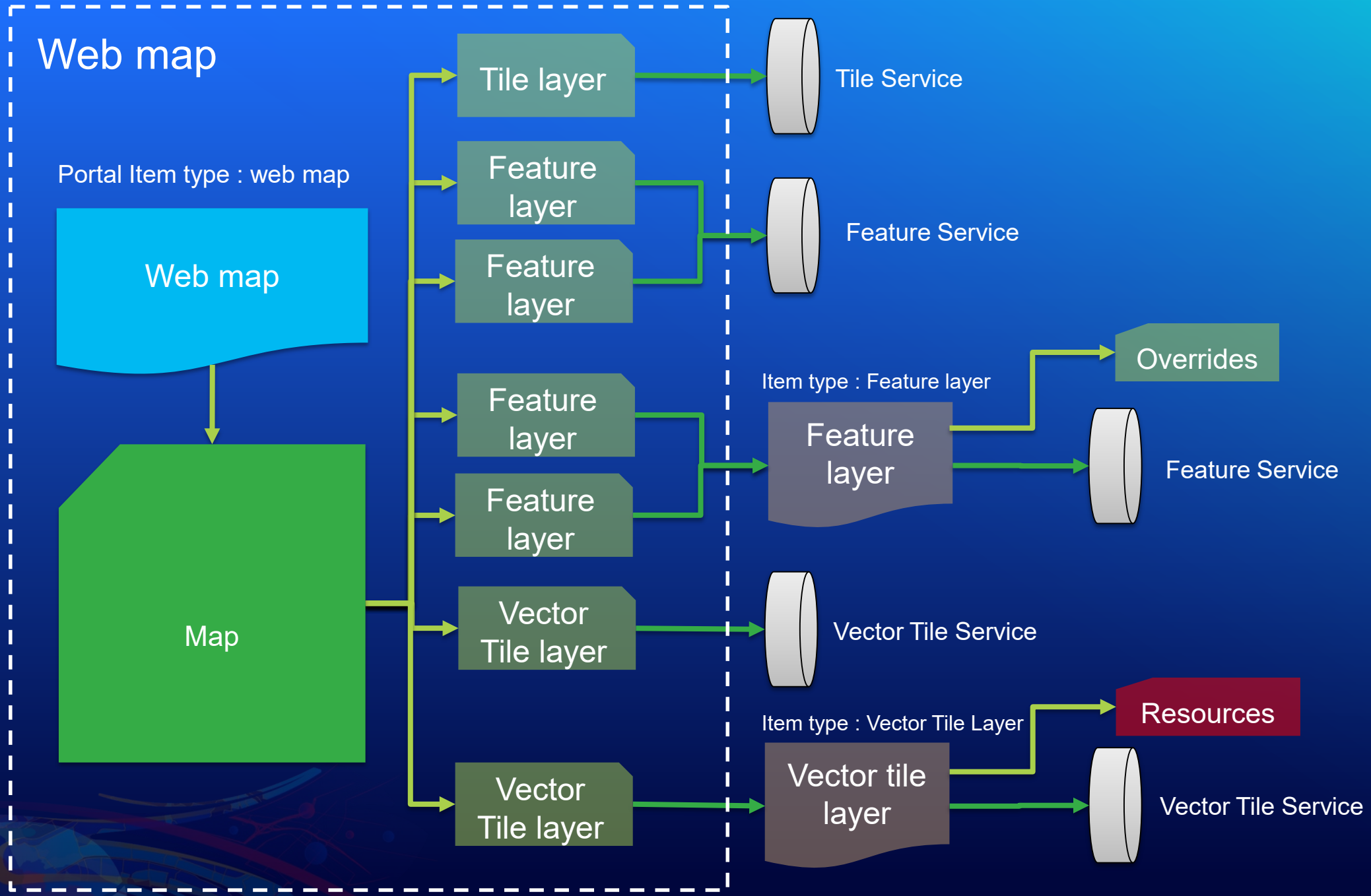
Always connected

Online web map

Always Connected

- Services Pattern
- Editable (services back-end)
- Web map authored with:
  - ArcGIS Pro
  - Online
  - Runtime

Online

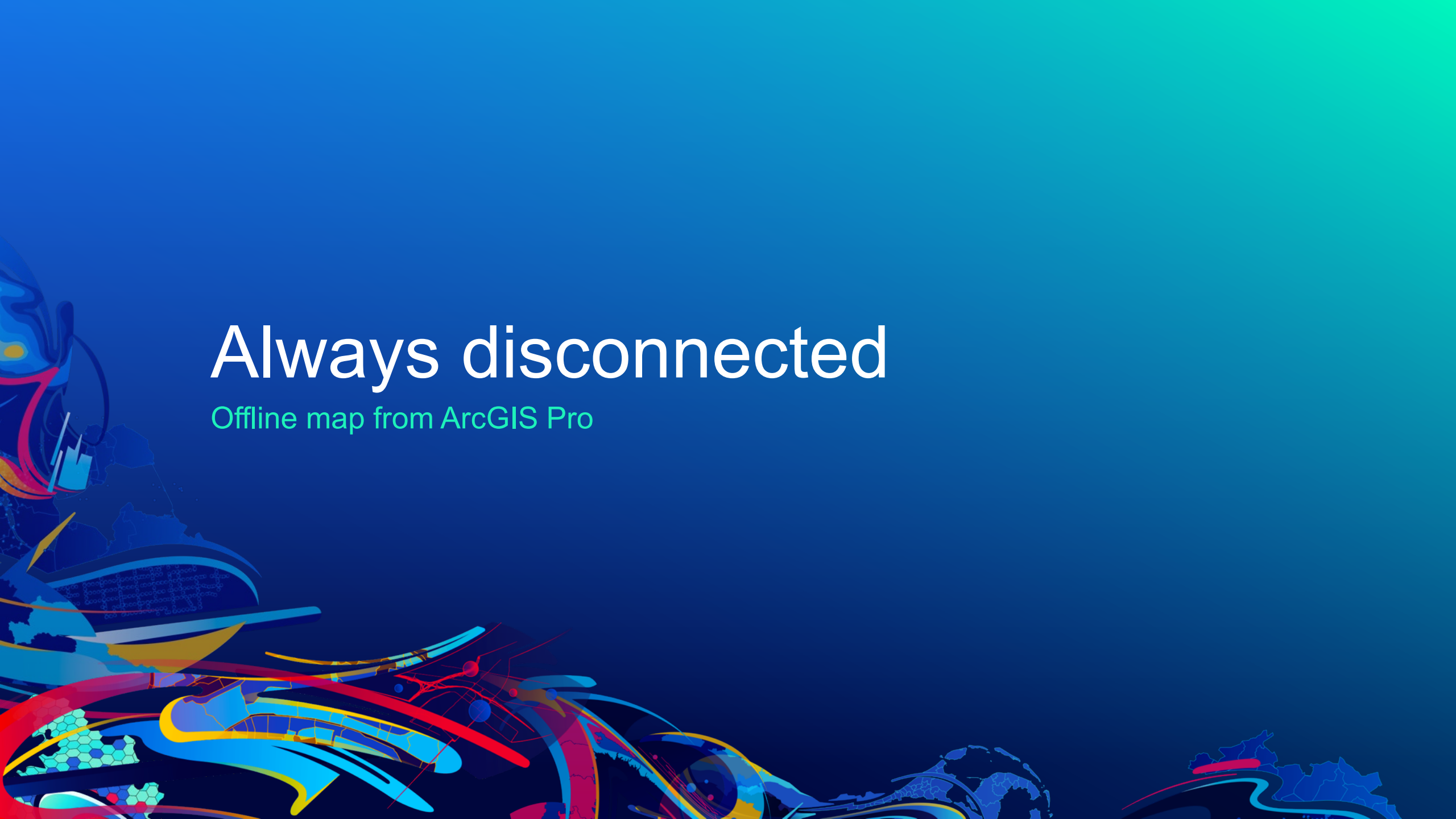

Web map
Portal Item type : web map
Web map
Map
Tile layer
Feature layer
Feature layer
Feature layer
Feature layer
Vector Tile layer
Vector Tile layer
Tile Service
Feature Service
Item type : Feature layer
Feature layer
Overrides
Feature Service
Vector Tile Service
Item type : Vector Tile Layer
Vector tile layer
Resources
Vector Tile Service

Display a Web map

```
Portal (URL to portal)
// handle authentication if required

PortalItem (Portal, item ID of web map)

Map (PortalItem)

mapView.map = Map
```

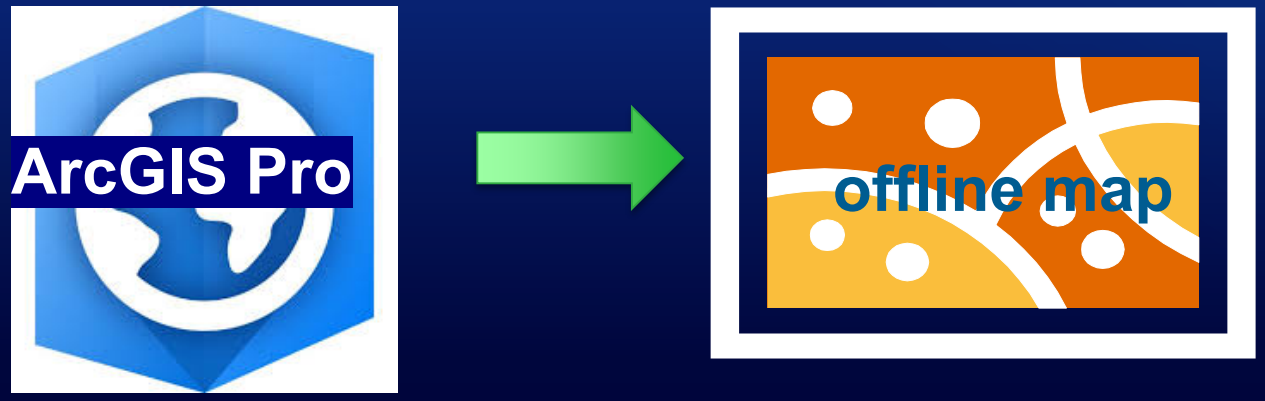
Always disconnected

Offline map from ArcGIS Pro

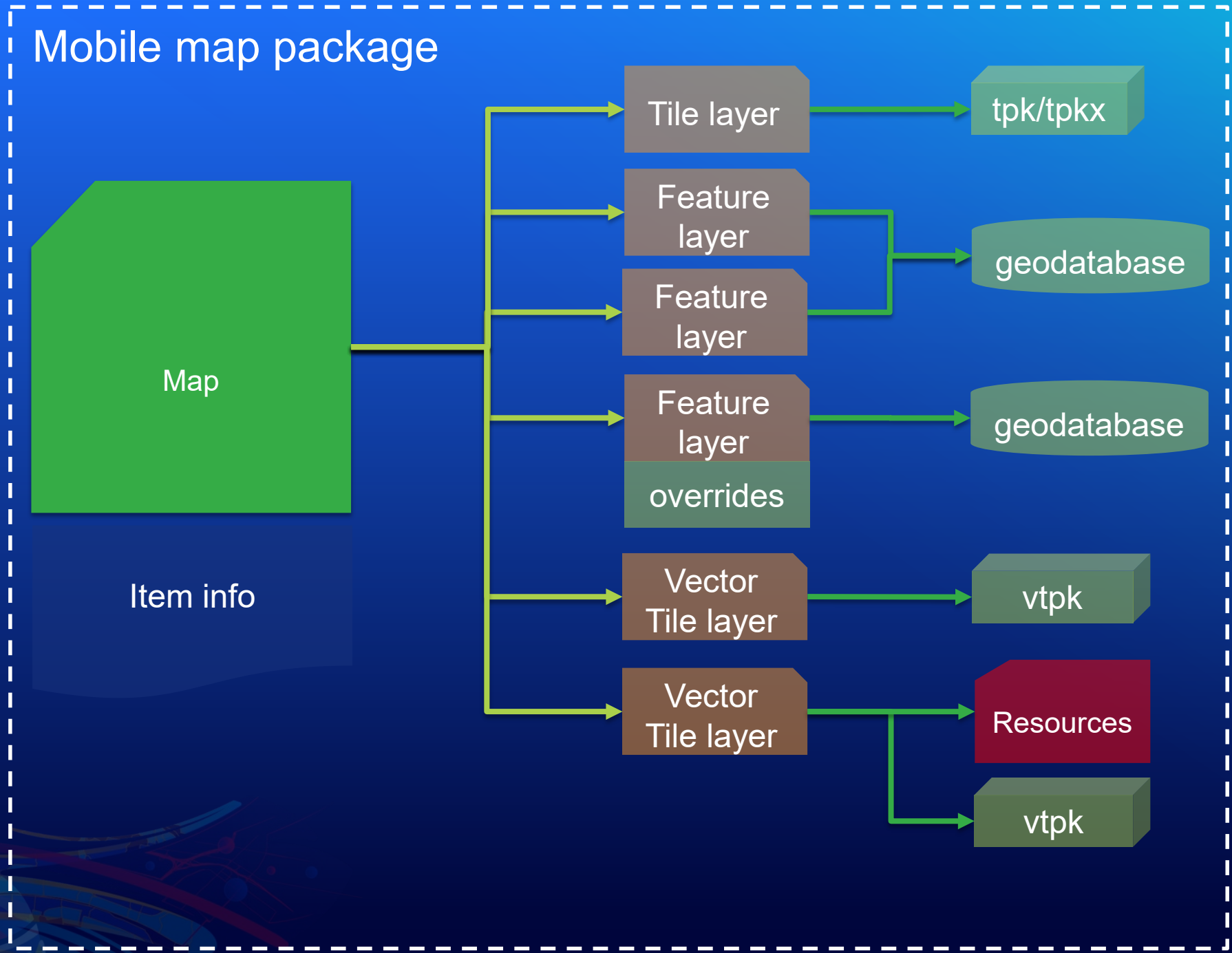


Always Disconnected

- Mobile Map and Scene Packages authored with ArcGIS Pro
- Read-only workflows
- Side loaded or downloaded to the client device
- Only option for offline 3D
- Expiration with the Publisher Extension
- Transportation Networks and Locators
- Include online layers for supporting information like weather/traffic



Offline


Mobile map package
Map
Item info
Tile layer
tpk/tpkx
Feature layer
Feature layer
geodatabase
Feature layer
overrides
geodatabase
Vector Tile layer
vtpk
Vector Tile layer
Resources
vtpk

Displaying maps from a mobile map package

Nick

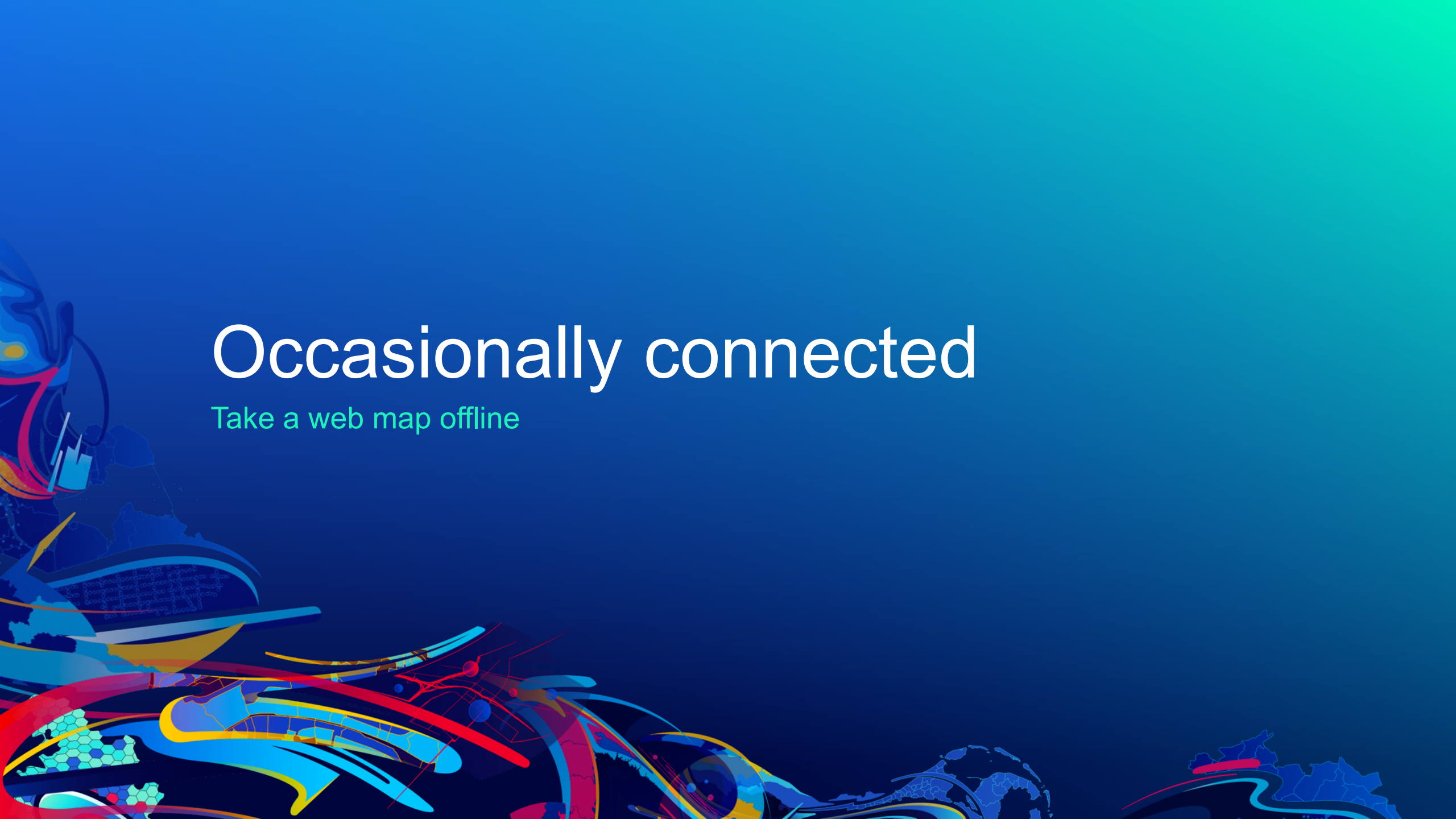
Display a Mobile Map / Scene Package

```
MobileMapPackage (Path to mobile map package file - .mmpk)

MobileMapPackage.load (…and wait)

mapView.map = MobileMapPackage.maps.first
```

```
MobileScenePackage (Path to mobile scene package file - .mspk)

MobileScenePackage.load (…and wait)

sceneView.scene = MobileScenePackage.scenes.first
```

Occasionally connected

Take a web map offline



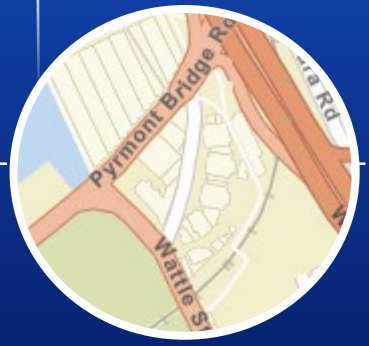
Occasionally Connected

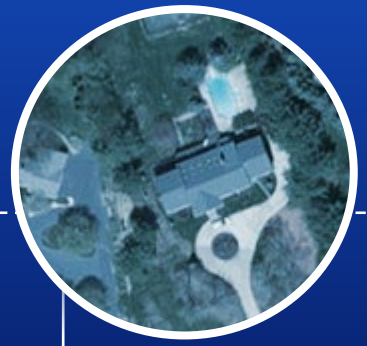
- Web map authored in ArcGIS Online or ArcGIS Enterprise
- Enable Offline Mode, Editing and Sync
- Downloaded as a Mobile Map Package directory

- Preplanned – author defines offline map
- On-demand – user defines offline map

Offline Data Types

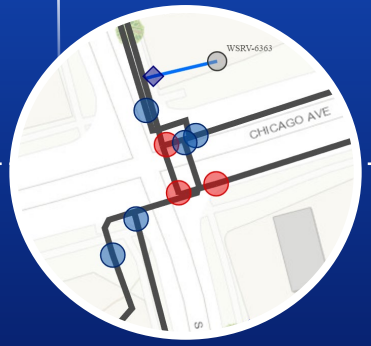
Vector tiles

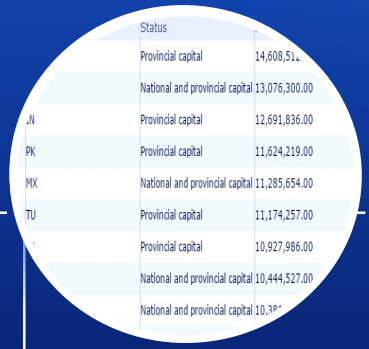




Raster tiles

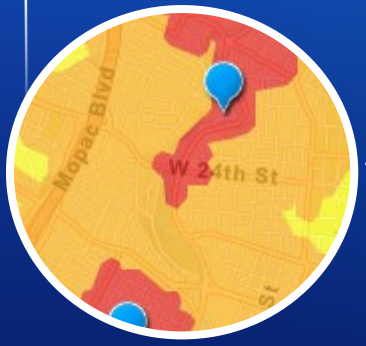
Features





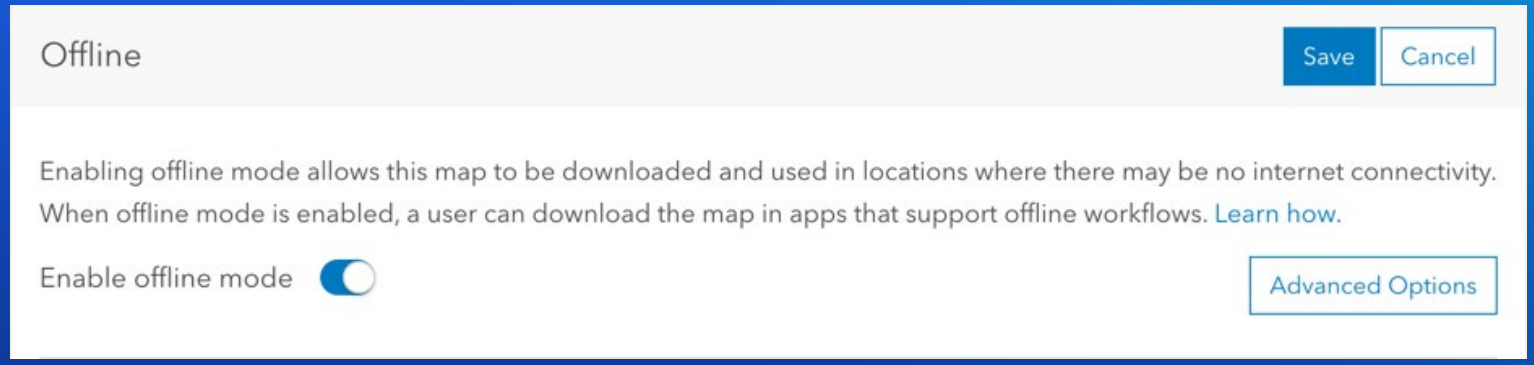
Tables

Feature collections



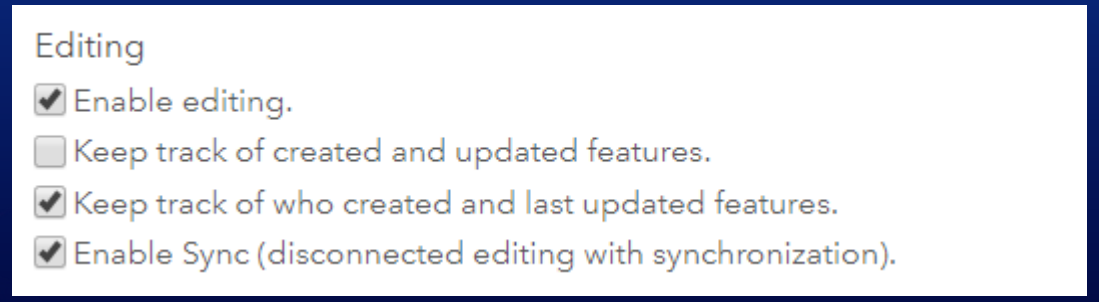
Allow Map and Data to be Taken Offline

- **Web Map settings**

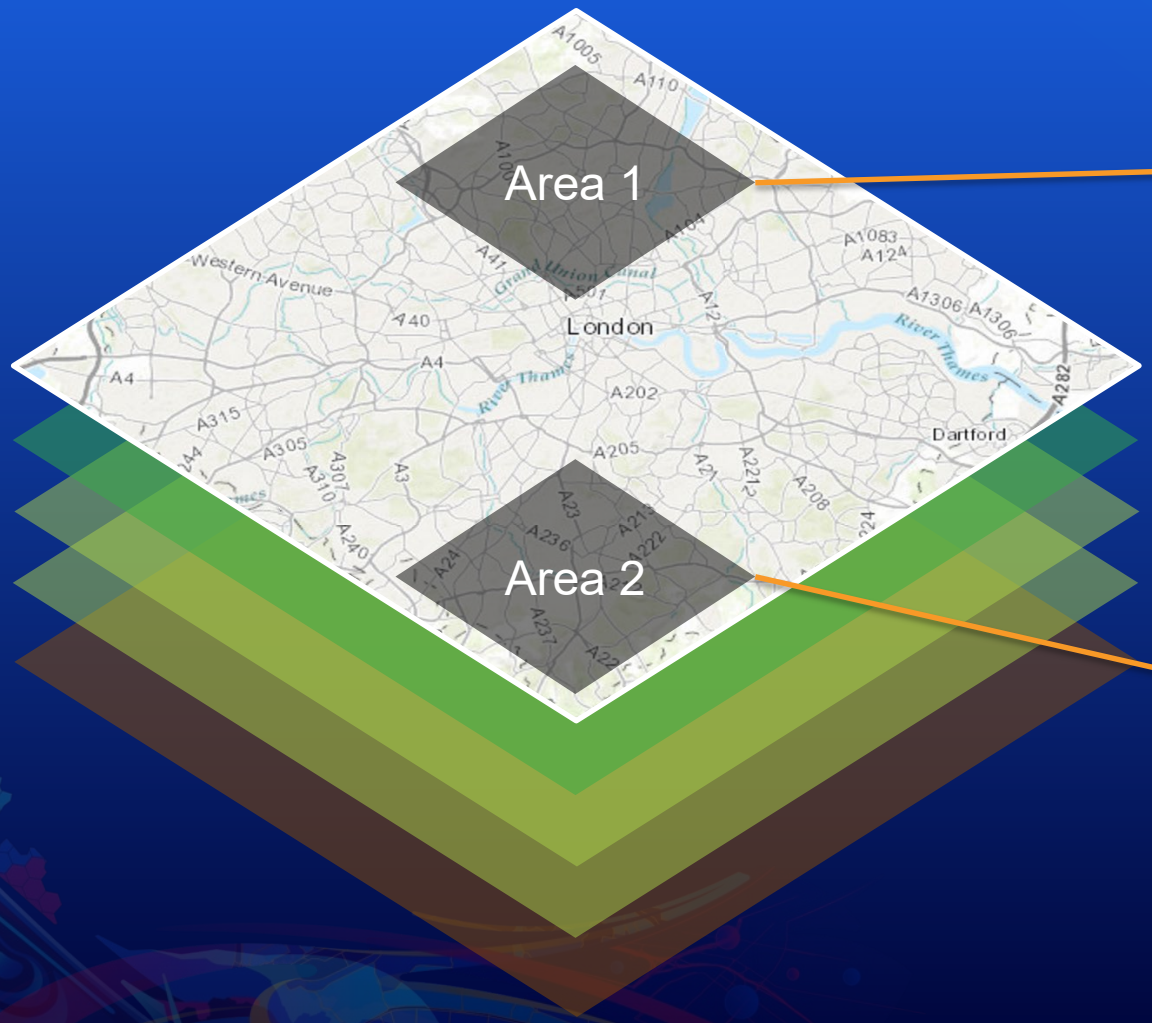


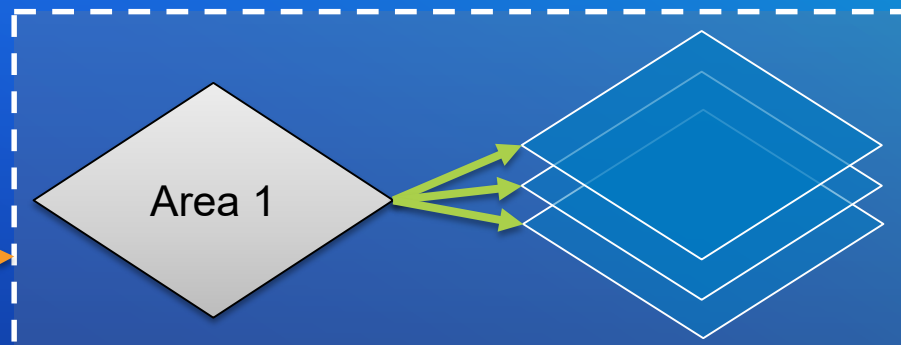
- **Service settings**
  - **Raster and Vector Tile Services**

  - **Feature services**



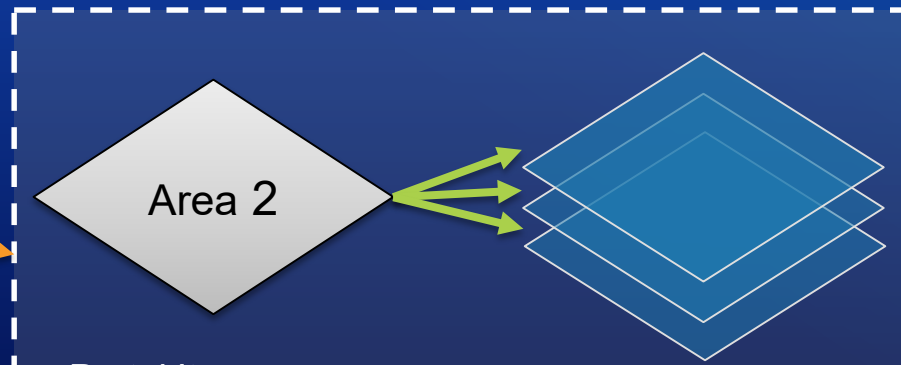
Preplanned Workflow





Portal Item : map area

Portal Items : tpks, vtpks, geodatabases



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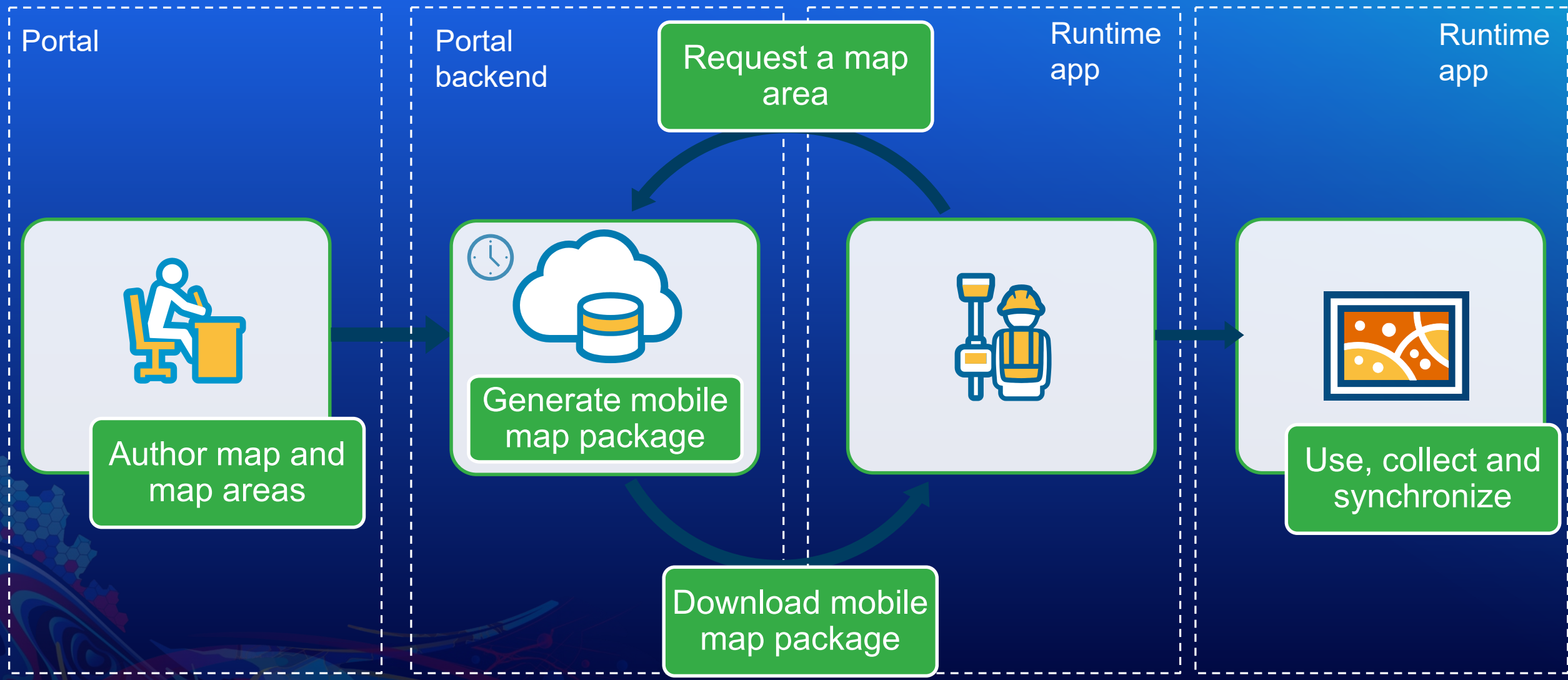
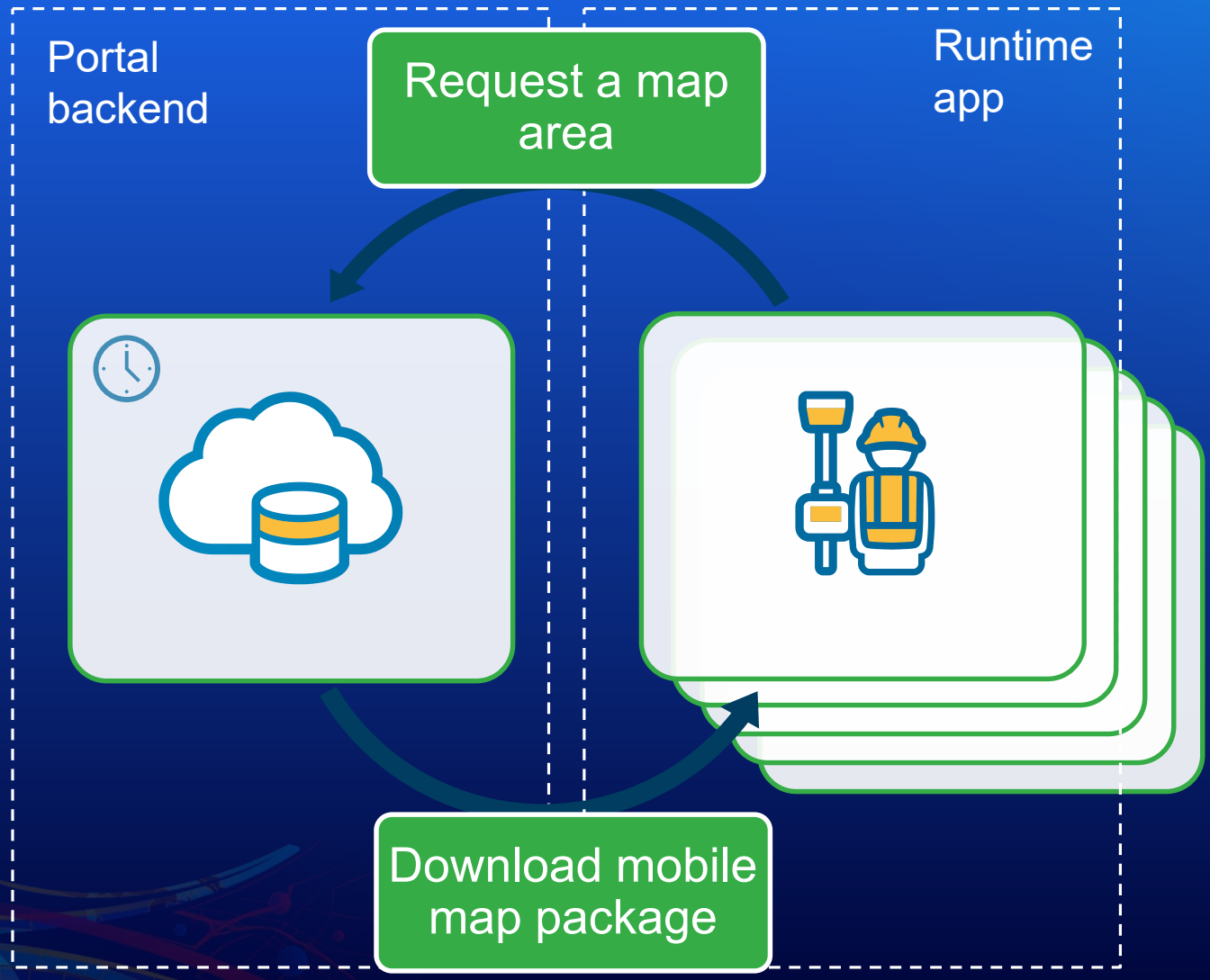
Preplanned Workflow



Preplanned Workflow



Authoring and using preplanned map areas

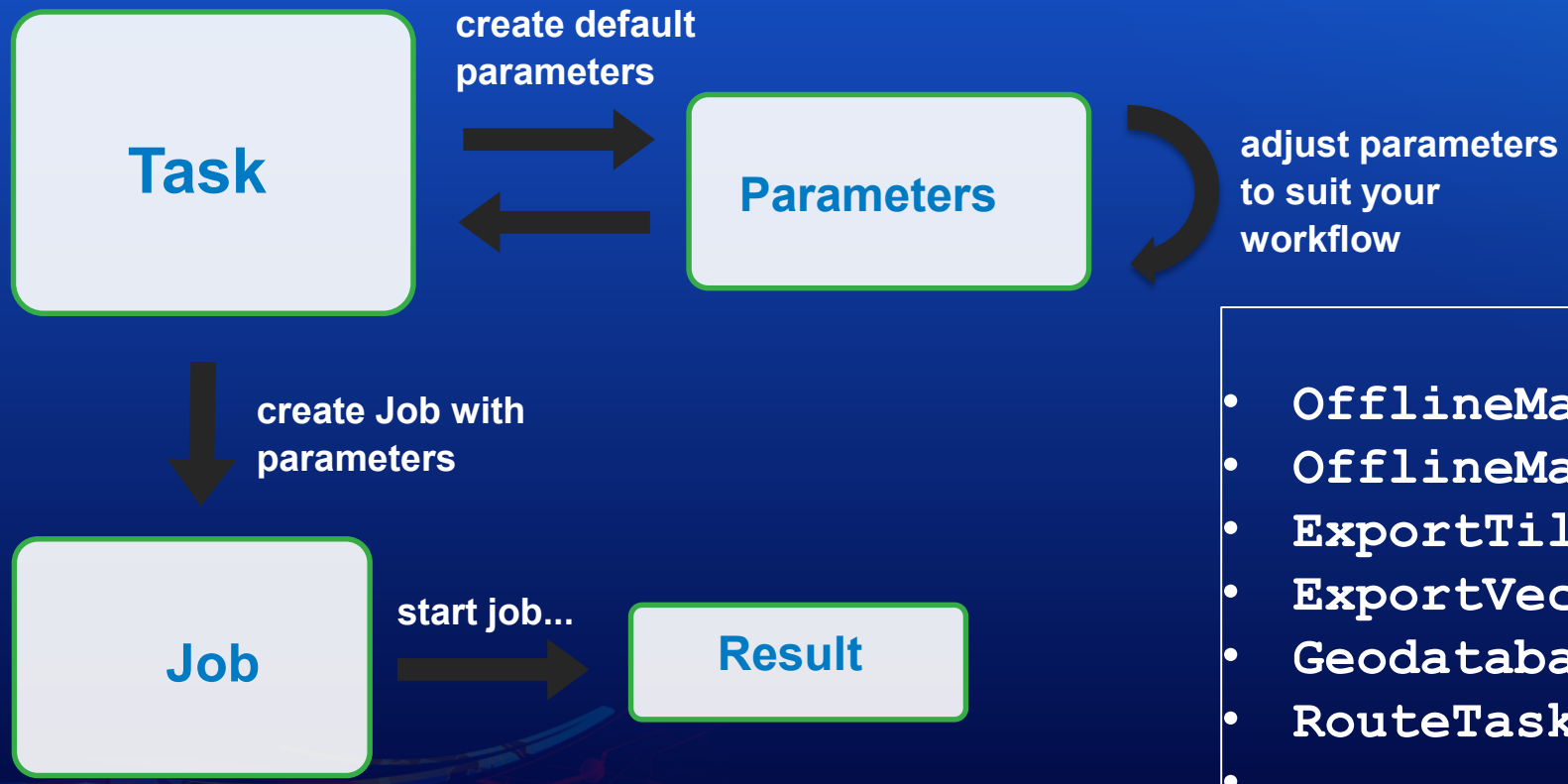
Presenter(s)

Preplanned Workflow Code

```
OfflineMapTask (webmap)
OfflineMapTask.load (…and wait)

Collection of MapAreas = OfflineMapTask.preplannedMapAreas (…and wait)

MapArea = MapAreas[selectedMapArea]

Parameters = OfflineMapTask.createDefaultParameters(mapArea) (…and wait)
// adjust parameters to suit your workflow

Job = OfflineMapTask.downloadPreplannedMapArea(Parameters, download path)
Job.start (…and wait)
mapView.map = Job.result.offlineMap
```

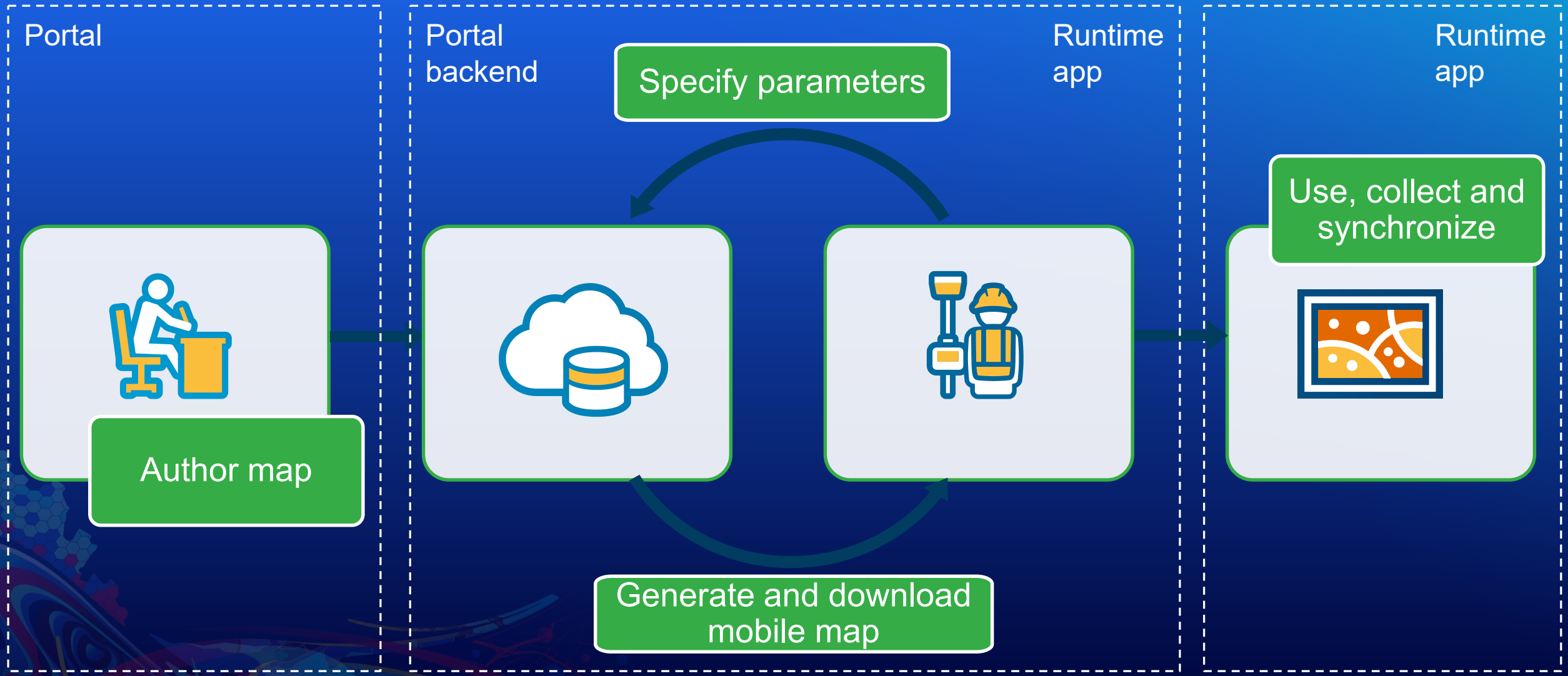
Take Webmap Offline: OfflineMapTask

- Runtime Task pattern



- `OfflineMapTask`
- `OfflineMapSyncTask`
- `ExportTilesTask`
- `ExportVectorTileTask`
- `GeodatabaseSyncTask`
- `RouteTask`
- `...`

On-demand Workflow



On-demand Workflow

- Load online web map
- Choose your area and scale range
- Create parameters
  - Default parameters based on web map author's settings
  - Schema only
  - Attachment settings
  - Download a basemap?
  - Use a local basemap
- Generate offline map using parameters

Take a map offline on-demand

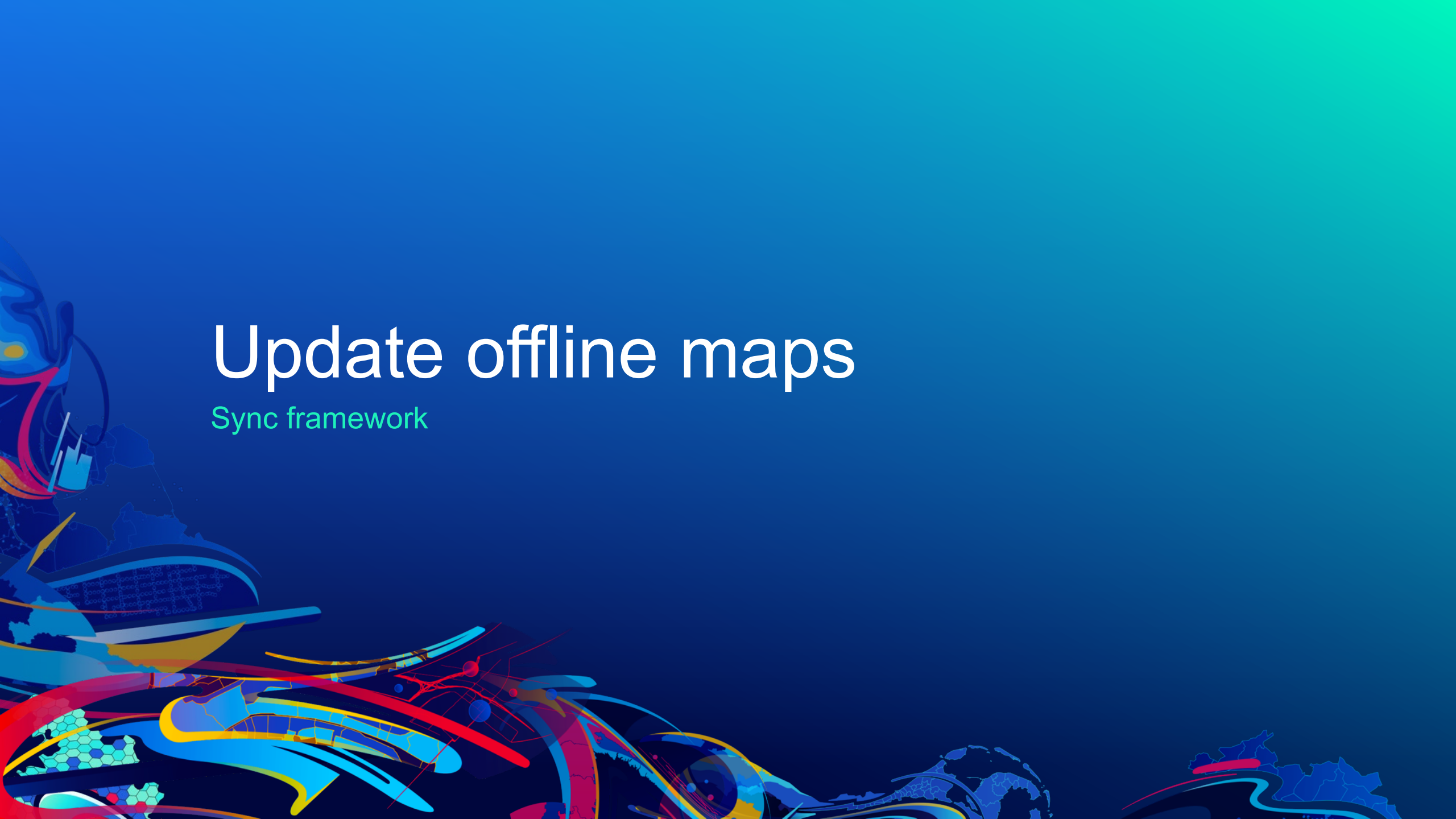
Nick

On-demand Workflow Code

```
OfflineMapTask (webmap)
OfflineMapTask.load (…and wait)

Parameters = OfflineMapTask.createDefaultParameters(AOI, scale) (…and wait)
// adjust parameters to suit your workflow

Job = OfflineMapTask.generateOfflineMapJob(Parameters, download path)
Job.start() (…and wait)
mapView.map = Job.result.offlineMap
```

Update offline maps

Sync framework

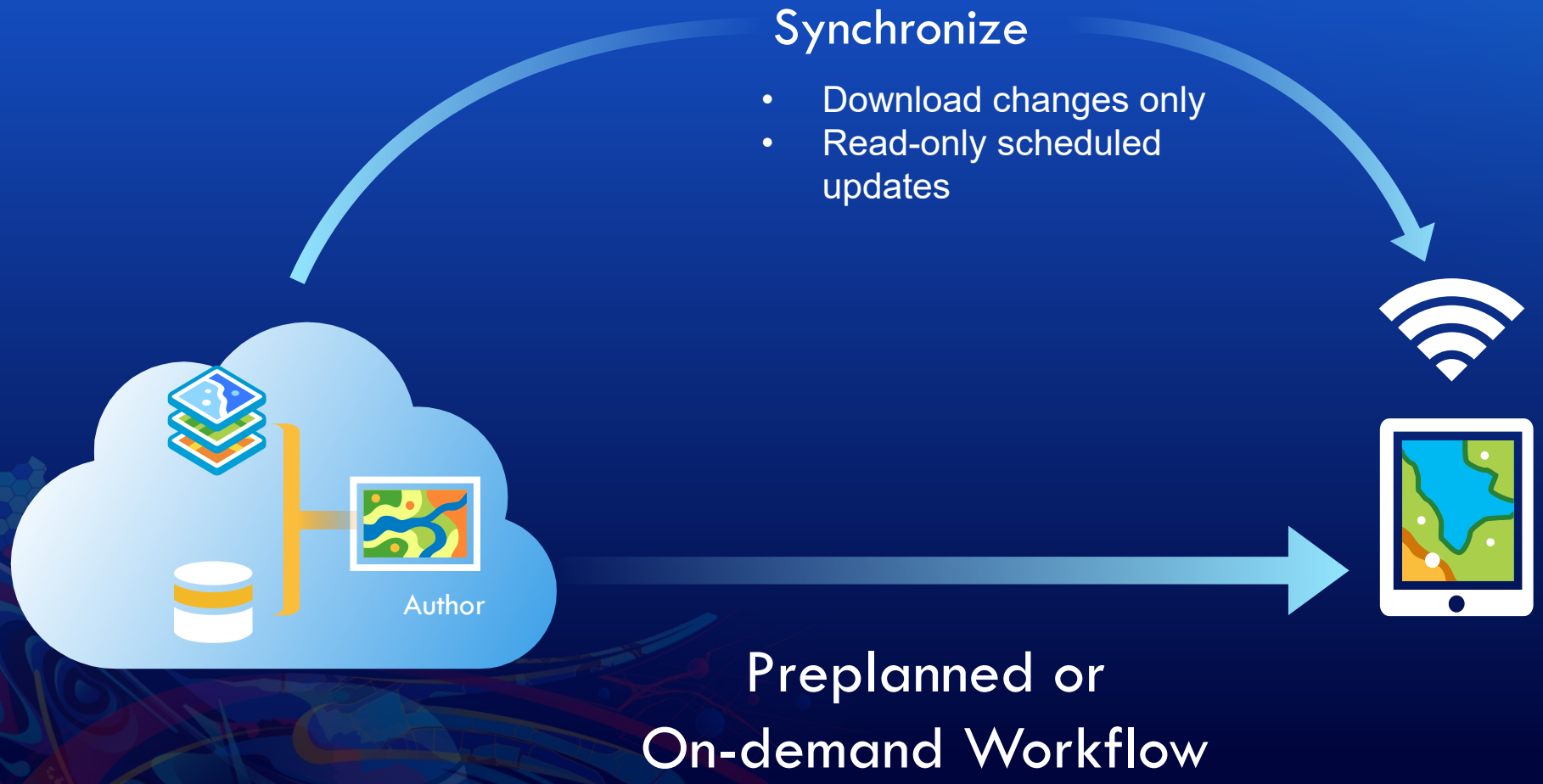


Update Strategy

- Always connected:
  - Online web map – always up-to-date
- Always Disconnected:
  - ArcGIS Pro (read-only) - recreate .mmpk
- Occasionally Connected
  - Offline Map Sync Task
  - When do you update?
  - Download vs Upload

Update an Offline Map

`OfflineMapSyncTask`



Update an offline map

Nick

OfflineMapSyncTask Code

```
OfflineMapSyncTask(offlinemap)
OfflineMapSyncTask.load()  (…and wait)

Parameters = OfflineMapSyncTask.createDefaultParameters()  (…and wait)
// adjust parameters to suit your workflow

Job = OfflineMapSyncTask.syncOfflineMap(OfflineSyncParameters)

Job.start()  (…and wait)
```

Deploying Apps using ArcGIS Runtime

License Levels

- Lite
  - View maps, scenes and layers from the platform, simple routing and place finding
- Basic
  - Simple feature editing (connected or disconnected),authoring maps, creating groups, sharing and navigation
- Standard
  - Local data access and Local Server
- Advanced
  - Direct connect to SDE, Mosaic datasets, advanced GP tools

- Analysis Extension
  - Available with Standard and Advanced levels
  - Spatial, 3D and Network Analysis tools

Summary

- Account for connectivity when designing your application
  - Connected
  - Always Disconnected
  - Occasionally connected
- Design Map and Layers to reflect your update strategy

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