

AI & Operational Water Management

End-to-End Water Management Series – Part 3

Water Infrastructure - APAC

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Agenda

1 Autodesk AI

2 Surrogate Modelling

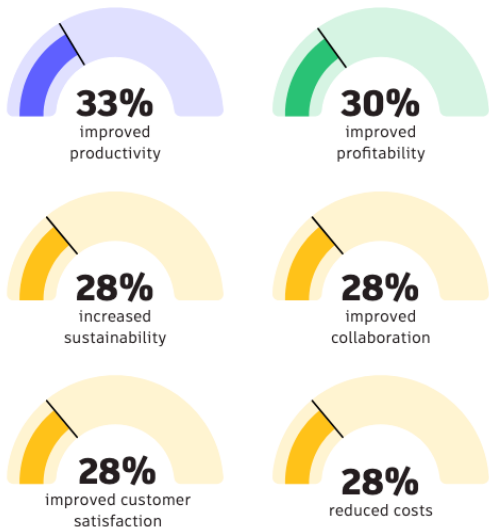
3 Enhanced Scripting with AI Agents

4 Autodesk Assistant

5 Questions

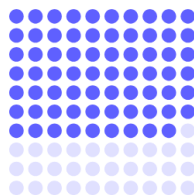
Digital transformation is no longer optional

Productivity tops the list of digital transformation benefits



Technology and talent

69% say digital maturity helps attract talent



36% are prioritizing hiring workers with digital project management skills

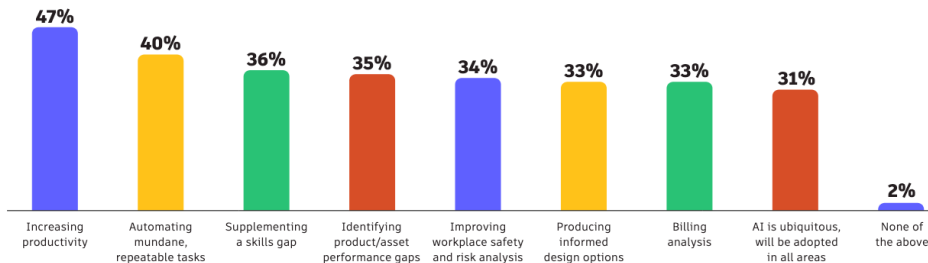


33% are prioritizing hiring workers with data science and data management skills

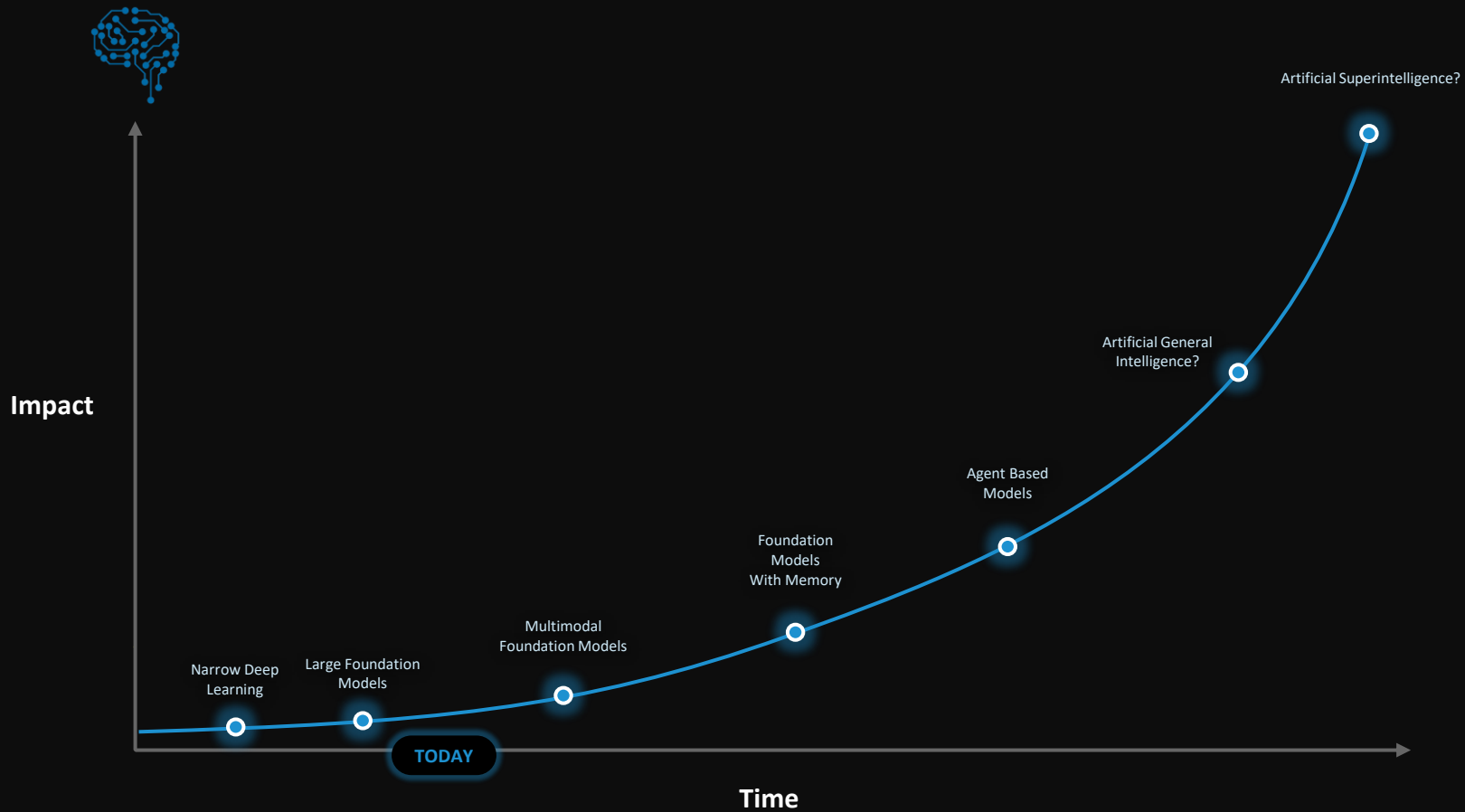
Cost is the top barrier to digital transformation

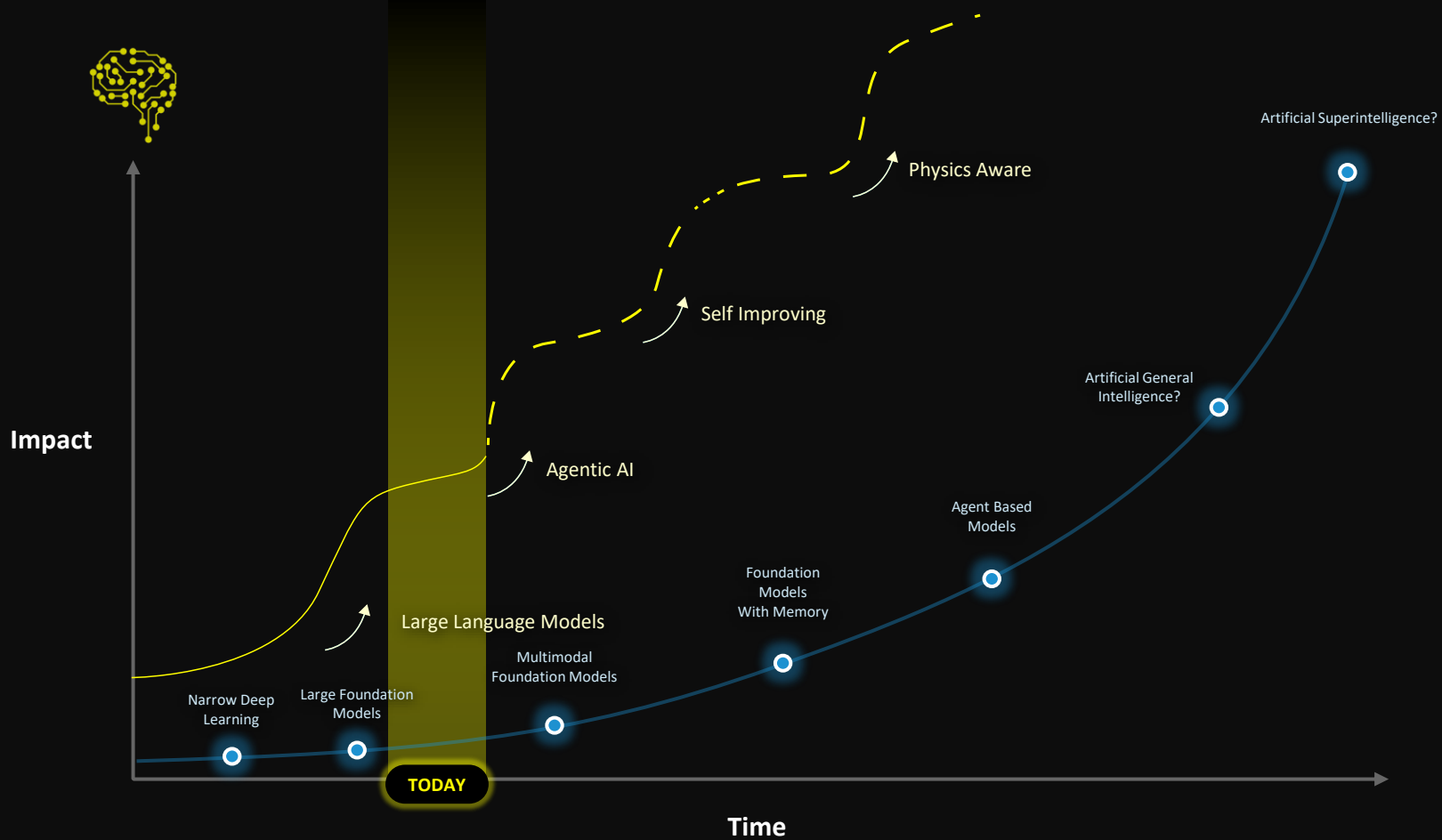


AI use cases across the water industry

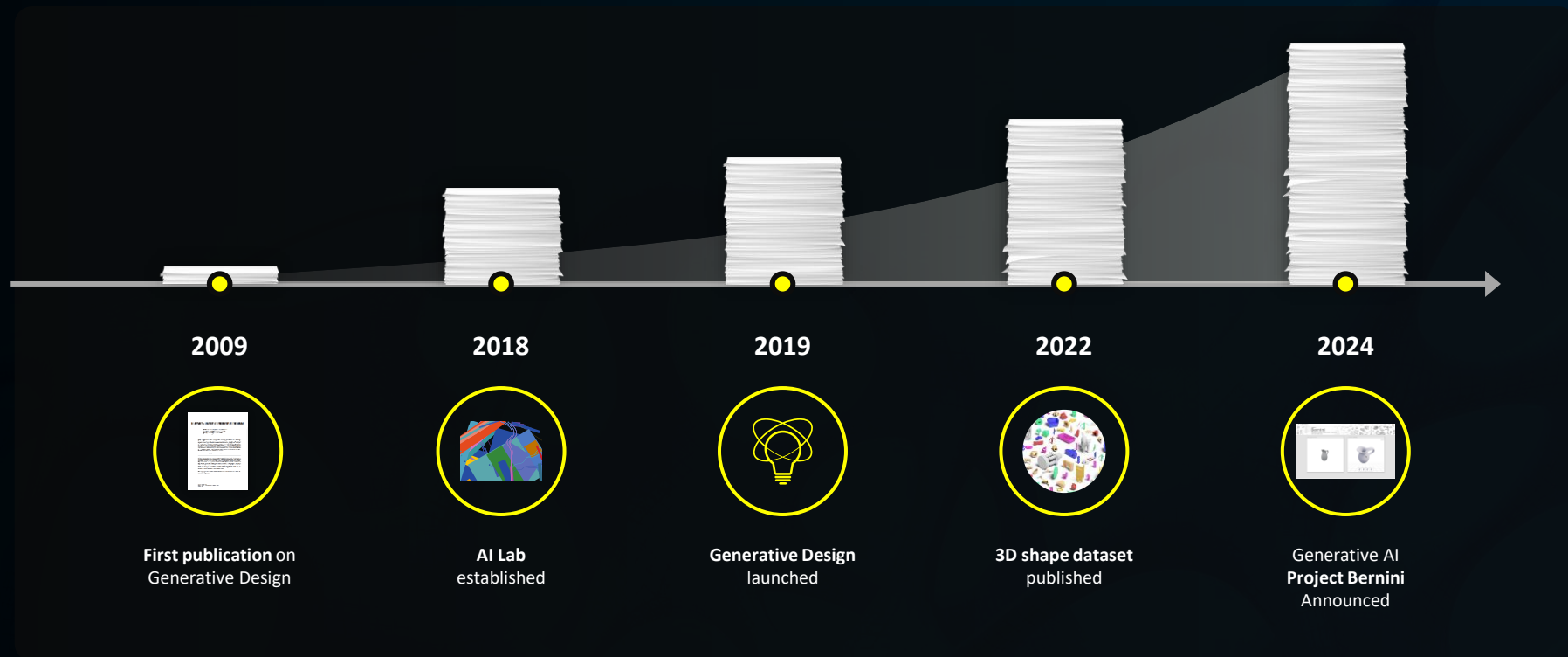


Sources:
2024 State of Design & Make Report
2024 Spotlight on Data and Digitalization in the Water Industry

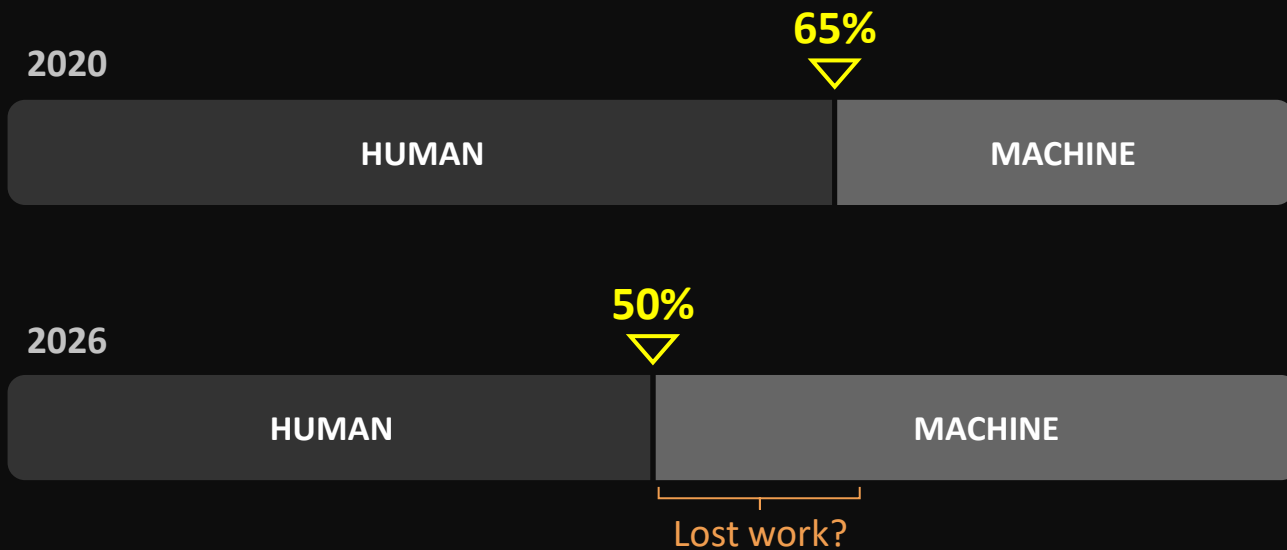




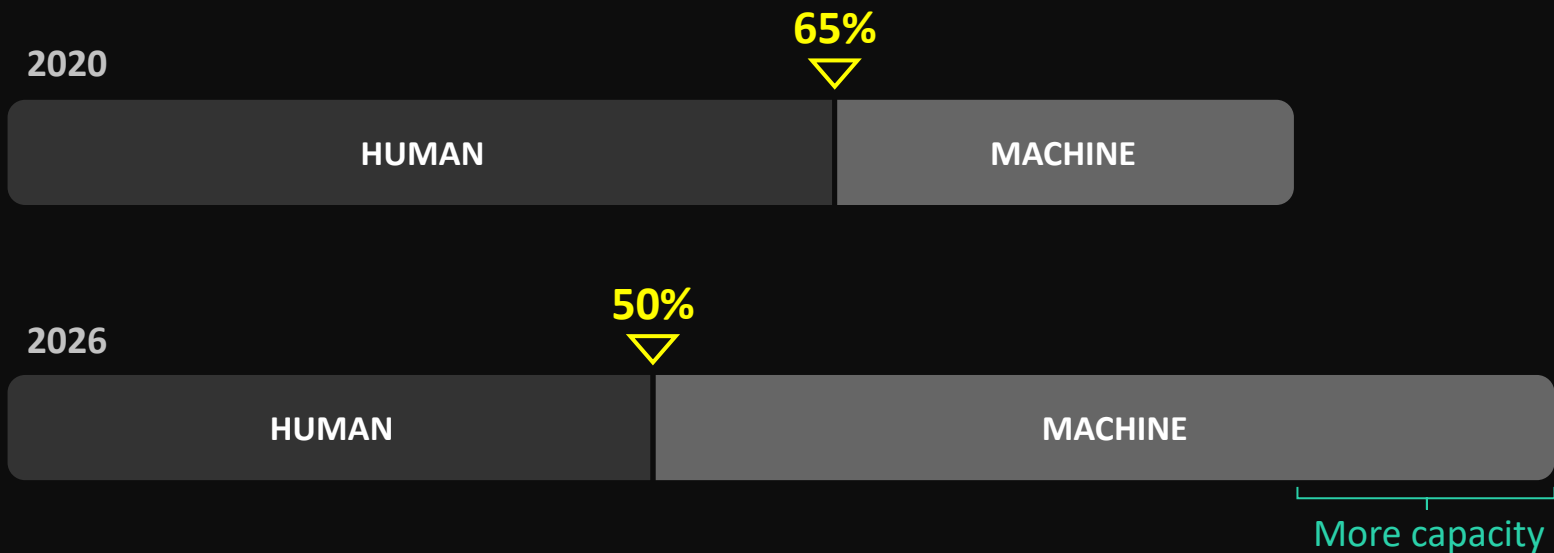
Autodesk's history with AI



A new relationship with machines



A new relationship with machines

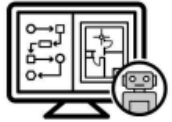


Types of AI



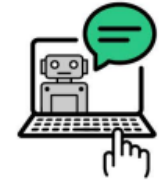
Machine learning (ML)

- A subset of AI that enables computers to “learn” and make decisions based on data sets without being explicitly programmed.



Deep learning

- Uses ML algorithms with biologically inspired logical structures called “artificial neural networks”. It focuses on deep neural networks to model and solve complex problems.



Generative AI

- Produces novel creations based on pretrained deep neural networks that produce probable, albeit unvalidated, outputs.



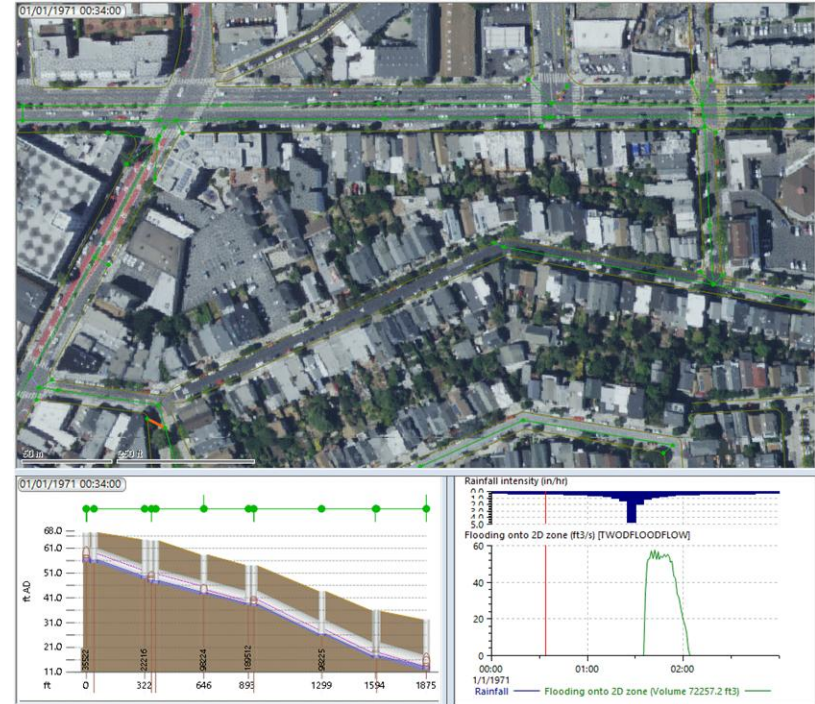
Generative design

- Uses computation to run many real-world simulations and arrive at optimal designs. It produces outputs defined by specific parameters.

Running hydraulic models today

Integrated Catchment Models

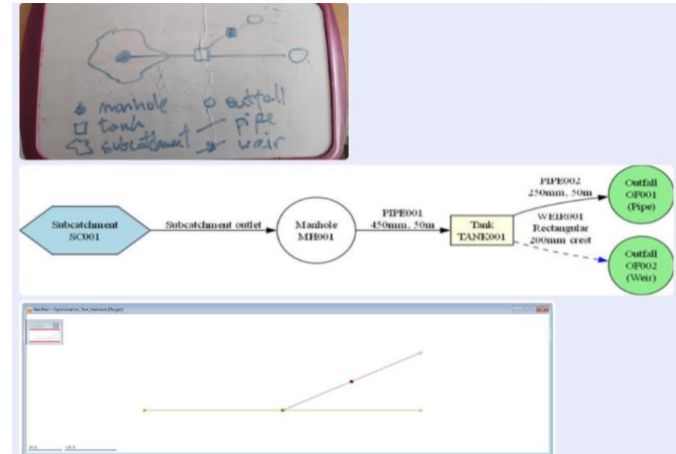
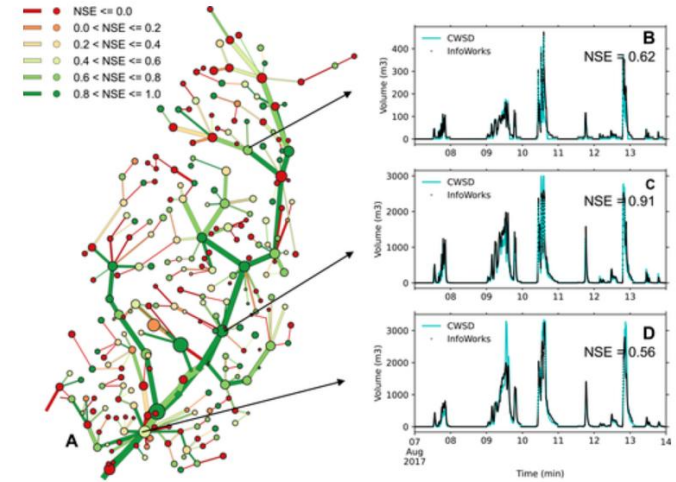
- **Core outputs:** flows, velocities, water levels, flood volumes
- **Based on first principles:** conservation of mass, energy and momentum
- **Advantages:** reality-driven, robust under interventions
- **Limitation:** computationally expensive, especially for multiple scenarios



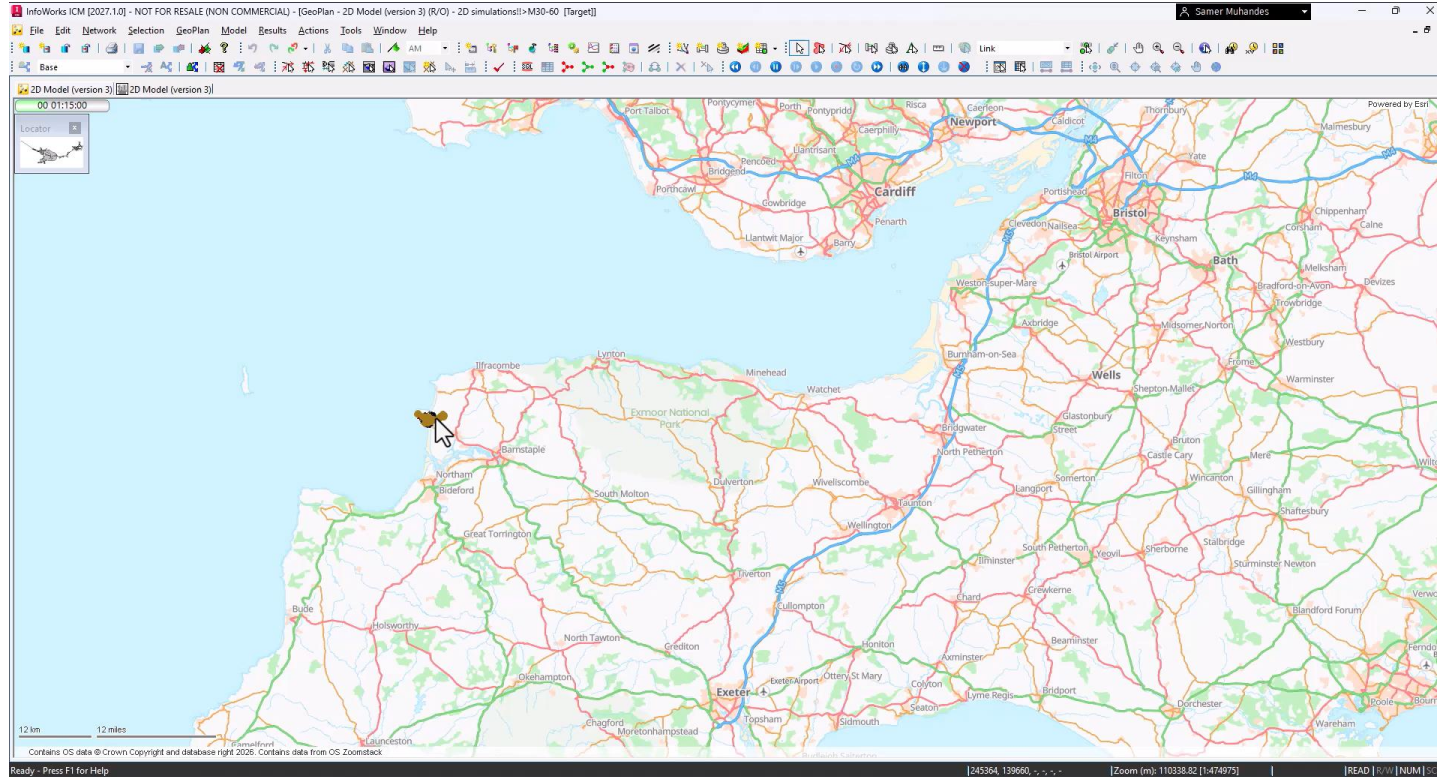
Surrogate Modelling

Integrated Catchment Models

- Computationally expensive to run full hydraulic simulations slowing down operational decision-making
- Approximation, data-driven model trained from outputs from physics-based models
- Input-output pairs from detailed simulations or observed data, learning the relationship between conditions and outcomes
- Provides fast predictions without needing to run the full hydrodynamic model each time



Catchment specific surrogate modelling



- **Machine Learning (ML)** flow prediction
- **Proof of Concept** interface while co-developing with existing digitally mature utilities/asset owners

Catchment specific surrogate modelling

Using Machine Learning for flow prediction

01

Identify locations of interest (e.g., common/critical flooding locations)

02

Run simulations to generate training data for a specific catchment

03

Train surrogate model on variety of conditions and rainfall patterns

04

Deploy surrogate for rapid flow predictions

05

Retrain when new interventions are introduced in the catchment

Site-based Flood Mapping

- Instant feedback on site drainage
- Highlight flooding hotspots to establish optimal locations for drainage structures such as swales, ponds, basins, etc.
- Explore multiple drainage solutions early in the design process enabling a better design process
- **Faster analysis, Enhanced stability, Iterative Design**



25X

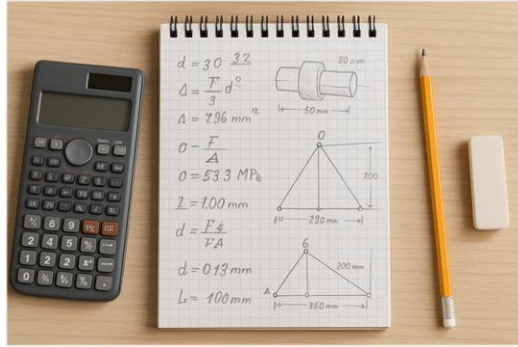
Faster simulation
vs traditional
deluge calculation

10,000+

Trained on
simulations for
model accuracy

Progression of engineering work

Hand Calculations



Spreadsheets



Automation



Past

Recent

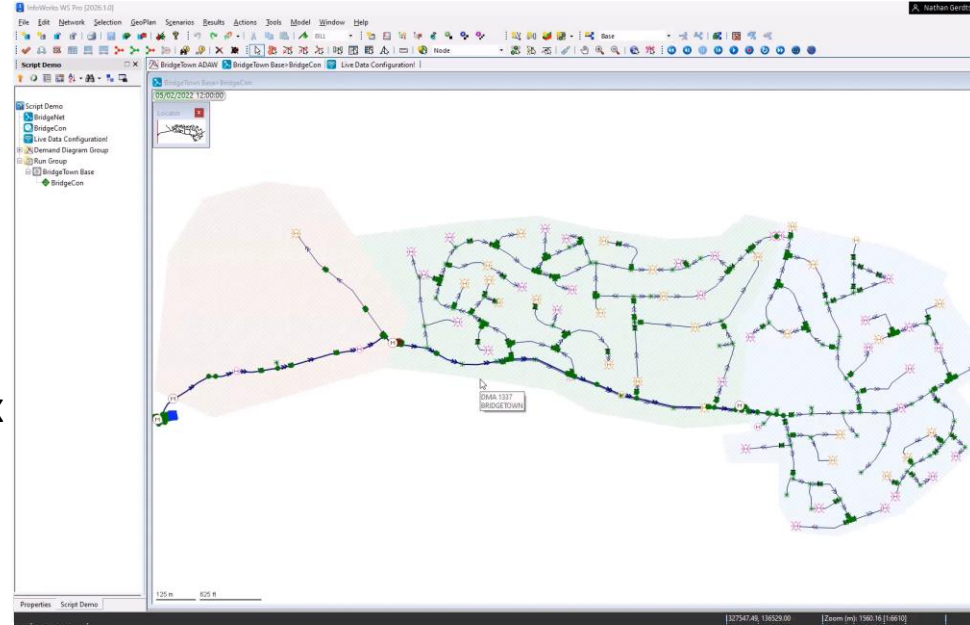
Future

Data Volume



Automation in Hydraulic Modelling

- **Data model tools:** data exchange, data inferencing, spatial analyses
- **Query-based tools:** dynamic selection, automated editing and custom reports
- **Scripting:** programming to solve complex problems



Manual

Consultative

Agentic

Modes of scripting

Manual

Consultative

Agentic

The screenshot displays the InfoWorks ICM (2026.3.0) software interface. The main window shows a Ruby script titled "Earthworks cost estimator - pipes and storage" which calculates high-level earthworks cost estimates for selected pipes, storage nodes, and/or ponds. The script includes usage instructions and a list of results fields. A pop-up window indicates that the "Earthworks cost estimation" is complete, showing a total volume of 5962.74 m³ and a total cost of \$298136.84. The background map shows a drainage network with various structures labeled (e.g., Structure - (409), Structure - (412), Structure - (413), Structure - (415), Structure - (416), Structure - (417), Structure - (456)). The left sidebar shows the project tree with folders like "Database [2026.3]", "Export", "General", "Hydraulics", "Hydrology", "Import", "Rainfall", "Results", "Rivers", "SQLs", "Template Networks", "Themes", "2. DEMOS", "3. TESTING", and "Recycle Bin (*)". The right sidebar shows the "InfoWorks ICM" help page, specifically the "!=" (Does Not Equal) operator section, which explains its syntax and usage.

InfoWorks ICM UI Script
Earthworks Cost Estimator (Pipes, Storage Nodes, and Ponds)
This script calculates high-level earthworks cost estimates for selected pipes, storage nodes, and/or ponds in the ICM UI.
- Pipes: Based on trench volume (length × width × average depth).
- Storage Nodes/Ponds: Based on storage array volume.
InfoWorks ICM 2026.3.0

Usage:
1. Select pipes, storage nodes, and/or ponds in the ICM UI.
2. Run this script from the ICM UI.
3. Enter the standard trench width when prompted (feet).
4. Enter the cost per cubic meter for earthworks.
5. Review the results in the output window and export to CSV.

Earthworks cost estimation complete!
Pipes: 47
Storage/Ponds: 0
Total Volume: 5962.74 m³
Total Cost: \$298136.84
See output window for detailed results.

InfoWorks ICM Help
+ InfoWorks ICM Help
+ Technical Notes and References

!= (Does Not Equal)
Checks if this model object is not the same as another model object (inequality check).
Syntax: `!=(other_mo) ⇒ Boolean`
EXCHANGE | UI
Returns the value of a field.

== (Equals)
Checks if this model object is the same as another model object (equality check).
Syntax: `==(other_mo) ⇒ Boolean`
EXCHANGE | UI
Returns the value of a field.

[] (Get Field)
Returns the value of a field.
Syntax: `#[(field)] ⇒ Any`
EXCHANGE | UI

[]= (Set Field)
Sets the value of a field.
Syntax: `#[(field)]= (value) ⇒ void`
EXCHANGE | UI

Parameters

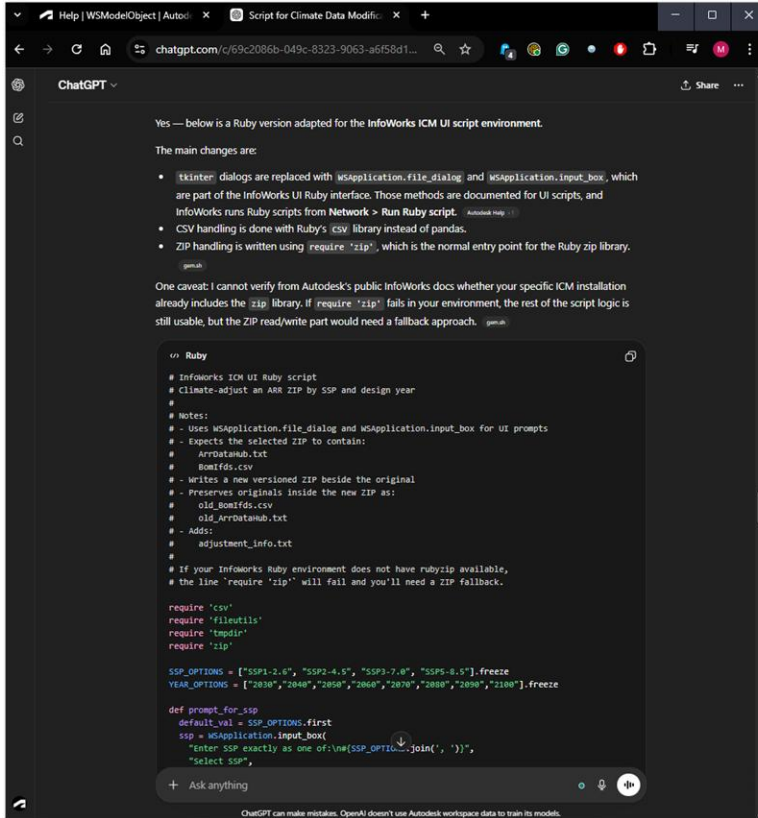
Name	Type(s)	Description
field	String	Name of the field.

Modes of scripting

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Yes — below is a Ruby version adapted for the InfoWorks ICM script environment.

The main changes are:

- `tkinter` dialogs are replaced with `WSApplication.file_dialog` and `WSApplication.input_box`, which are part of the InfoWorks ICM Ruby interface. Those methods are documented for UI scripts, and InfoWorks runs Ruby scripts from **Network > Run Ruby script**.
- CSV handling is done with Ruby's `CSV` library instead of `pandas`.
- ZIP handling is written using `require 'zip'`, which is the normal entry point for the Ruby zip library.

One caveat: I cannot verify from Autodesk's public InfoWorks docs whether your specific ICM installation already includes the `zip` library. If `require 'zip'` fails in your environment, the rest of the script logic is still usable, but the ZIP read/write part would need a fallback approach.

```
#!/usr/bin/ruby
# InfoWorks ICM UI Ruby script
# Climate-adjust an ARR ZIP by SSP and design year

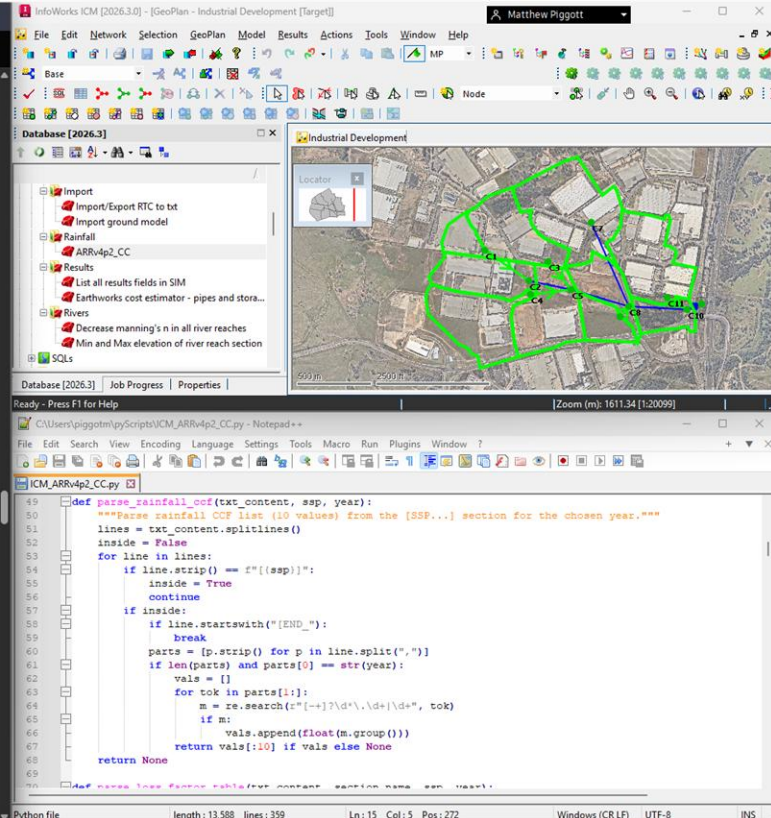
# Notes:
# - Uses WSApplication.file_dialog and WSApplication.input_box for UI prompts
# - Expects the selected ZIP to contain:
#   - Arrnetab.txt
#   - Bomifds.csv
# - Writes a new versioned ZIP beside the original
# - Preserves originals inside the new ZIP as:
#   - old_bomifds.csv
#   - old_arrnetab.txt
# - Add:
#   - adjustment_info.txt
#
# If your InfoWorks Ruby environment does not have rubyzip available,
# the line 'require 'zip'' will fail and you'll need a ZIP fallback.

require 'csv'
require 'fileutils'
require 'tmpdir'
require 'zip'

SSP_OPTIONS = ["SSP1-2.6", "SSP2-4.5", "SSP3-7.0", "SSP5-8.5"].freeze
YEAR_OPTIONS = ["2030", "2040", "2050", "2060", "2070", "2080", "2090", "2100"].freeze

def prompt_for_ssp
  default_val = SSP_OPTIONS.first
  ssp = WSApplication.input_box(
    "Enter SSP exactly as one of:#{SSP_OPTIONS.join(', ')}",
    "Select SSP",
    default_val
  )
end
```

ChatGPT can make mistakes. OpenAI doesn't use Autodesk workspace data to train its models.



InfoWorks ICM [2026.3.0] - [GeoPlan - Industrial Development [Target]]

Database [2026.3]

- Import
 - Import/Export RTC to txt
 - Import ground model
- Rainfall
 - ARRv4p2_CC
- Results
 - List all results fields in SIM
 - Earthworks cost estimator - pipes and stora...
- Rivers
 - Decrease manning's n in all river reaches
 - Min and Max elevation of river reach section
- SQLs

Database [2026.3] | Job Progress | Properties |

Ready: Press F1 for Help | [Zoom (m): 1611.34 [1:20099]]

C:\Users\piggott\pyScripts\ICM_ARRv4p2_CC.py - Notepad++

```
def parse_rainfall_obj(txt_content, ssp, year):
    """Parse rainfall CCY list (10 values) from the [SSP...] section for the chosen year."""
    lines = txt_content.splitlines()
    inside = False
    for line in lines:
        if line.strip() == f"[{ssp}]":
            inside = True
            continue
        if inside:
            if line.startswith("END"):
                break
            parts = [p.strip() for p in line.split(",")]
            if len(parts) and parts[0] == str(year):
                vals = []
                for tok in parts[1:]:
                    m = re.search(r"([+-]?[d*]\.d+|\d+)", tok)
                    if m:
                        vals.append(float(m.group(1)))
                return vals[:10] if vals else None
    return None
```

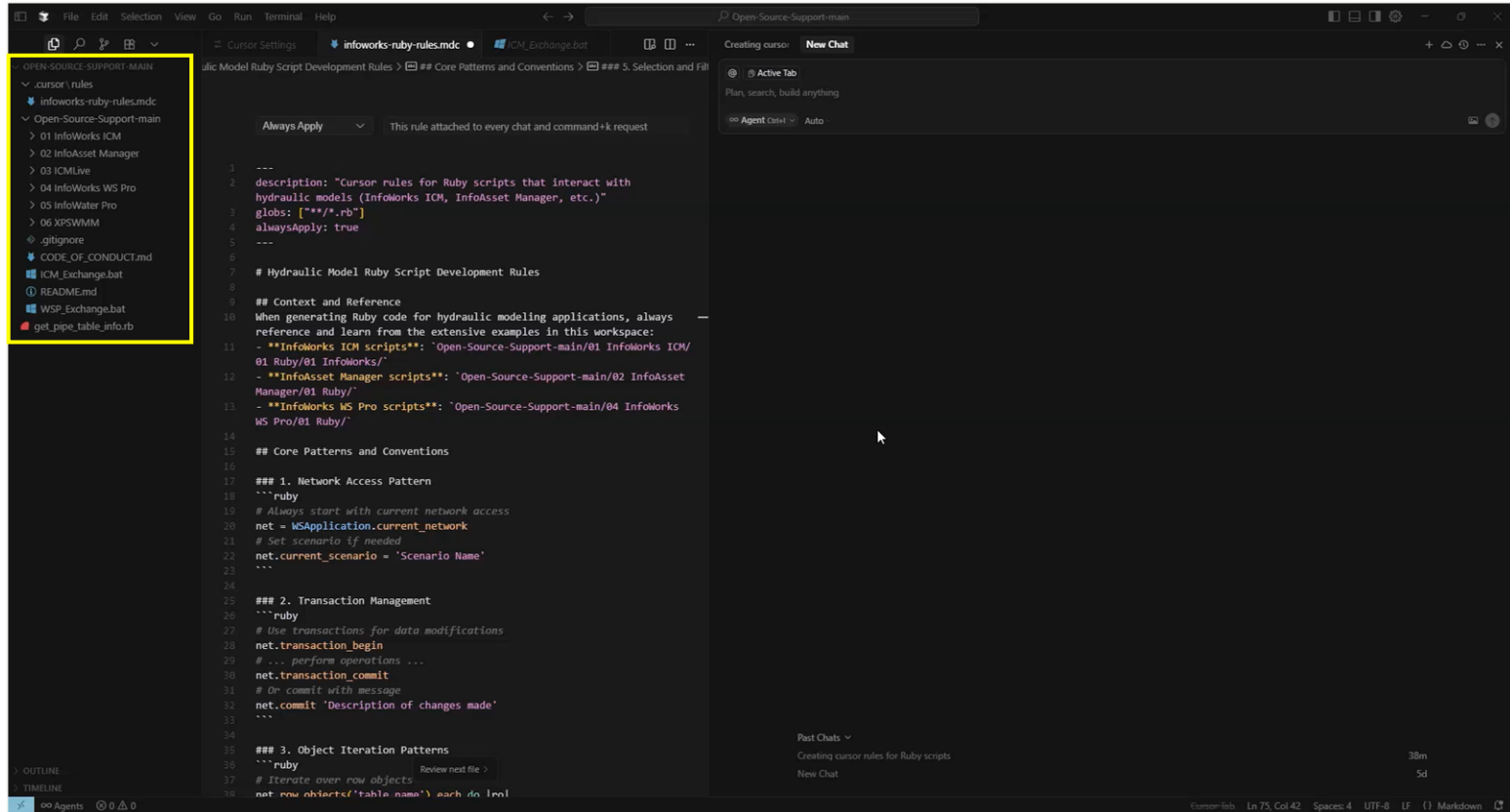
Python file | length: 13,588 | lines: 359 | Ln: 15 | Col: 5 | Pos: 272 | Windows (CR LF) | UTF-8 | INS

Modes of scripting

Manual

Consultative

Agentic



Modes of scripting

Automation in hydraulic modelling



Manual

- Understand **language** to write code
- **Run** scripts via software UI or Command prompt



Consultative

- **Generative AI** acts reactively based on pretrained info e.g., free license of ChatGPT
- **Helps** write, refine and debug scripts
- Requires a lot of context and can be quite **iterative** for complex workflows



Agentic

- **Agentic AI** acts proactively interacts with connected info e.g., Cursor AI
- **Helps** plan, write, guide (ask) and debug scripts
- More **efficient** since connected with external open resources e.g., GitHub, online help files



Running AI-enhanced scripting



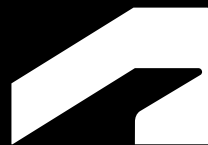
AWI GitHub repository <https://github.com/innovyze>

The screenshot shows the GitHub repository page for 'innovyze/Open-Source-Support'. The repository is public and has 40 forks and 91 stars. The 'Code' tab is selected, showing a list of files and folders. The files include: .cursor, .github/workflows, 01 InfoWorks ICM, 02 InfoAsset Manager, 03 ICMLive, 04 InfoWorks WS Pro, 05 InfoWater Pro, 06 XP3WMM, 07 Ruby Exchange Gems, .gitignore, AGENTS.md, CODE_OF_CONDUCT.md, LICENSE, PR_RULES_OF_ENGAGEMENT.md, and README.md. The repository description states: 'This repository hosts open code that can be used in Innovyze products that support scripting. This includes Ruby for the UI/Exchange, SQL and other useful stuff. We stand on the shoulders of badgers and penguins.'

Autodesk Product Help MCP Server

The screenshot shows the Autodesk Product Help MCP Server documentation page. The page is titled 'Autodesk Product Help MCP Server' and includes a search bar. The main content area lists the supported clients and IDEs: ChatGPT, Claude Desktop, Claude Code, Cursor IDE, MCP-capable HTTP clients, Source: Autodesk Help and Support content (live content), and Use It to: discover products, search by keywords, and retrieve trusted documentation (tool availability varies by endpoint/audience). The page also includes a 'Start Here (2-5 minutes)' section with three steps: 1) Set the endpoint, 2) Connect your client, and 3) Verify it works. The 'Set the endpoint' step provides the endpoint URL: https://developer.api.autodesk.com/knowledge/public/v1/mcp. The 'Connect your client' step lists the supported clients and IDEs. The 'Verify it works' step lists the supported clients and IDEs. The page also includes a 'Common Workflows' section with a table of scenarios, tools, prompt templates, and next steps.

Scenario	Tools (typical order)	Prompt template	Next step
Validate product + version (so you can scope searches)	get_available_products	List available products. For <products>, list supported releases and the exact values I should use.	Use the resolved product + release in your follow-up prompts.



Scripting examples

InfoWorks ICM

Custom Workflows

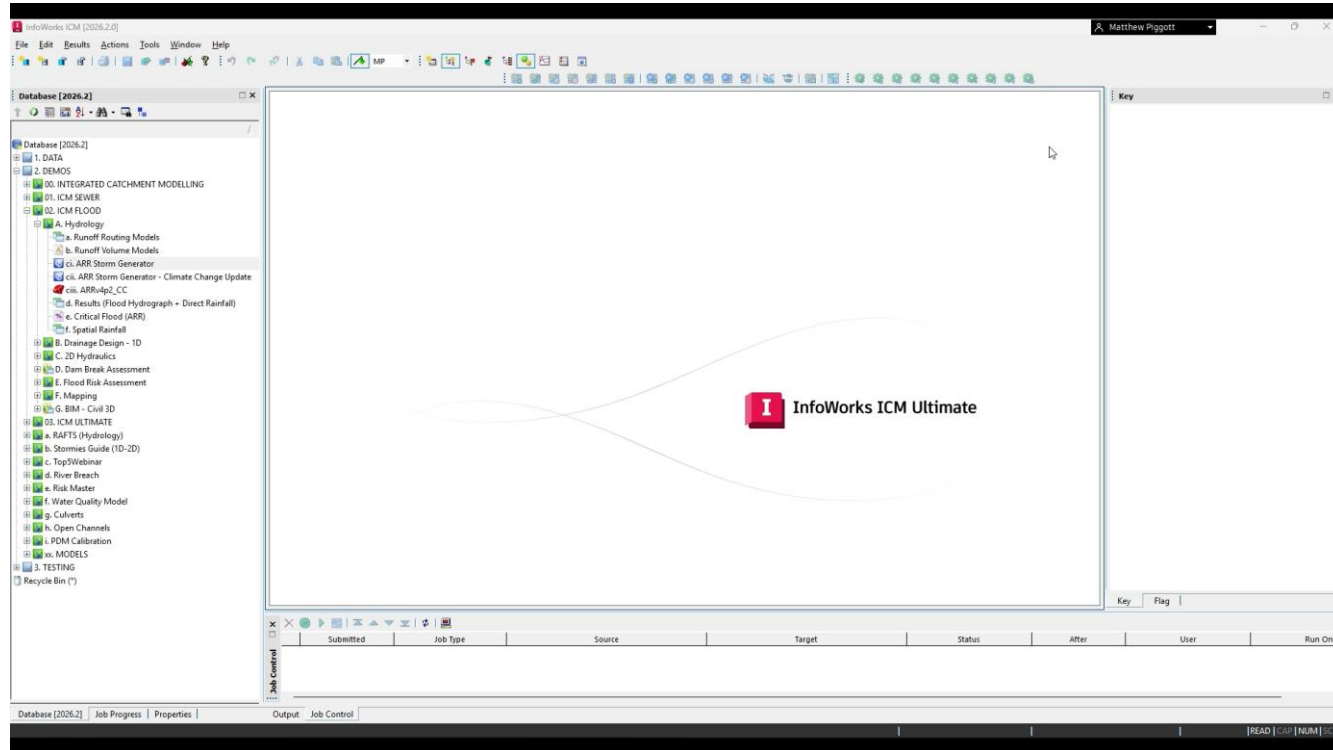
Stay up to date with changing local guidance

- ARR Climate Change update (version 4.2)

Manual

Consultative

Agentic



Custom Workflows

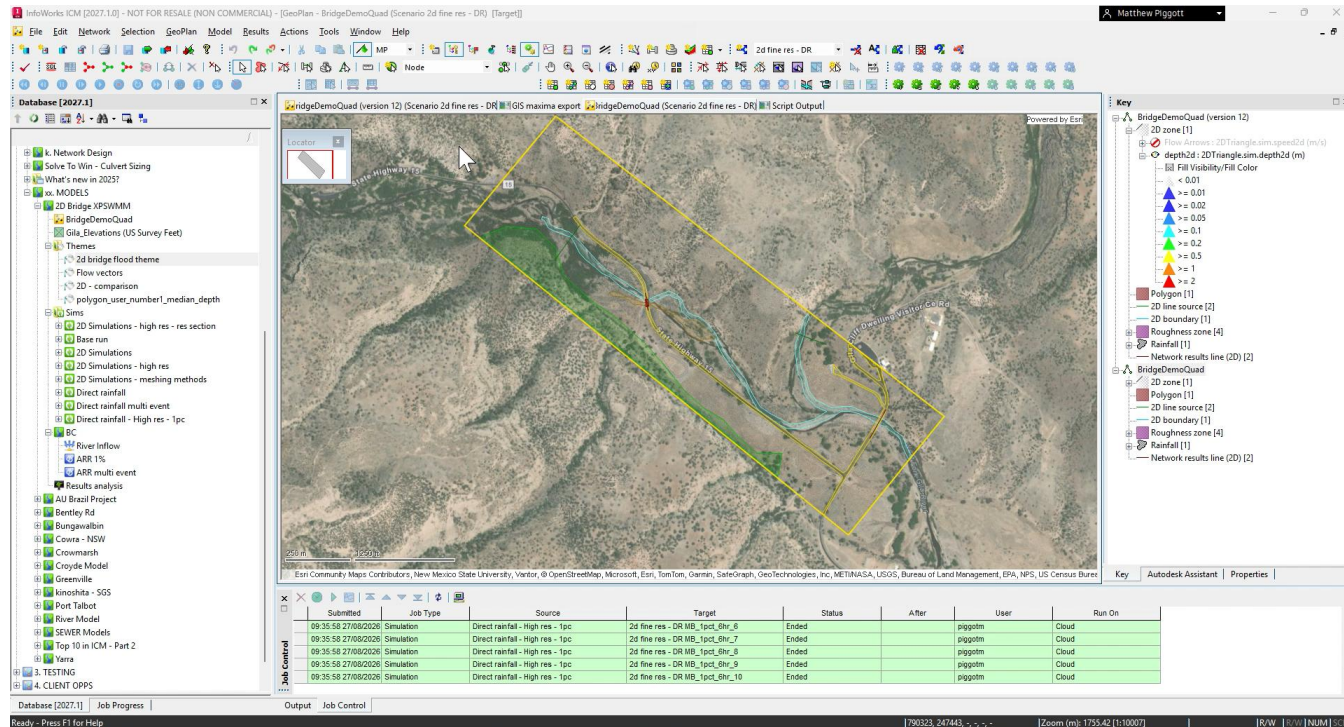
End user request – result processing

- ARR Statistics – 2D Zone Elements

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Custom Workflows

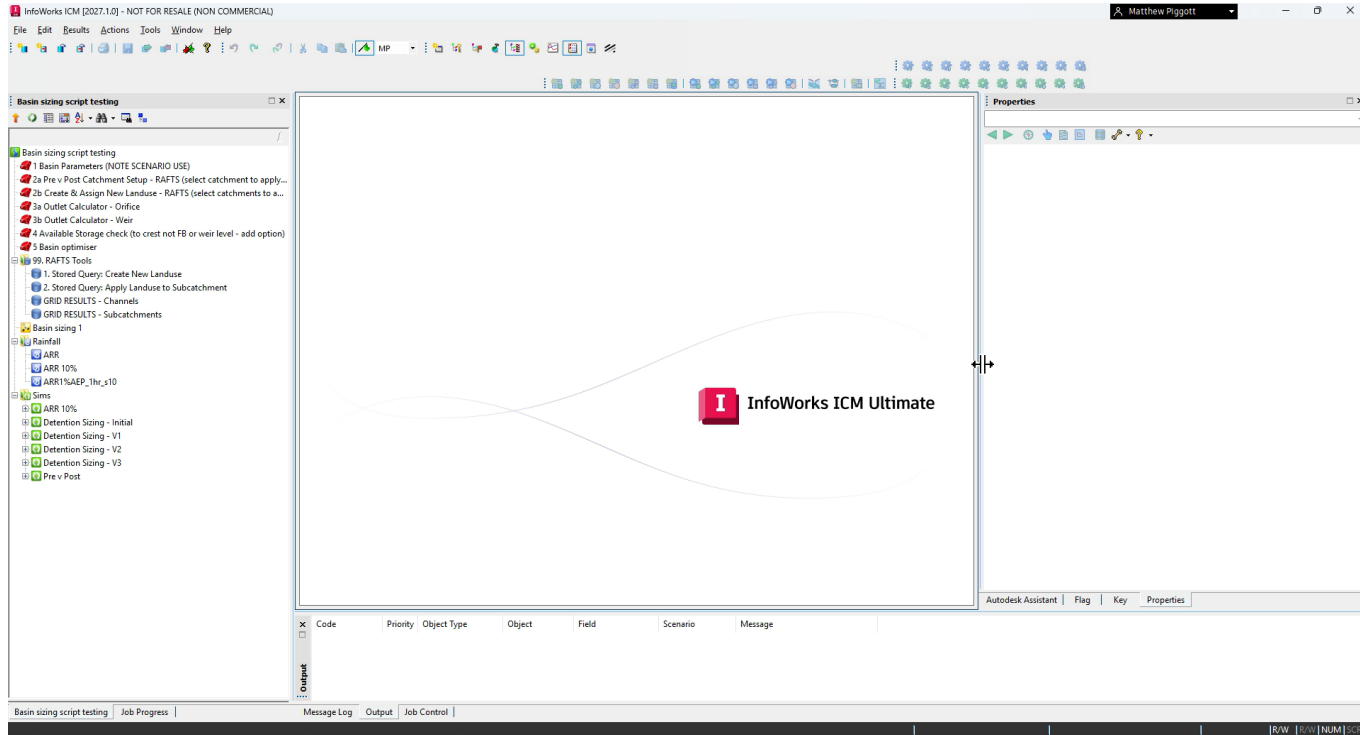
Streamline stormwater design process

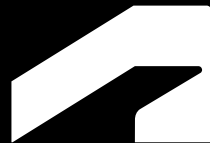
- Basin Sizing Tools

Manual

Consultative

Agentic





Autodesk Assistant

Get work done faster with AI embedded in your workflow

Autodesk Assistant



Autodesk Assistant

InfoWorks ICM Ultimate

InfoWorks ICM (2017.1.0) - NOT FOR RESALE (NON-COMMERCIAL)

File Edit Network Selection GeoPlan Model Results Actions Tools Window Help

ICM sample model

2D Model

2D zone: 2D Zone: 2D Model

Properties

2D zone Object Properties

Perimeter definition

ID: 2D Zone

Area (m2): 16,502

Minimum triangle area (m2): 100,000

Minimum element area (m2): 25,000

Mesh generation: DBK

Boundary type: Vertical Wall

Terrain sensitive meshing: ☐

Minimum height variation (m): 1,000

Minimum angle (degree): 25.00

Roughness (Manning's n): 0.0125

Roughness definition: ☐

Apply rainfall etc directly to mesh: ☐

Apply rainfall etc: everywhere

Rainfall profile: ☐

Infiltration surface: ☐

Turbulence model: ☐

Rainfall percentage: 100,000

Mesh summary: ☐

Mesh data: ☐

Subgrid sampling (Tech Preview): ☐

Subgrid sampling: ☐

Subgrid triangle area (m2): ☐

General properties: ☐

Indices: ☐

Hyperlinks: ☐

User default properties: ☐

Submitted Job Type Source Target Status After User Run On

ICM sample model Job Progress Message Log Output Job Control

Ready - Press F1 for help

15/06/2018 11:04:01 (15/07/18)

Autodesk Assistant



InfoWorks ICM



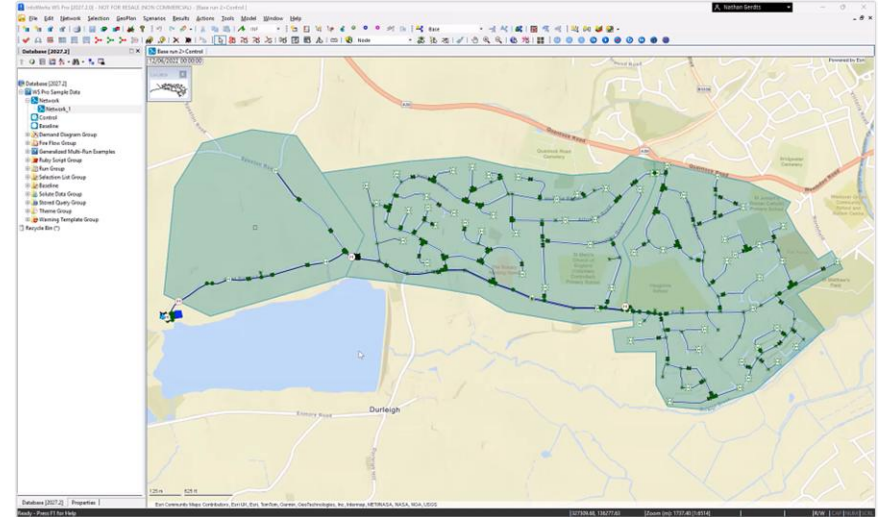
InfoWorks WS Pro

Current release

- Help guidance and troubleshoot errors
- Write SQL queries and scripts

Upcoming release

- Query model data and results for reporting and insights
 - "Summarise the demand, pressure, and leakage in each DMA"
 - "Show me my critical points in the system"
- Automate data editing
 - "Create multiple scenarios and run simulations to evaluate the optimal PRV settings"



Keeping AI and ML trusted

Advancing hydraulic models of water networks

AI and ML capability	Required control
Script generation	Review, testing, version control
Scenario automation	Documented assumptions and model standards
KPI reporting	Outcome-based with consistent definitions
Surrogate prediction	Validation against model simulations
Operational use	Documented engineering review
Network changes	Document retraining triggers

- The **physics-based hydraulic model** remains the engineering **source of truth**

Conclusions

AI & Operational Water Management

- **AI** use cases across hydraulic modelling are evolving to increase productivity, automate repetitive tasks and less rework
- **Catchment surrogate ML models** act as assistants to the hydraulic model (1D & 2D) enabling quicker evaluation and development of planning and operational strategies
- **AI enhanced scripting & AI Agents** automate key modelling workflows with generative and agentic AI lowering the barrier to scripting
- Demonstrate practical, incremental pathway for engineers to advance physics-based hydraulic modelling





Resources

- **Technical Hubs**
 - [InfoWorks ICM](#)
- **Autodesk Viewer licenses**
 - <https://www.autodesk.com/viewers>
- **Educational licenses**
 - [Autodesk Education Community](#)
- **Trail downloads**
 - [InfoDrainage Free Trial](#)

Resources

Scripting

- Load factory scripts and examples from the InfoWorks **sample database**
- Full paper - [Unlock the Power of AI-Enhanced Scripting for Hydraulic Modeling in InfoWorks ICM and InfoWorks WS Pro](#)
- Please reach out for script ideas or start with AI-coding applications if available e.g., Cursor, Claude or ChatGPT





Connect with us



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