Utilising Open Source GIS to Integrate geospatial and CAD workflows - *the insights of a 'Geographer in a CAD World'*
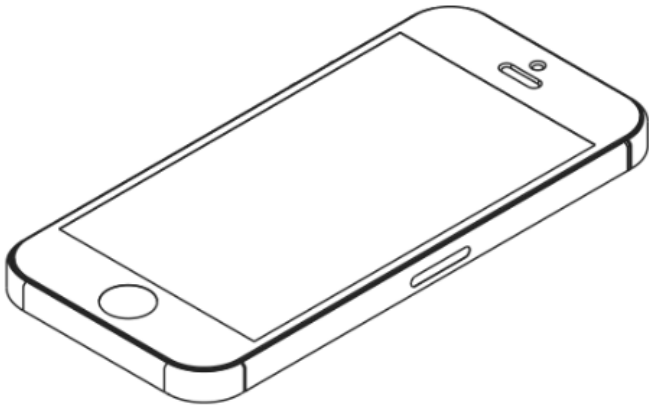
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David Crowther
Cadline Ltd (QS-011)
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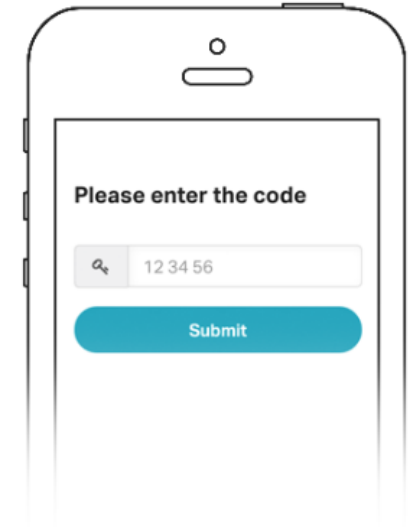
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About the speaker

David Crowther

At Cadline I help to implement our DynamicMaps geospatial solutions, as well as provide technical support for Autodesk geospatial products. Historically, I have utilised many desktop GIS, such as; AutoCAD Map3D, MapInfo Pro and ESRI ArcGIS, although more recently I have expanded my skill sets to include the Open Source geospatial technologies; QGIS, GeoServer and PostGIS.

A Geographer in a CAD World!

It all started here!

- 25 years ago in Wapping
- GIS Consultant
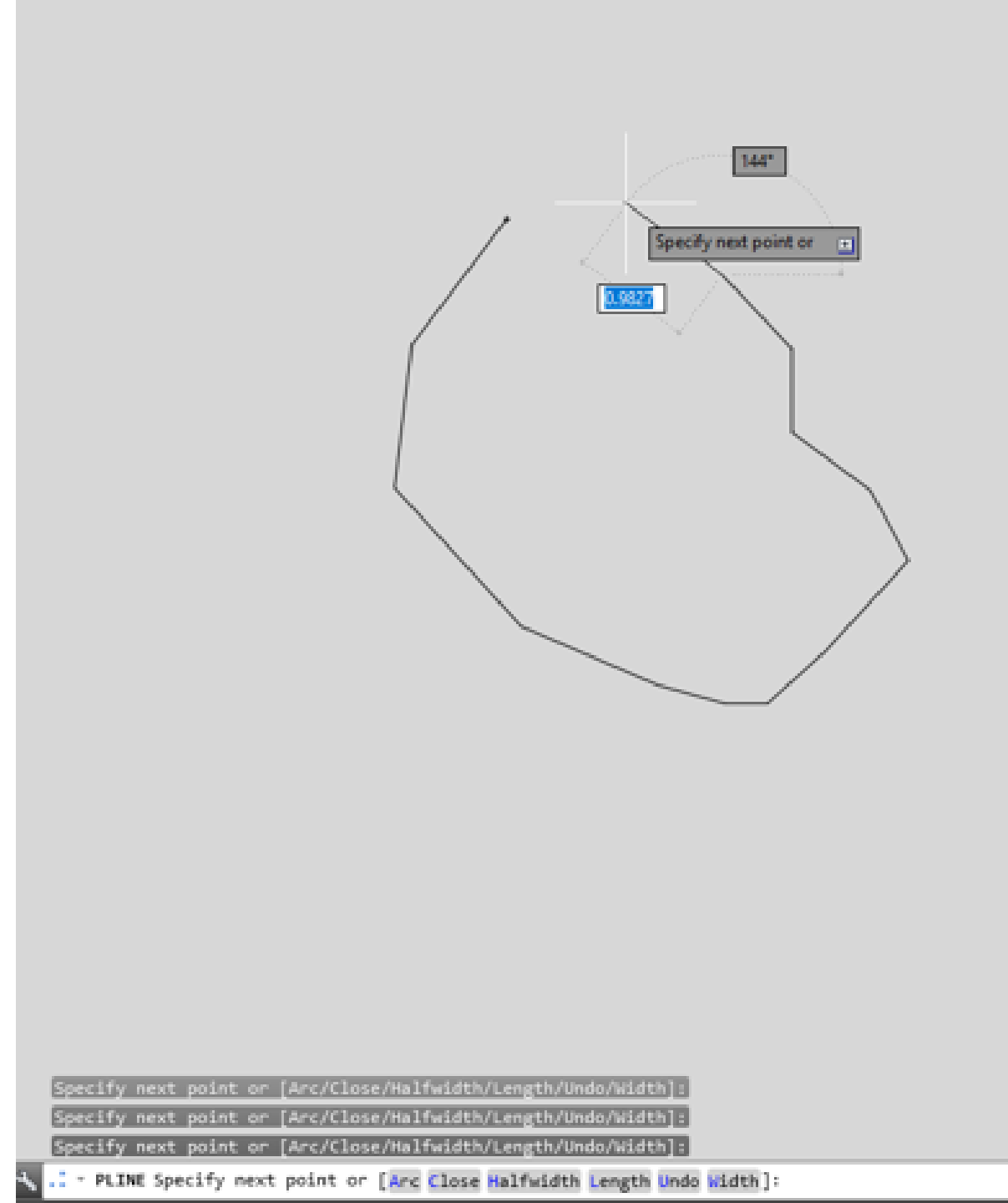- Now working for an Autodesk Partner

A Geographer in a CAD World

My first experience with Cadline Clients;

- Polylines or Polygons?

- We all use the correct CRS don't we?

- Who needs Attribute Data?

is CAD really the **Matrix?**

- Should I be drawing land parcels as **Polylines?**

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- Where are all the **attributes** for these CAD features?

- Am I a **Geographer in a CAD World?**

A Geographer in a CAD World!

It's been three and a half years since I joined Cadline as a GIS Application Engineer, and my new job title was probably the first sign that I was now a "Geographer in a CAD World". I have worked in GIS for nearly 20 years, and in all the roles that I have undertaken, at heart, I have always considered myself to be a GIS Consultant. Yet working for a Platinum Autodesk Partner I am now referred to as an "Application Engineer". It's a name I simply can't get used to, as I see Engineers as those who plan, build and implement complex projects using CAD software – such as Autodesk Electrical, Plant, Civils and Manufacturing. I don't build things, do I? As I once told my dad, "I simply do maps on computers".

As a GIS Consultant I have often stared at the banks of CAD users' screens and seen elements of the Matrix in the "Dark Art" of the work they do, and now I'm actually living day to day in the "CAD World" I felt a little out of my comfort zone. In fact, my very first client introduced me to how far apart I believed the CAD and GIS world to be. I sat in the CAD Team's office and watched as each CAD technician digitised land parcels as "polyline" objects. I still use this story every time I deliver a GIS training course and reveal how alien it seems to me to digitise what is essentially a closed shape as a polyline and not a polygon. How can they perform spatial analysis? How can they create thematic maps of land ownership? Why are they not concerned with the attributes of each land parcel? Why on earth would you ever draw a closed shape as a Polyline?

InfraWorks, which enables you to visualise 3D Models using both CAD and geospatial assets. Having trained the Vertical Mapper extension to MapInfo back in the early noughties, it's safe to say the visualisation of data in the 3D environment has come a very long way! On this specific project,

## Why on earth would you ever draw a closed shape as a Polyline?

we used InfraWorks as part of a planning application to visualise the environmental impact of a new school building. We received the proposed building design from the architect as a Revit file and as soon as I opened the file I knew there was again a disconnect between CAD and GIS. The Revit building appeared some 2km away from the proposed site! I contacted the architect and they explained it was their usual practice to design their buildings somewhere near the site. Sorry, somewhere near the site? Surely not? What about the current site conditions? The transport links? The local utilities? Any environmental constraints? Surely these were essential when designing a new building? I kept quiet and decided maybe not.

Very soon it was eating away at me. Was GIS a concept that simply didn't have a place in the CAD

Confused   Disoriented

Lost   Unsure

Perplexed   Bewildered
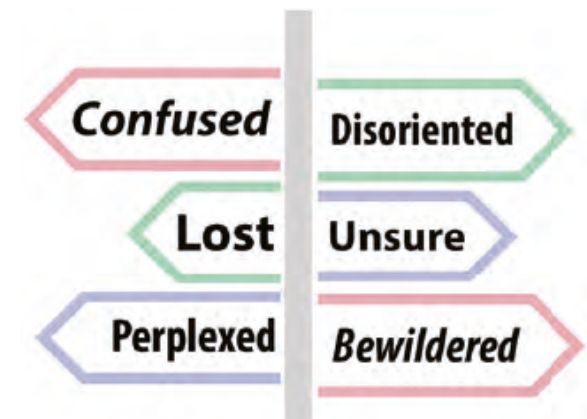
Or is GIS a **Dark Art?**

- Why is there a **disconnect** between GIS and CAD?

- Maybe GIS datasets are seen as **overly complicated** with unreadable file formats!

- Do **complex Geospatial tasks** have any place when implementing a Building Design or Infrastructure Project?

- And indeed, is GIS a 'Dark Art' that should be left to the **'Map Geeks'** in the corner?
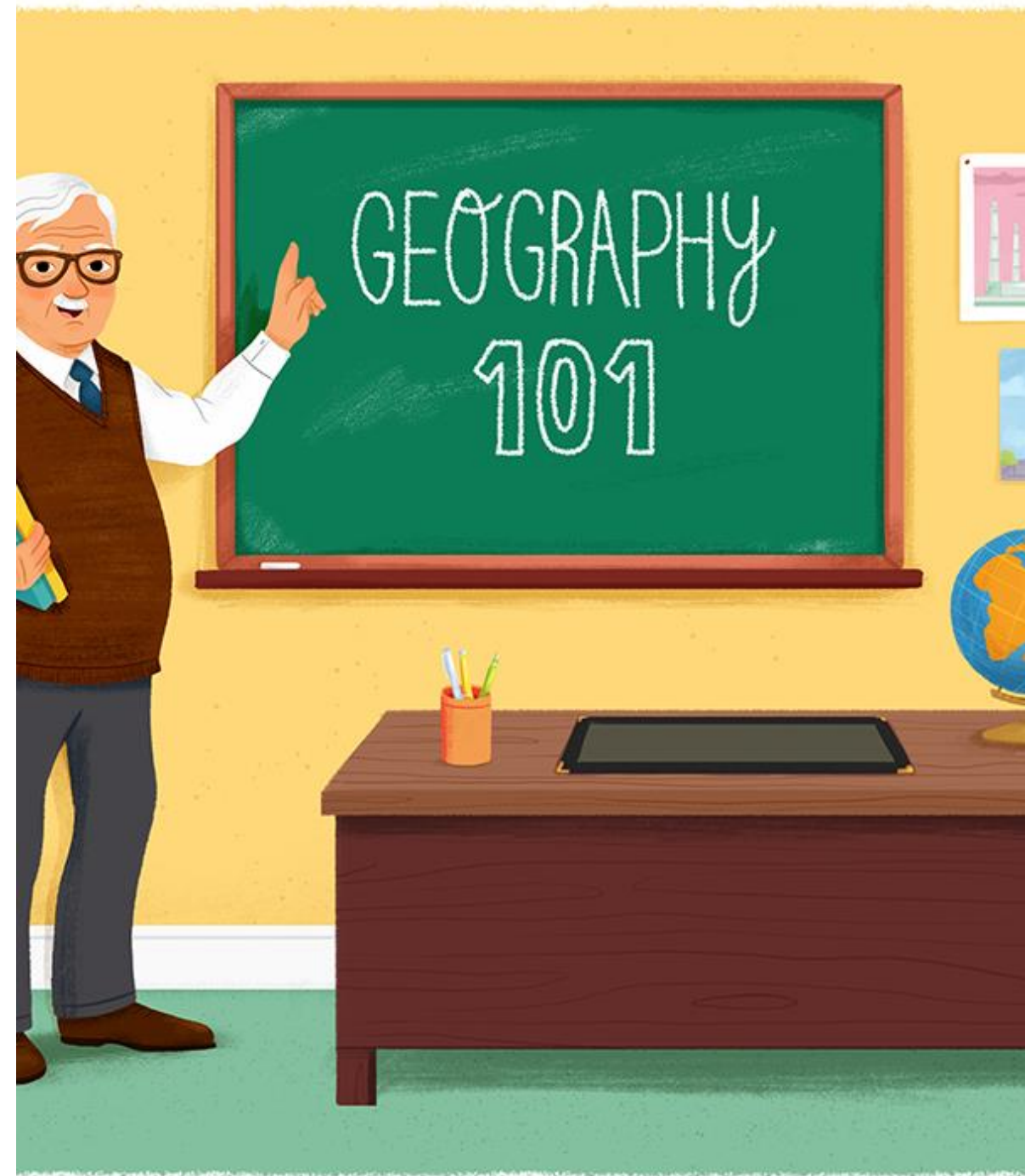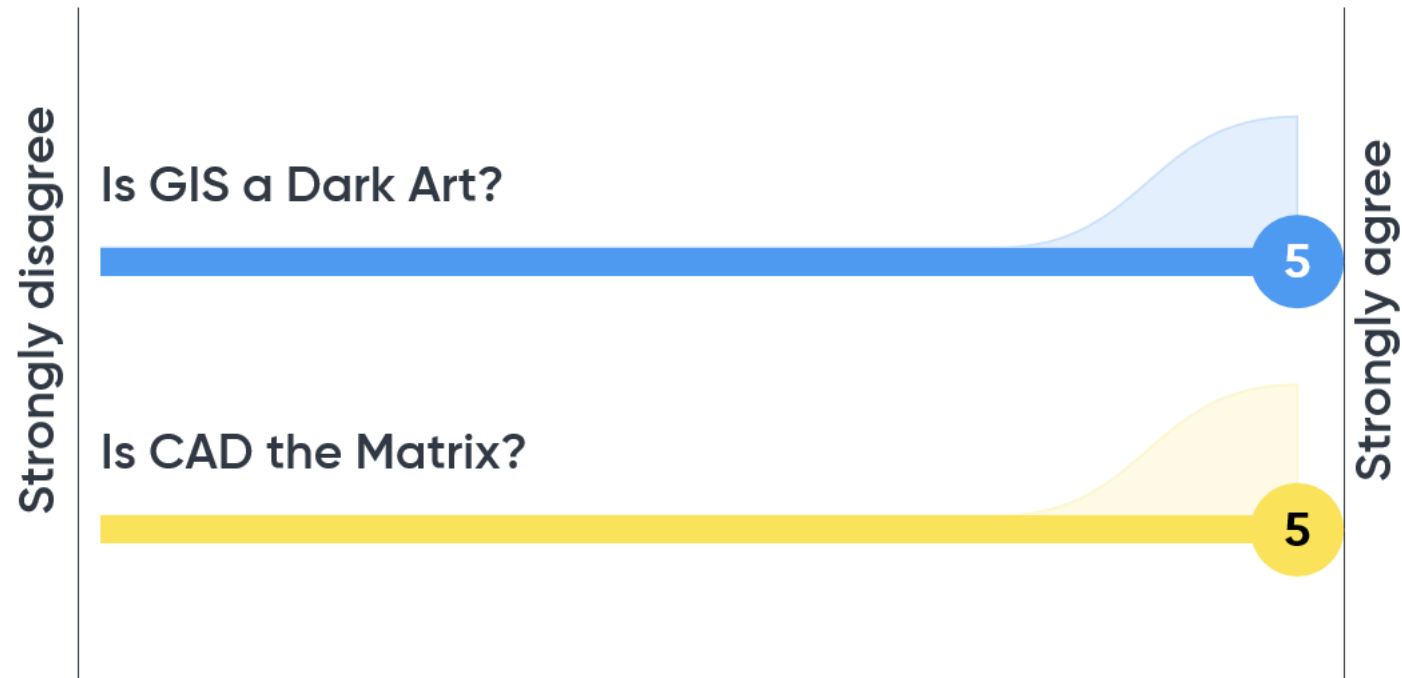
Voting Results

Mentimeter

Dark Art or Matrix?

Bringing CAD and GIS closer together….BIM in Action

Industry **Trends**

Building information modelling (BIM).

Greater focus on entire asset lifecycle and collaborative 3D modelling. Helps to improve project predictability and provides asset owners with greater information about their maintainable asset.

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At the core….
Autodesk InfraWorks

- InfraWorks is a flagship **infrastructure design** solution from Autodesk enabling **site analysis** and early stage **design optioneering** to be performed in a fast, accurate and visually compelling 3D environment

- InfraWorks allows the creation of city scale **3D models** built quickly and intuitively from GIS and engineering data

- InfraWorks supports **BIM workflows**, enabling early stage design to be undertaken in a **collaborative 3D environment,** rich with project data that can be re-used and utilised within on-going project stages
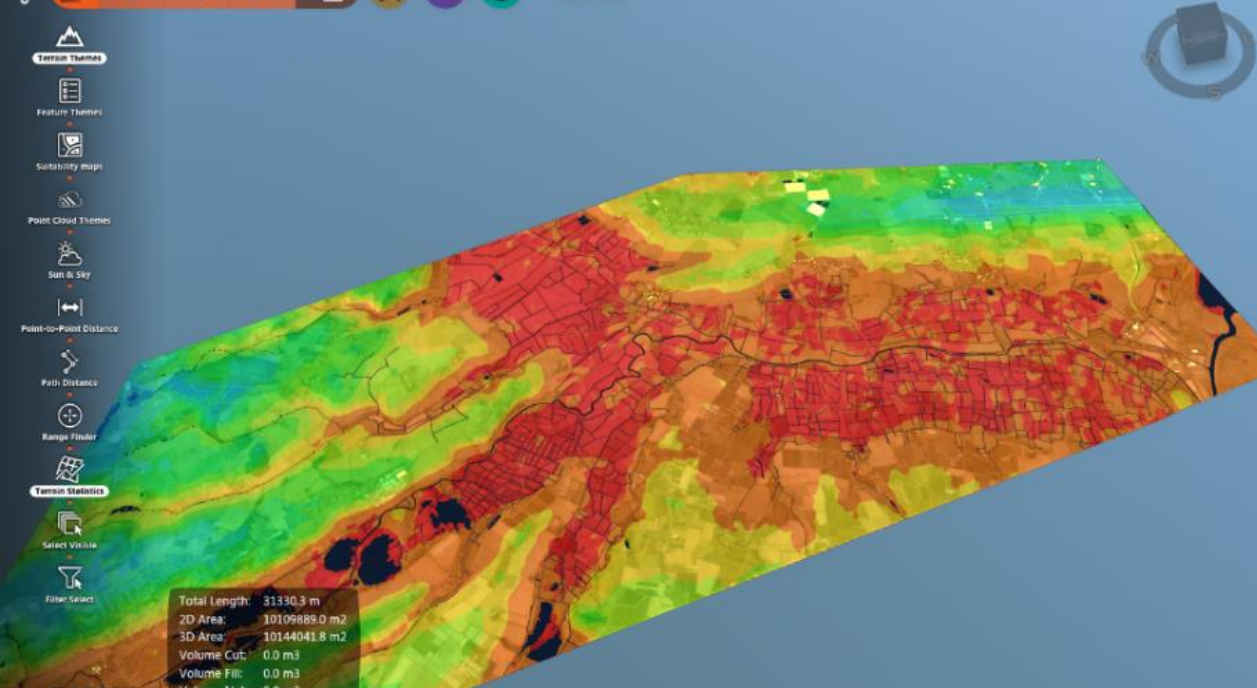
- Feasibility Studies

- Constraints Plans

- **Environmental Impact Assessments**

- Water Shed Analysis

- Slope Analysis

- **Masterplanning**

- Design Optioneering

- Visual Impact Assessments

- Conceptual Highways Design

- Junction **Design**

- Traffic Simulation

- Conceptual Bridge **Design**

- Landscape design

- Drainage **Design**

- And more…..
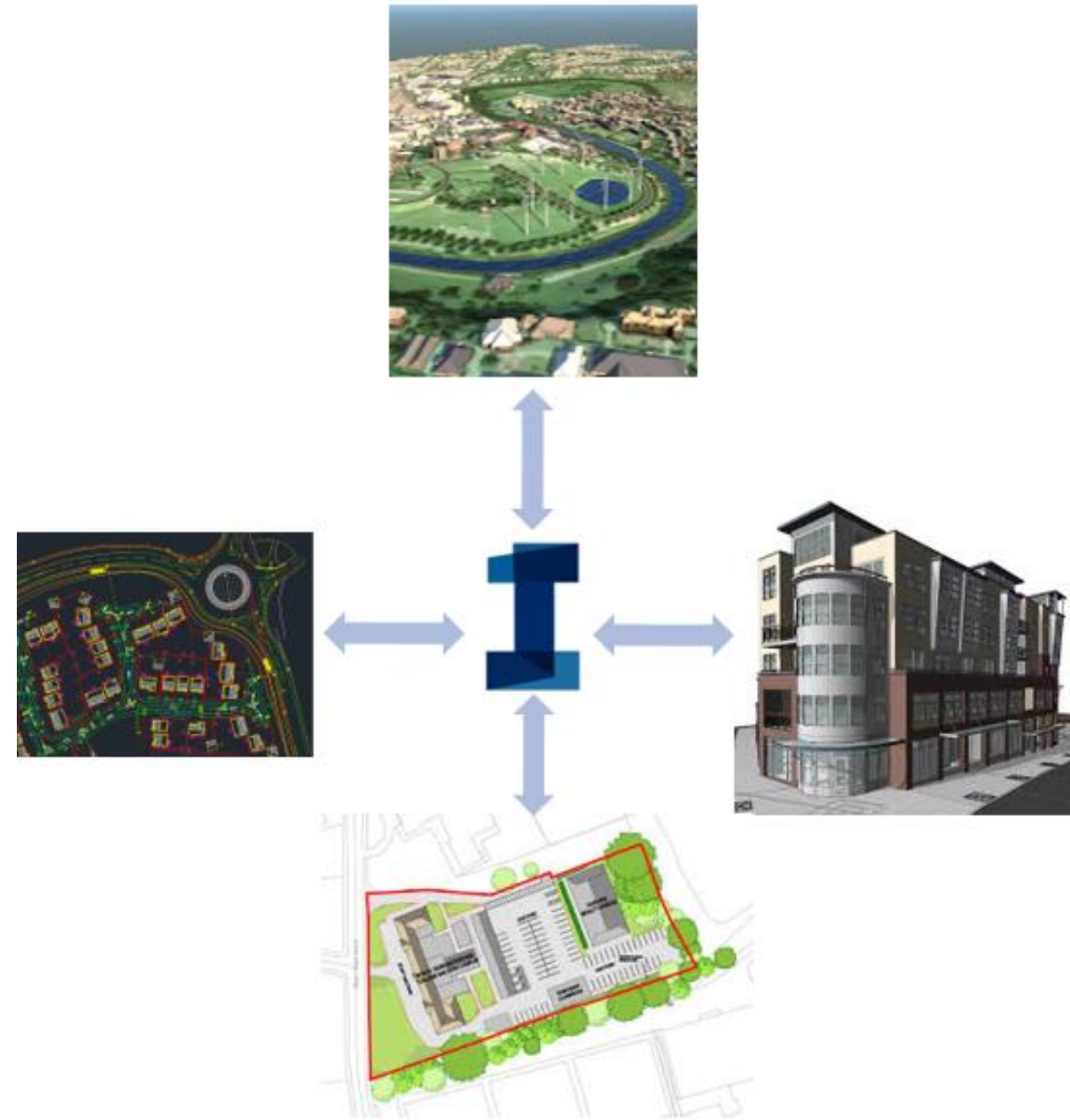
BIM in Action:

InfraWorks allows you to integrate isolated applications, skillsets, data and projects into one federated model.
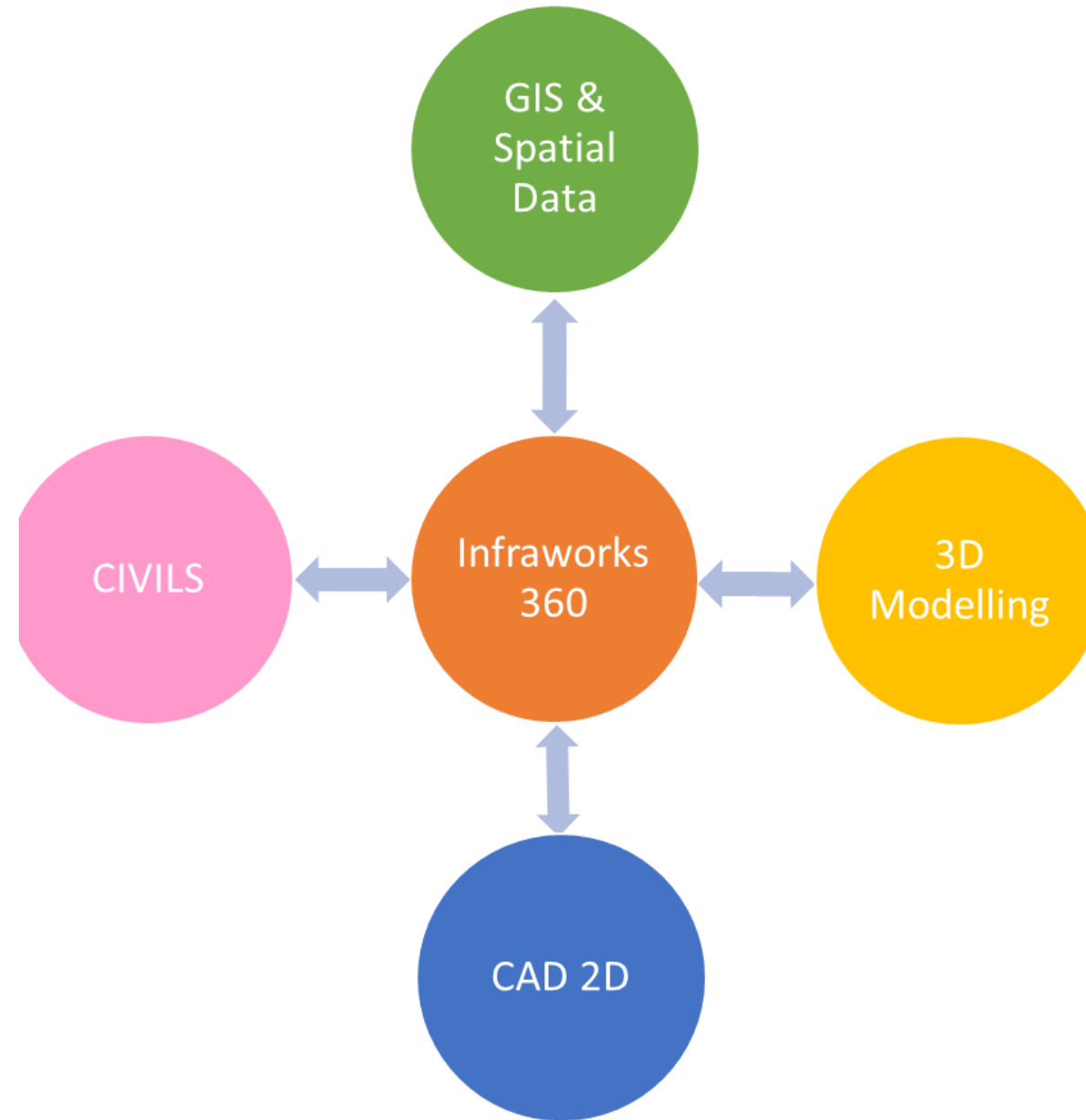
BIM in Action:

Providing access to;

Geospatial data, Road, Bridge and Drainage design, 2D CAD Drawings and 3D Building and Earthwork Model.

Common Obstacles… (and how to overcome them!)

Data Sharing…. **Common Obstacles**

Currency

- Is your data current? or is it out of date as soon as it is exported from its source format?

Complexity

- Can you access that information easily, or do you need GIS experts to translate complex spatial data?

Duplication

- Do you have duplicated datasets on your networks and find it hard to know who has the most up to date version of your asset information?

PostGIS…One Source of Truth!

- **QGIS:** desktop GIS enabling you to manipulate your geospatial assets and environmental constraints.

- **Map3D:** Autodesk mapping application to integrate CAD and geospatial asset information.

- **webGIS:** access spatial datasets onsite and undertake remote data manipulation.

- **GeoServer:** a web map publishing application to provide WMS and WFS web services.

- **InfraWorks:** supports BIM workflows, enabling early stage design to be undertaken in a collaborative 3D **environment.**

- **PostGIS:** an Open Source spatial database, allowing you to implement 'One Source of Truth' using a Common Delivery Platform.

Common Delivery Platform

Collaboration

PROJECTS

Enable your Project Team to collaborate with your centralised Model.

Automation

SOFTWARE

Automate the updation of your asset information across multiple platforms.

Optimisation

TIME

Optimise your time by reducing costly rework.
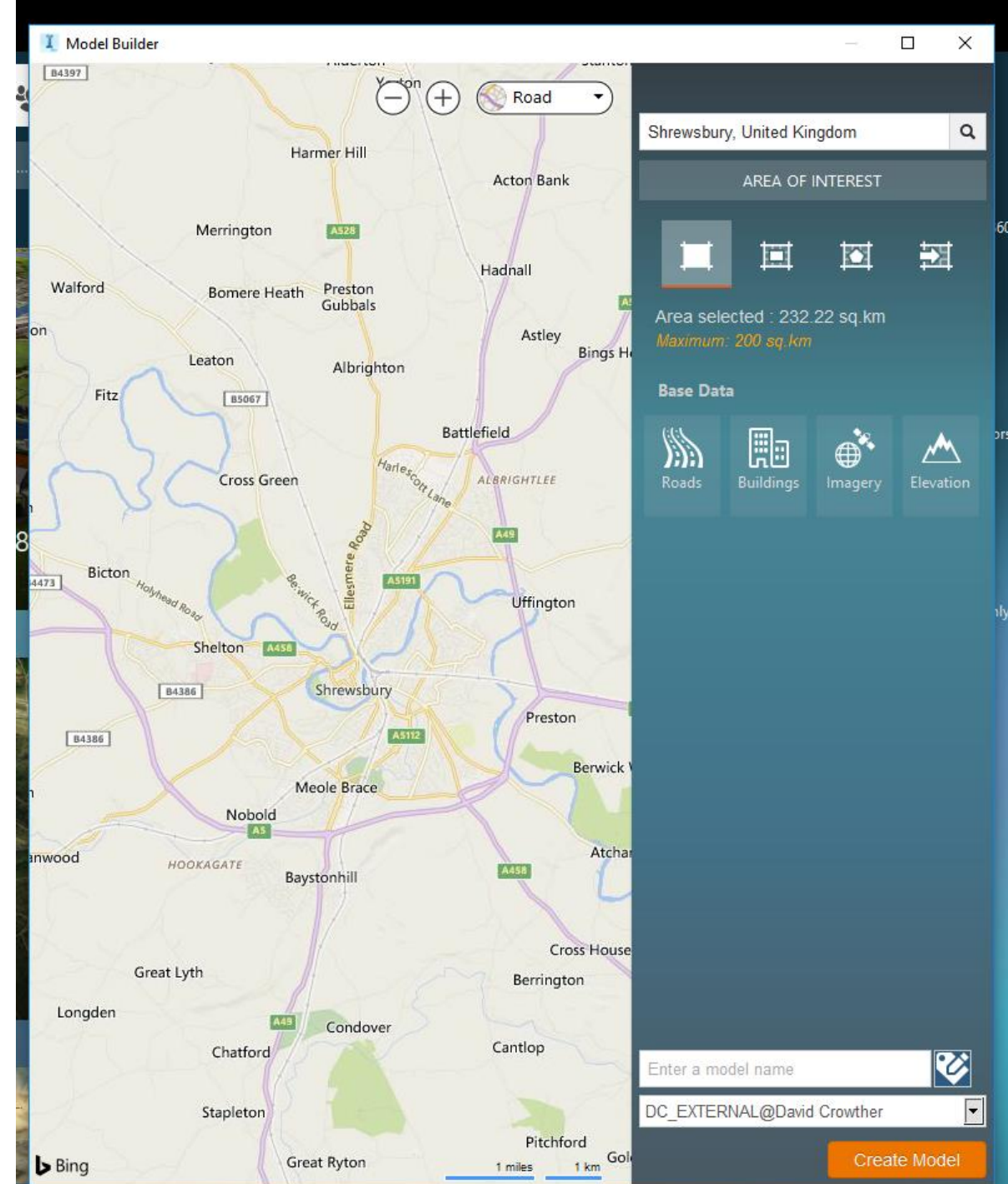
Interoperable

SPATIAL DATA

Implement a Spatial Database to make your spatial data platform independent.
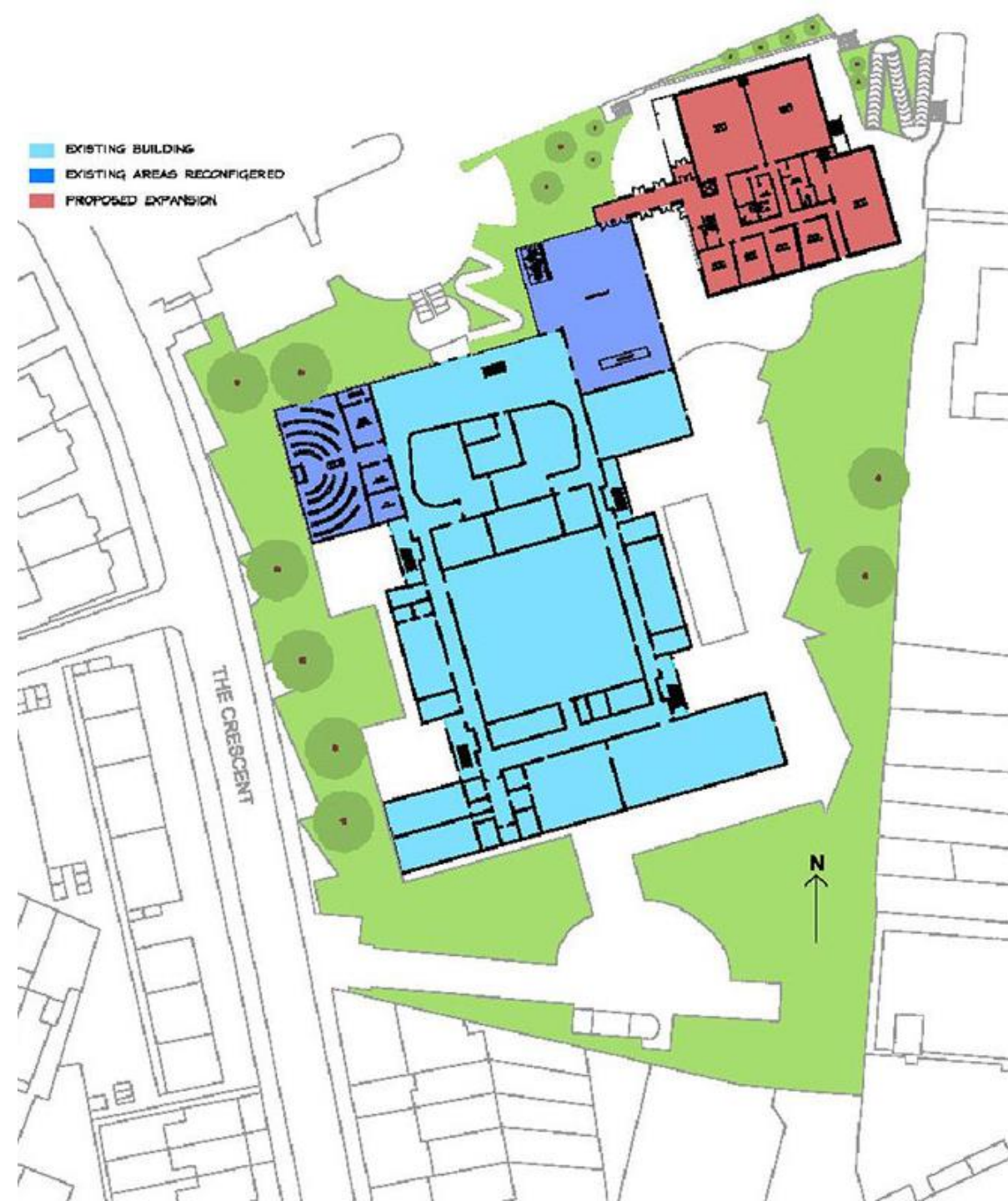
Live Demonstration

Build Your Model

- Use the **Model Builder** to create a Model anywhere in the World

Planning Apps

- Add Planning Applications Layer

- Amend Planning Applications

- Update Shared Model

EXISTING BUILDING
EXISTING AREAS RECONFIGERED
PROPOSED EXPANSION

Environmental Constraints

- Utilise the Environment Agency GeoStore

- Add Environmental Constraint Layers

- Interrogate Environmental Features in Shared Model
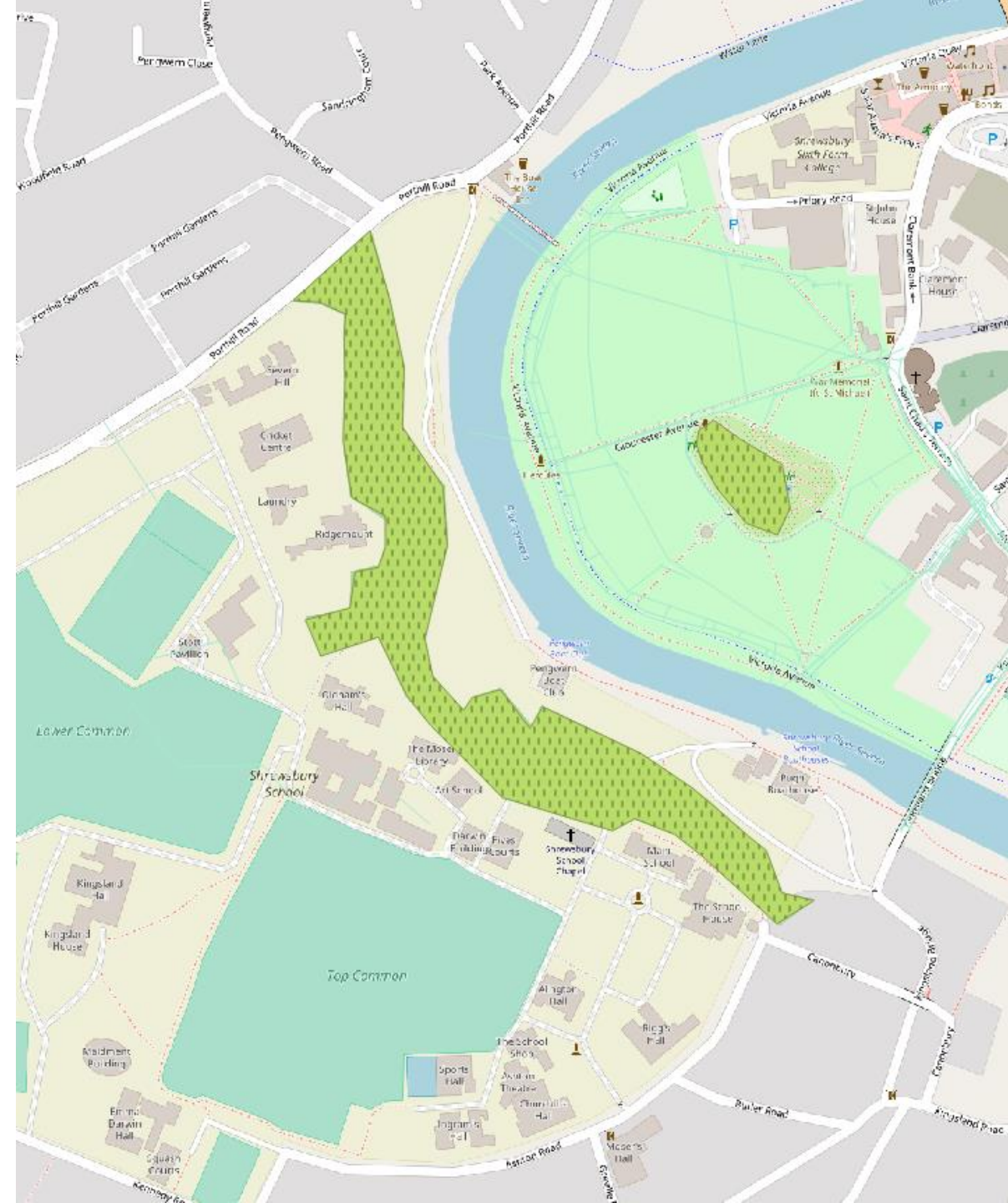
Buildings Layer

- Add Building Development Layer

- Update the Shared Model as the Development is updated

Add Project Data

- Add and Manage any other Project Related Datasets

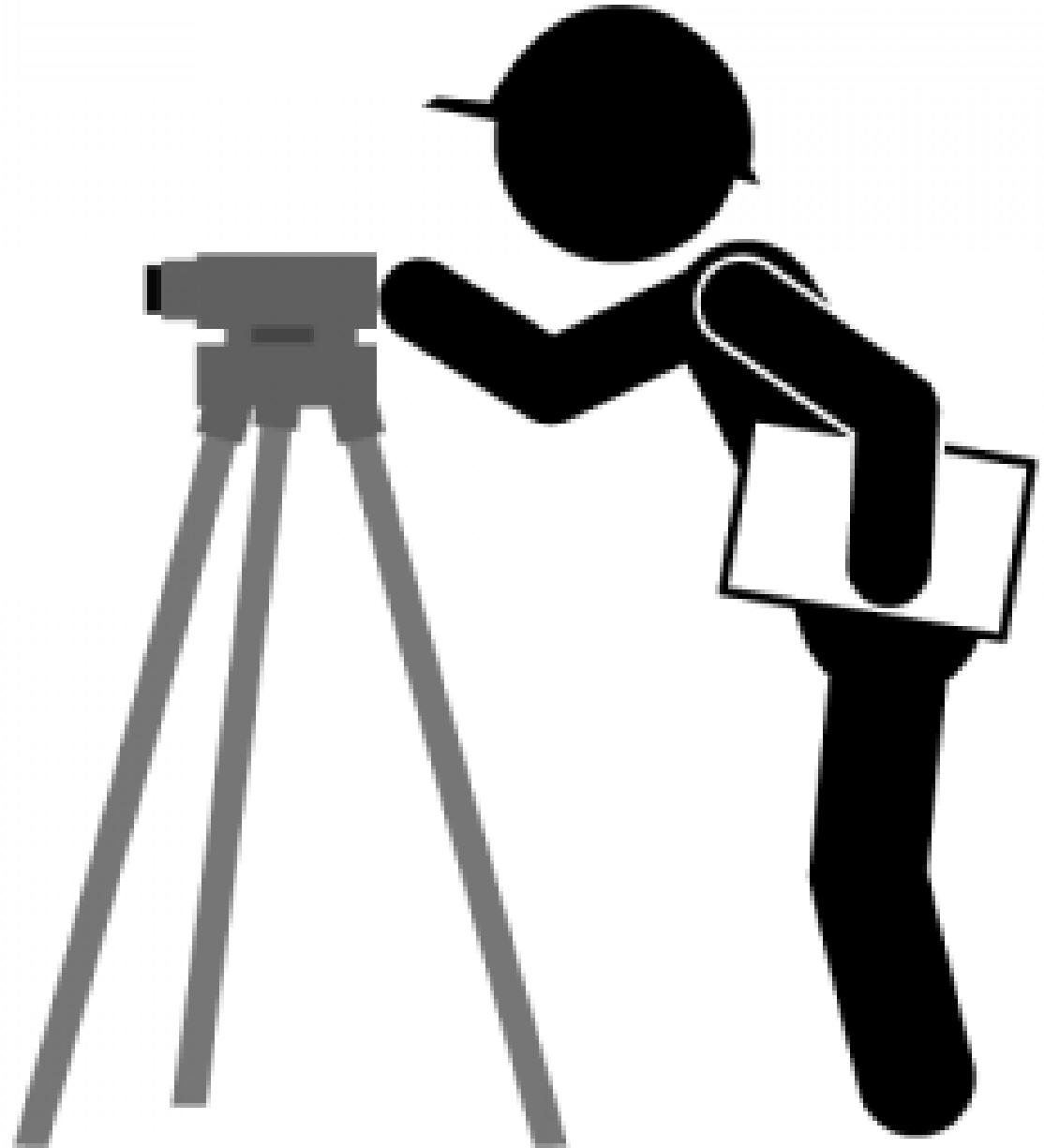- 3D Objects – Wind Turbines

- Revit/FBX Files

Utilities

- Add Utility Networks

- Reshape Features

- Update Attributes

- Add New Features

- Update Heights for Features

Mobile Working

- Access Project Data in the Field

- Identify Features

- Amend Assets

AUTODESK

Make anything.