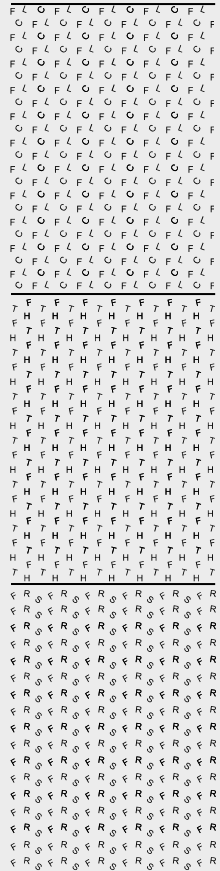


AI for Tomorrow's On-Demand Digital Twins

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How can we help planners to better understand the impact of new policies and plans on the urban climate?

By using a digital twin of the city that allows them to **simulate** what-if scenarios...

DIGITAL URBAN CLIMATE TWIN EXPLORER



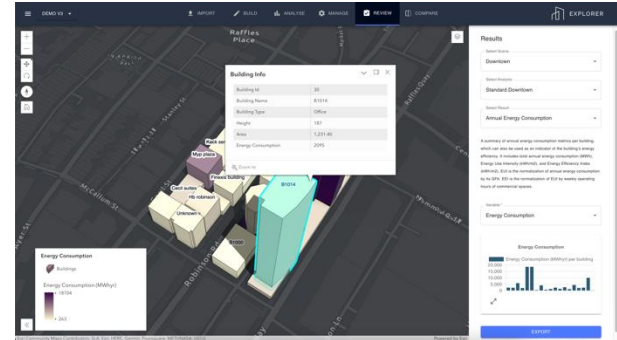
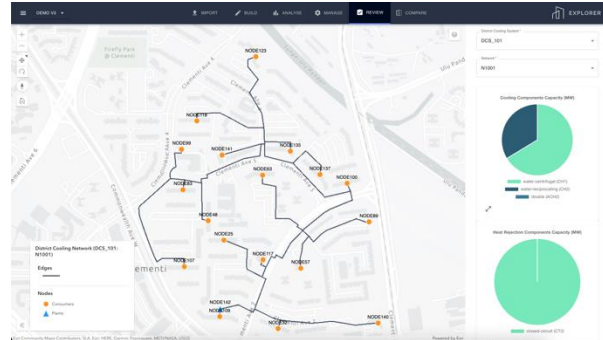
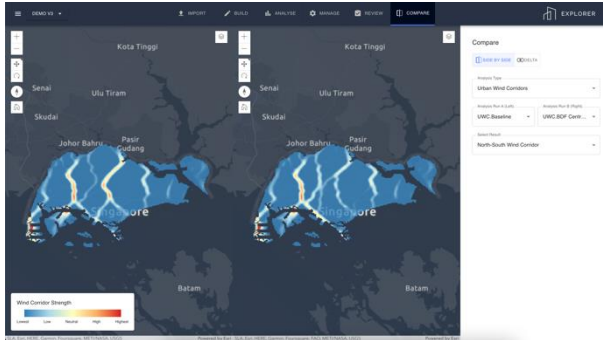
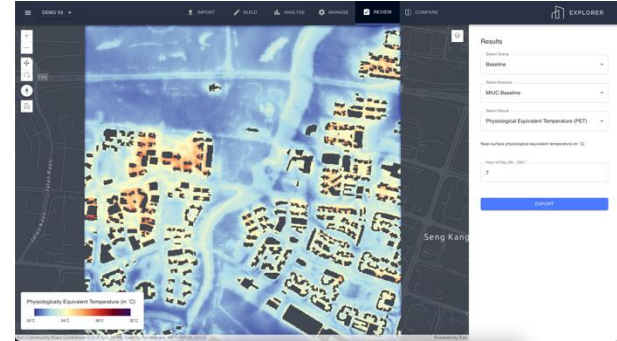
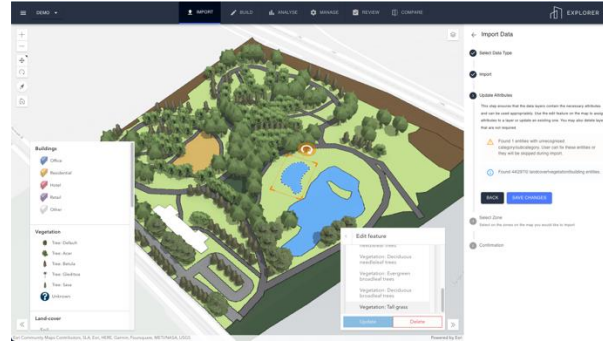
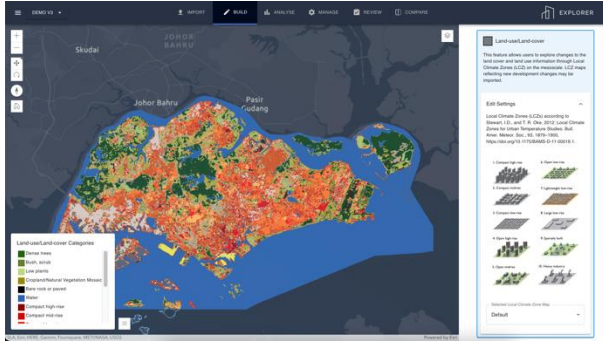
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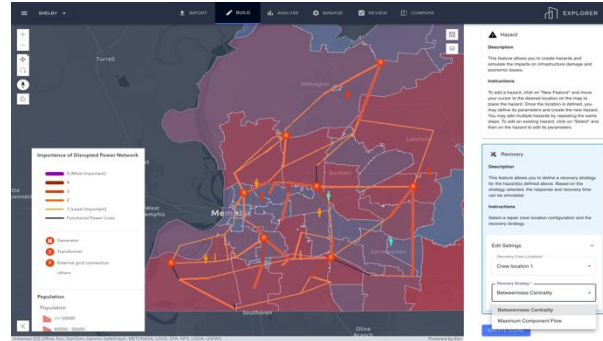
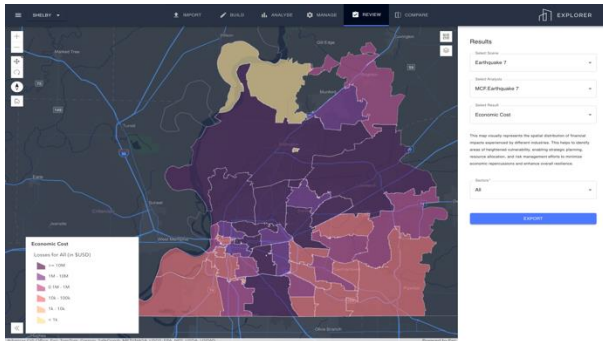
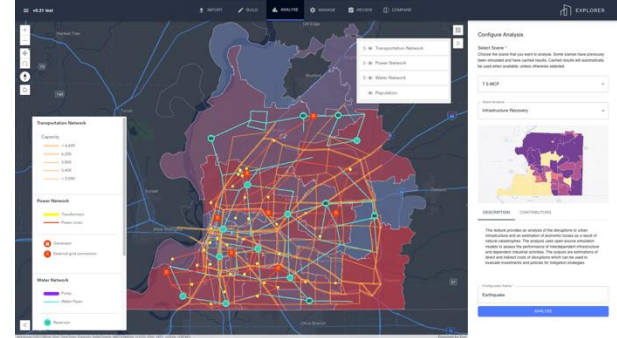
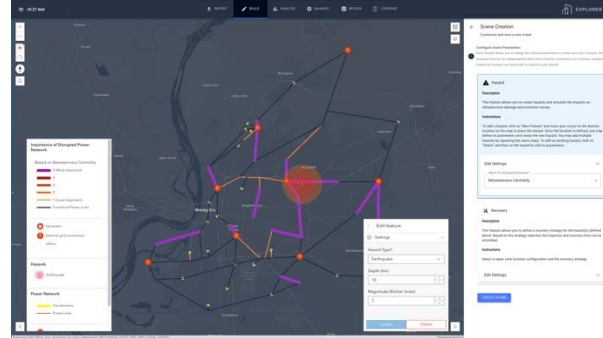
DIGITAL
TWIN
LAB



Digital Urban Climate Twin Explorer has been built with the goal is to enable planners to benefit from what-if scenario capabilities to help them with planning.



Infrastructure Resilience Explorer* is based on the same Explorer app but geared towards infrastructure network resilience.



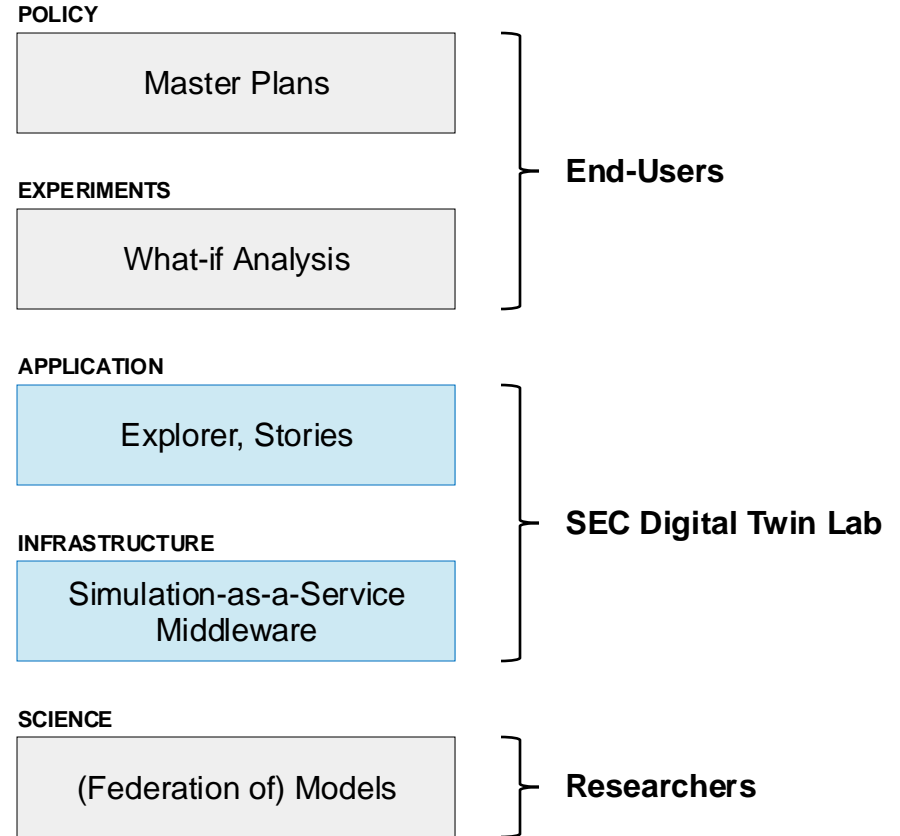
What is the impact of earthquakes on infrastructure networks? How does placement of repair teams impact infrastructure recovery?

*) This work was done for the Future Resilient Systems II programme.

From Science to Policy – DTL Approach

We build digital twin applications (**Explorer, Stories**) that can leverage computational models.

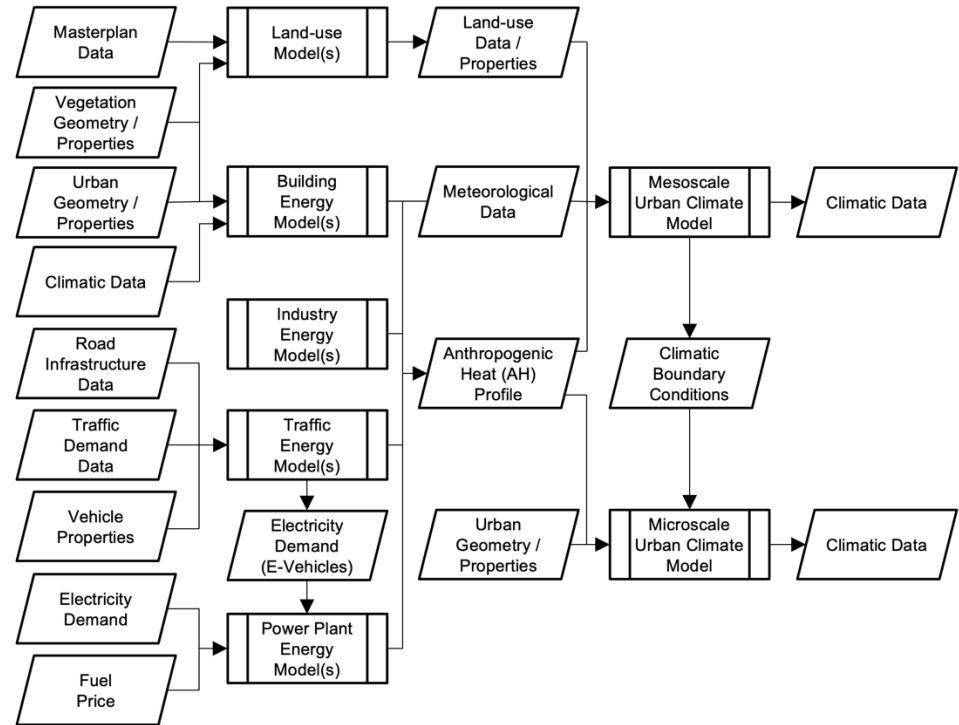
We operationalise computational models using our **Simulation-as-a-Service Middleware**.



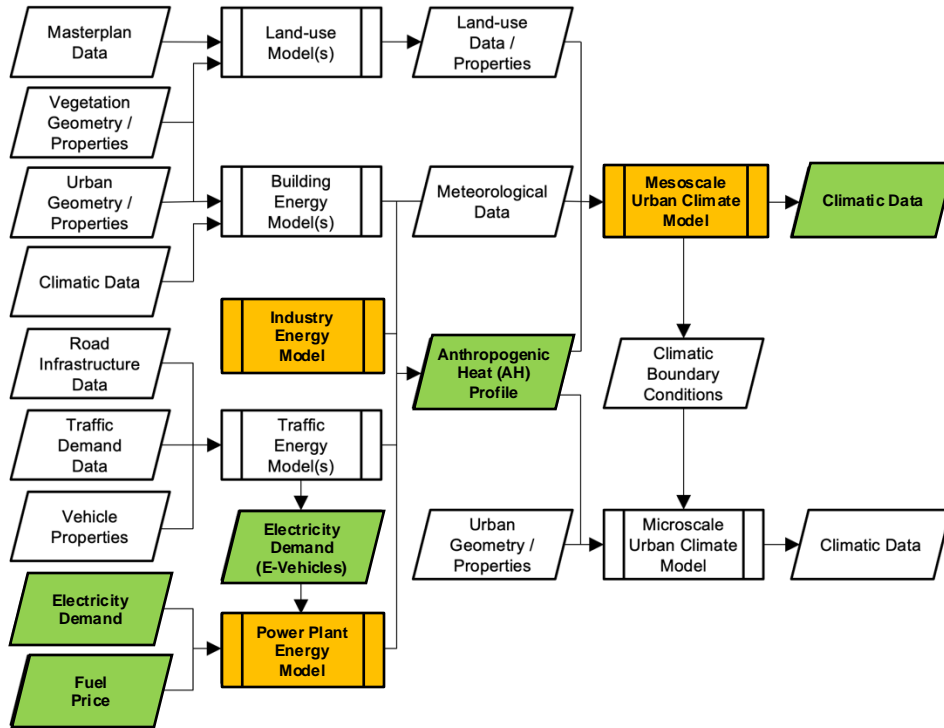
From Science to Policy *Today*

From Science to Policy *Today* – Example of Cooling Singapore

The digital twin integrates **computational models of all relevant urban elements** (e.g., land-use and vegetation, buildings, industry, transport) as well as urban climate models.



From Science to Policy Today – Example of Cooling Singapore



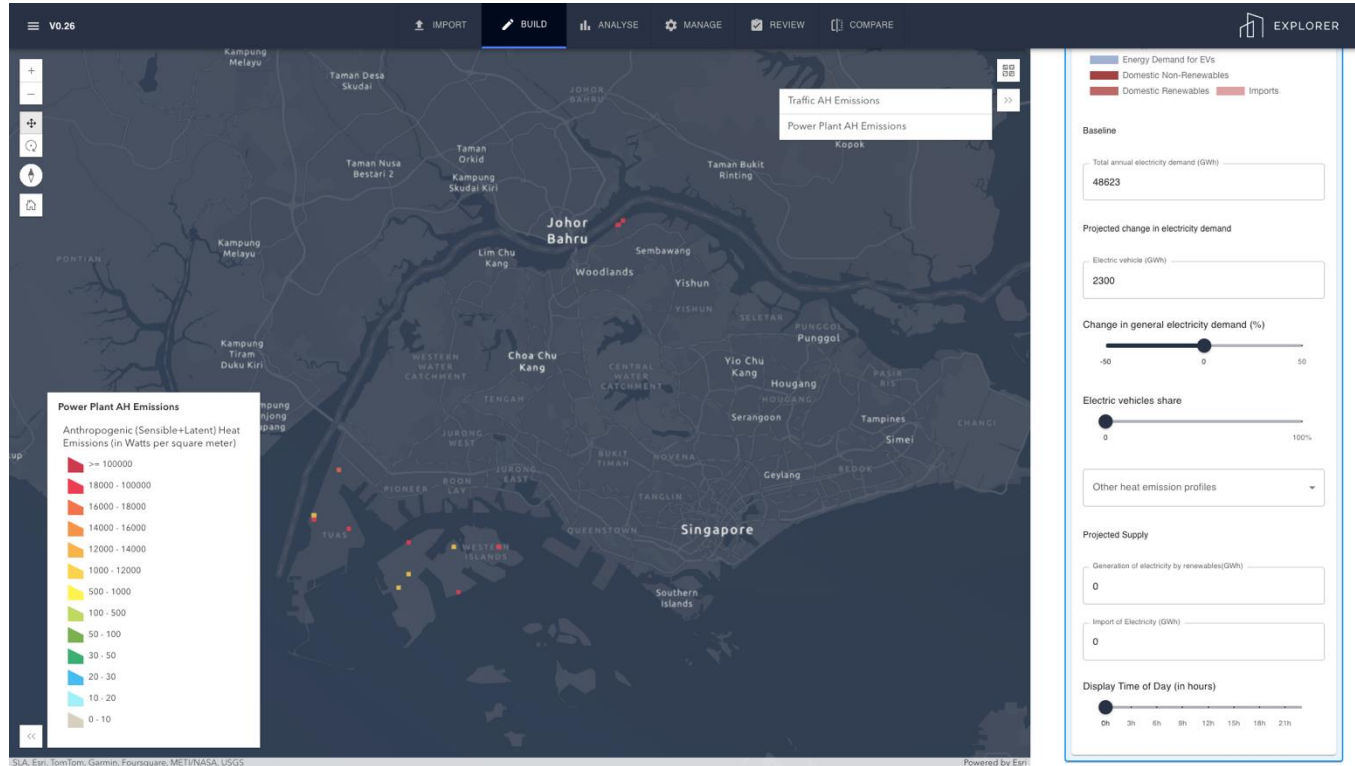
Today we have a pre-defined federation of models.

What-if scenarios are simulated using a pre-defined subset of models.

Example: “What is the impact of energy-intensive industries on the urban climate?”

Credits: Cooling Singapore (power plant and industry modelling by CARES, mesoscale urban climate modelling with WRF by SMART, SaaS model adapters and SaaS Middleware by SEC Digital Twin Lab).

From Science to Policy Today – Example of Cooling Singapore

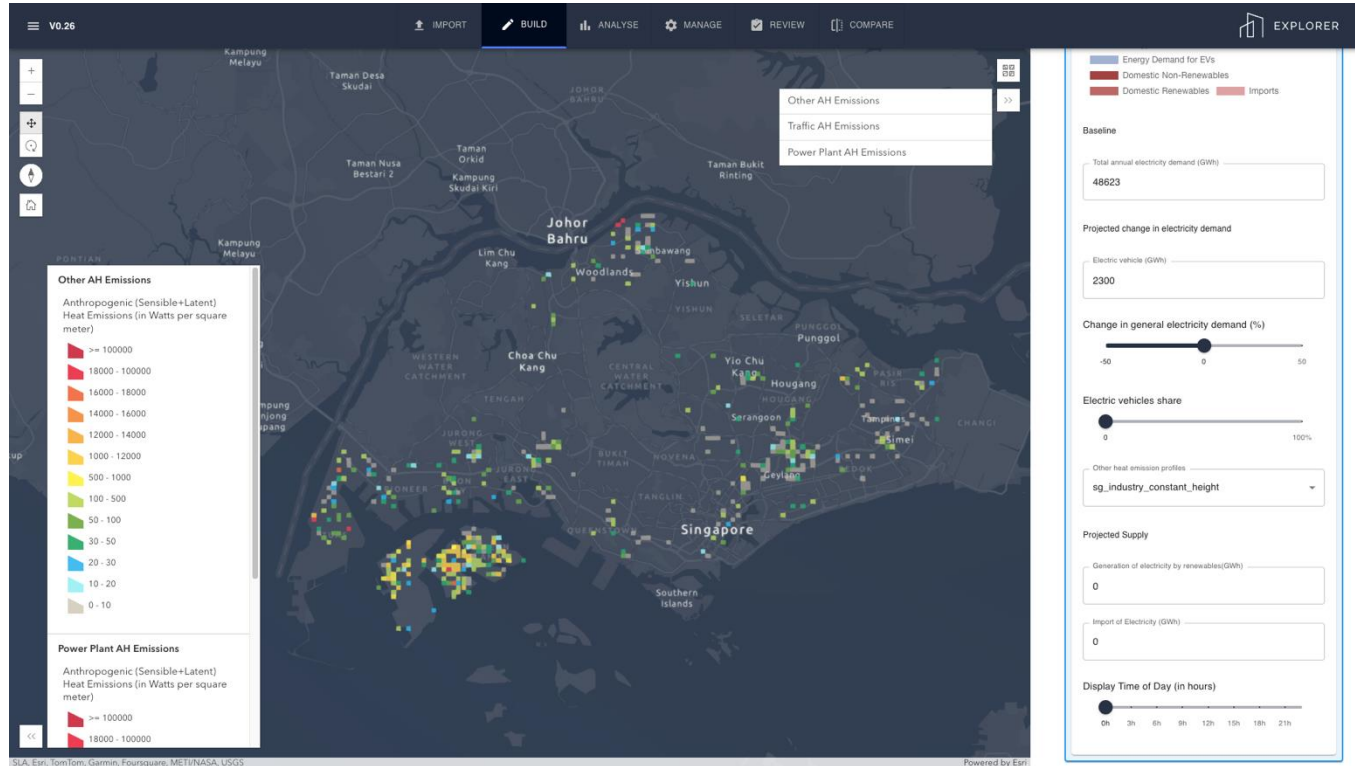


User provides input to parameterise the analysis.

Scenario 1:
Power plants only.

Credits: WONG Minn Lin, Cooling Singapore.

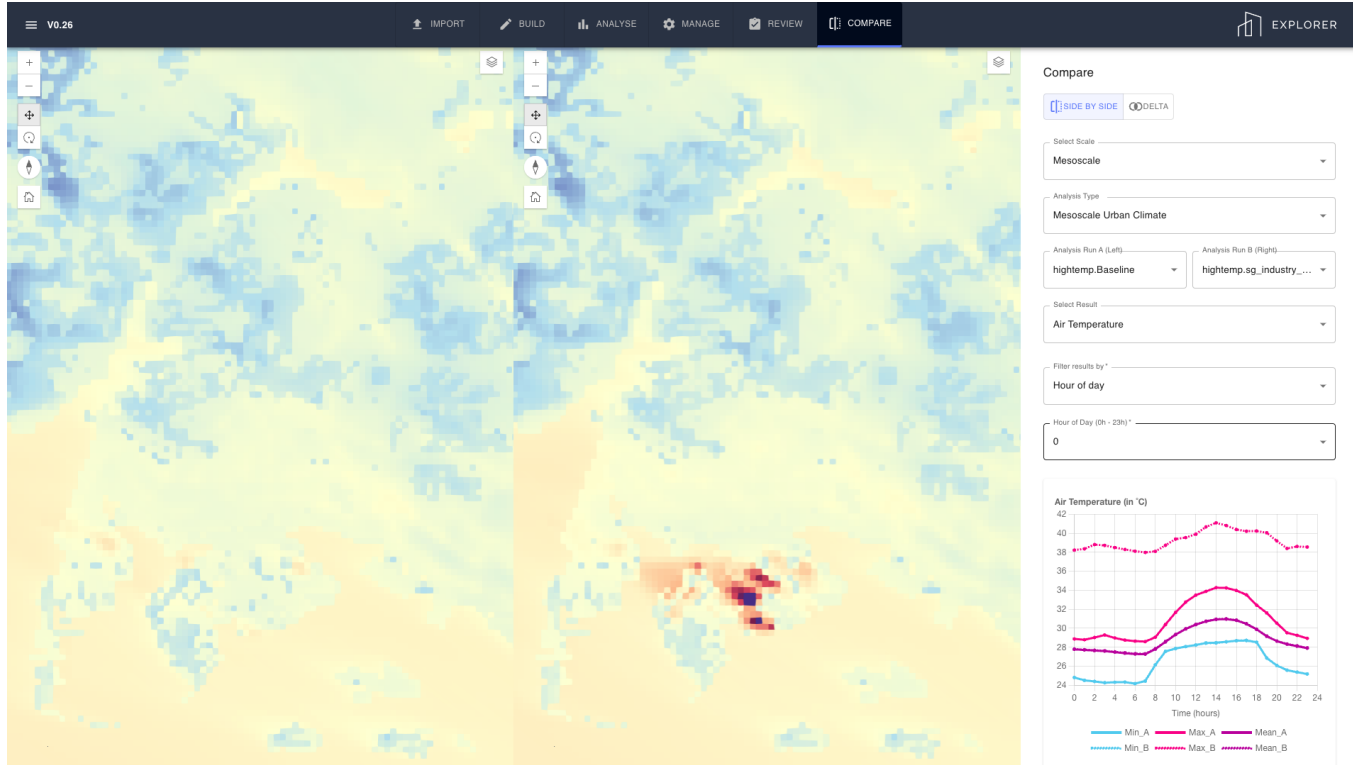
From Science to Policy Today – Example of Cooling Singapore



User provides input to parameterise the analysis.

Scenario 2:
Power plants and industry.

From Science to Policy Today – Example of Cooling Singapore



Results of different scenarios are visualised and can be compared with each other.

Areas with high AH emissions (i.e., Jurong Island) show an increase in air temperature.

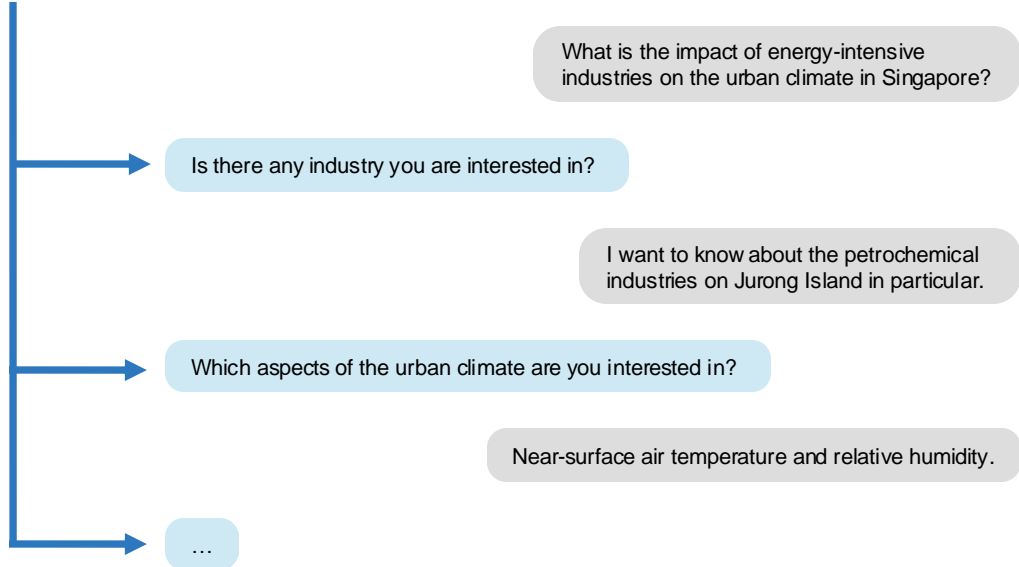
From Science to Policy

Tomorrow

Engage in dialogue to understand question/ problem statement.



Interact with the user and perform a requirements analysis to collect detailed information.

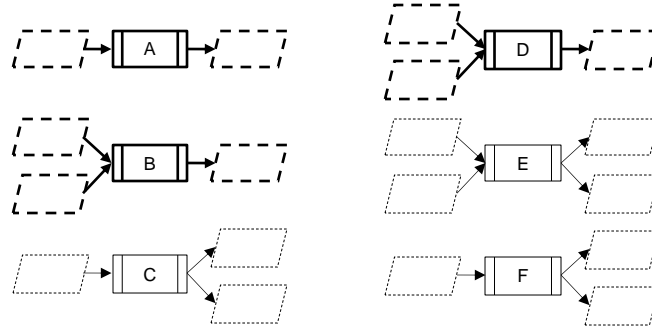


**Assemble
federation
of models
dynamically
by selecting
the required
models.**

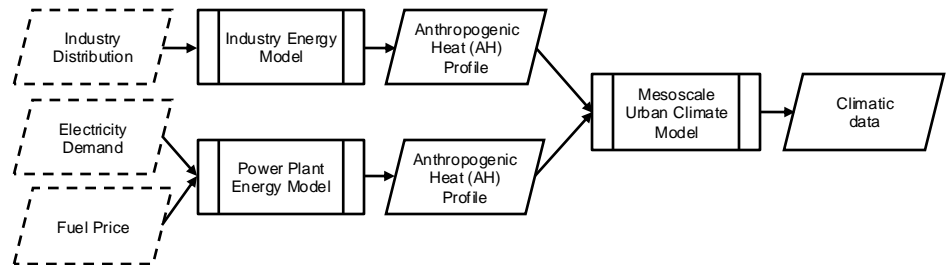


Discover available models and select the most appropriate ones to assemble the on-demand federation of models.

MODEL REPOSITORY:



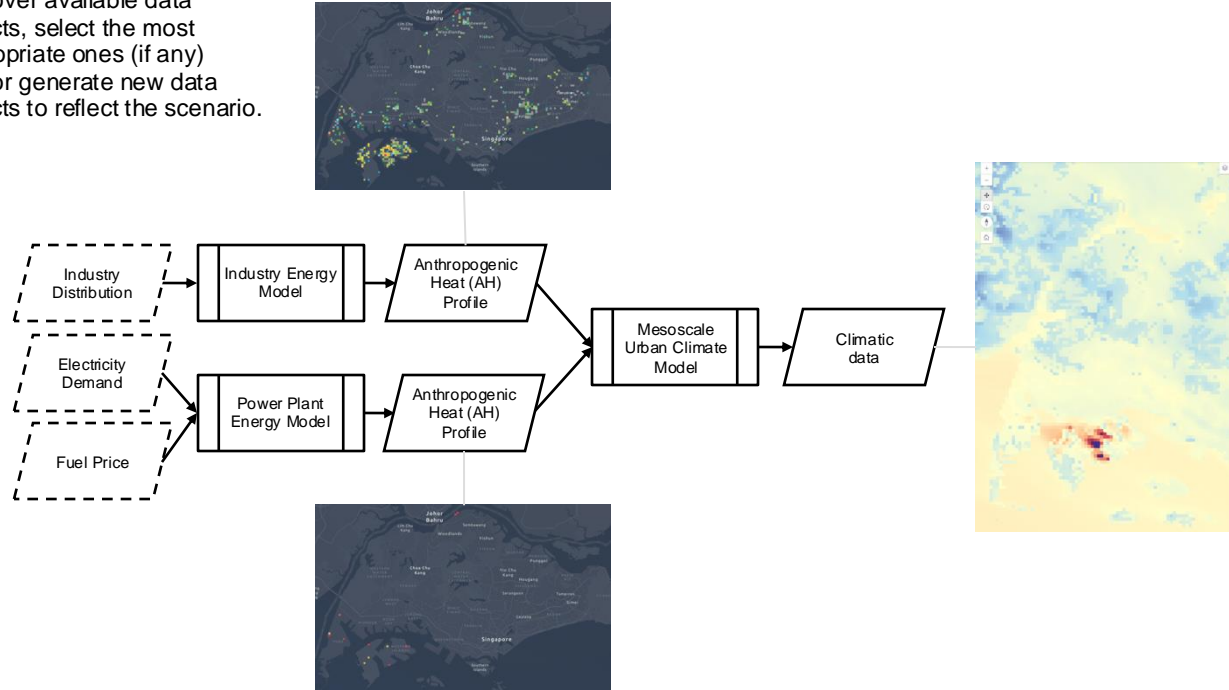
ON-DEMAND MODEL FEDERATION:



Design experiments, generate input and execute simulations using model federation.

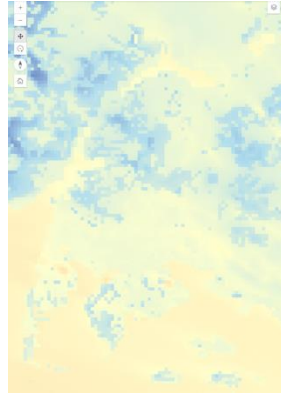


Discover available data objects, select the most appropriate ones (if any) and/or generate new data objects to reflect the scenario.

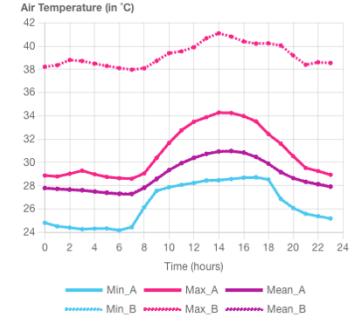
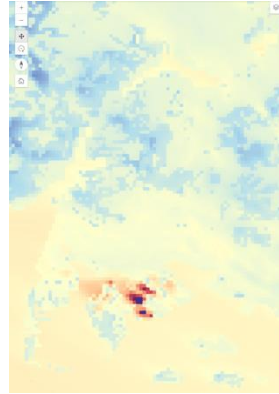


Translate results from simulations into actionable insights and feedback.

Scenario A

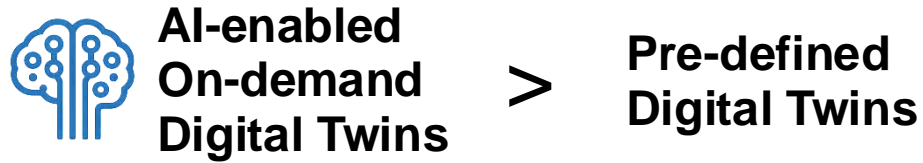


Scenario B



Analyse the results and generate an appropriate response to the user's original question / problem statement. Depending on context, provide a summary of actionable insights.





With the help of AI, digital twins will be generated on-demand as and when required.

This should lead to significantly reduced turn-around time and increased flexibility.

Thank you!

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