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2015 SPRING SEMINARS

Lighting & Placemaking

Part 3- Smart City

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Gensler

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Lighting and Smart Cities

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What is the Smart City?

“Future cities will be smart cities. Smart buildings will save electricity by optimizing their power consumption automatically. Smart traffic systems will reduce congestion by using sensors to manipulate the flow of people and vehicles. While smart energy companies will power homes and businesses with sunshine and vegetable peelings.”

-Intel iQ,The Cognicity Challenge:
Where virtual design meets the connected home

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What is the Smart City?

1. Sensor – Actuator network
   - Reflex system (Pavlov's city?)
   - Direct drive – on/off or timed (dumb stop light)

2. Information processing
   - Smart reflex system - Self-reflexive (sensor-logic stoplight)
   - Logic driven (and, nand, or, nor, if-then)
   - Cities see themselves and react to change, become 'smarter'

3. Predictive/adaptive analytics
   - Prediction, scenario building and 'what-ifs' (stoplight or roundabout?)
   - Outcome-driven – analysis vs simulation
   - Cities understand themselves and make decisions about how to change, have intelligence

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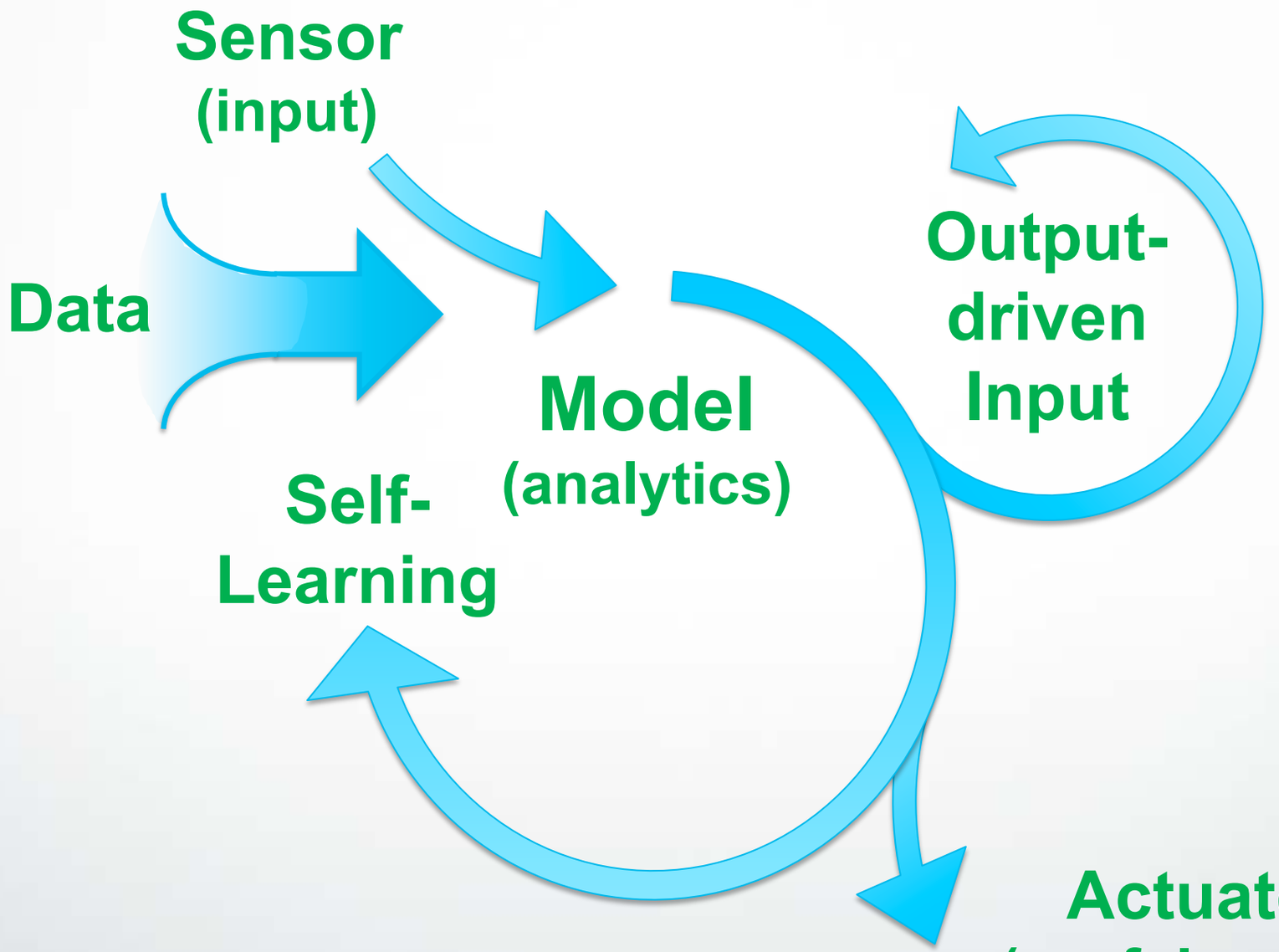
What is the Smart City?

This system is really ‘smart’ when all 3 components are working together.



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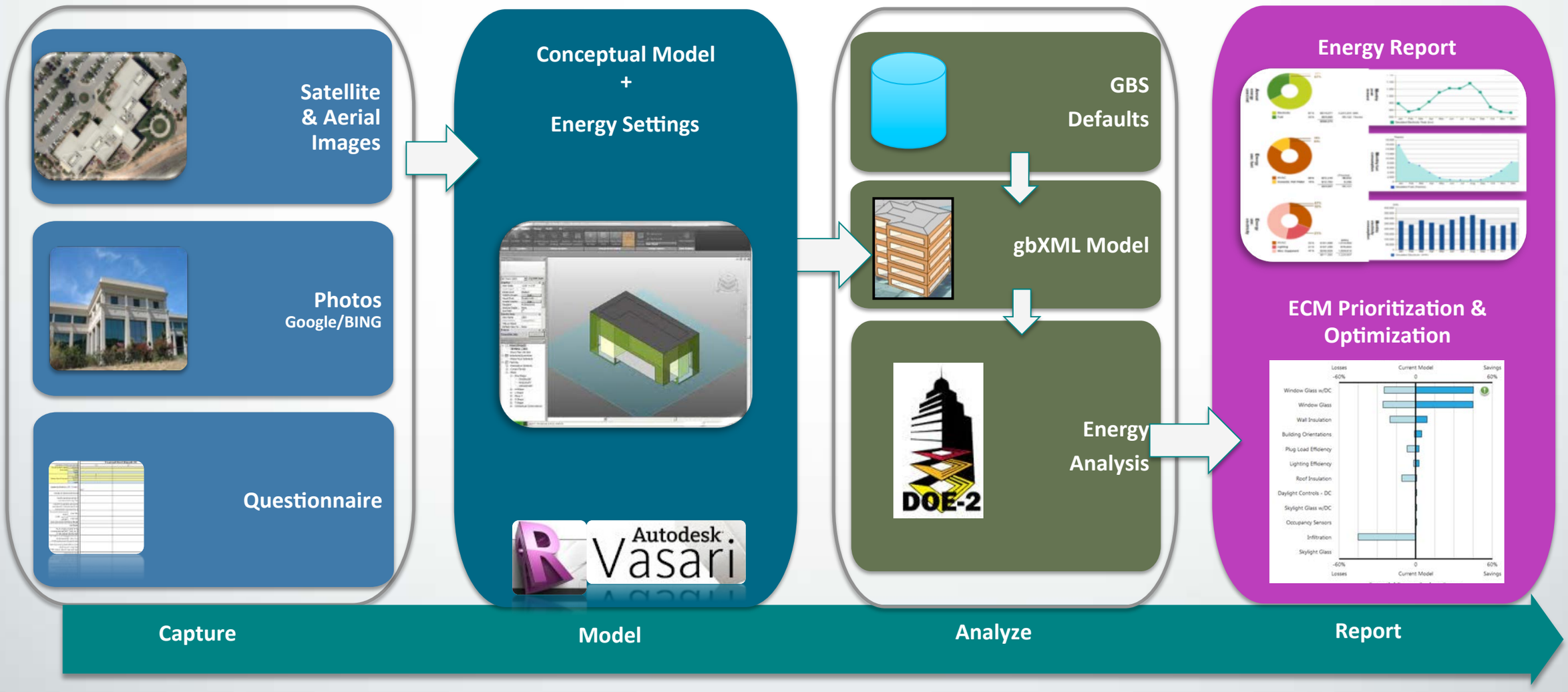
What is the Smart City?

Rapid Energy Modeling at the city scale

- Infraworks – automated form generation
- GBS – simulation model, data model, results processing



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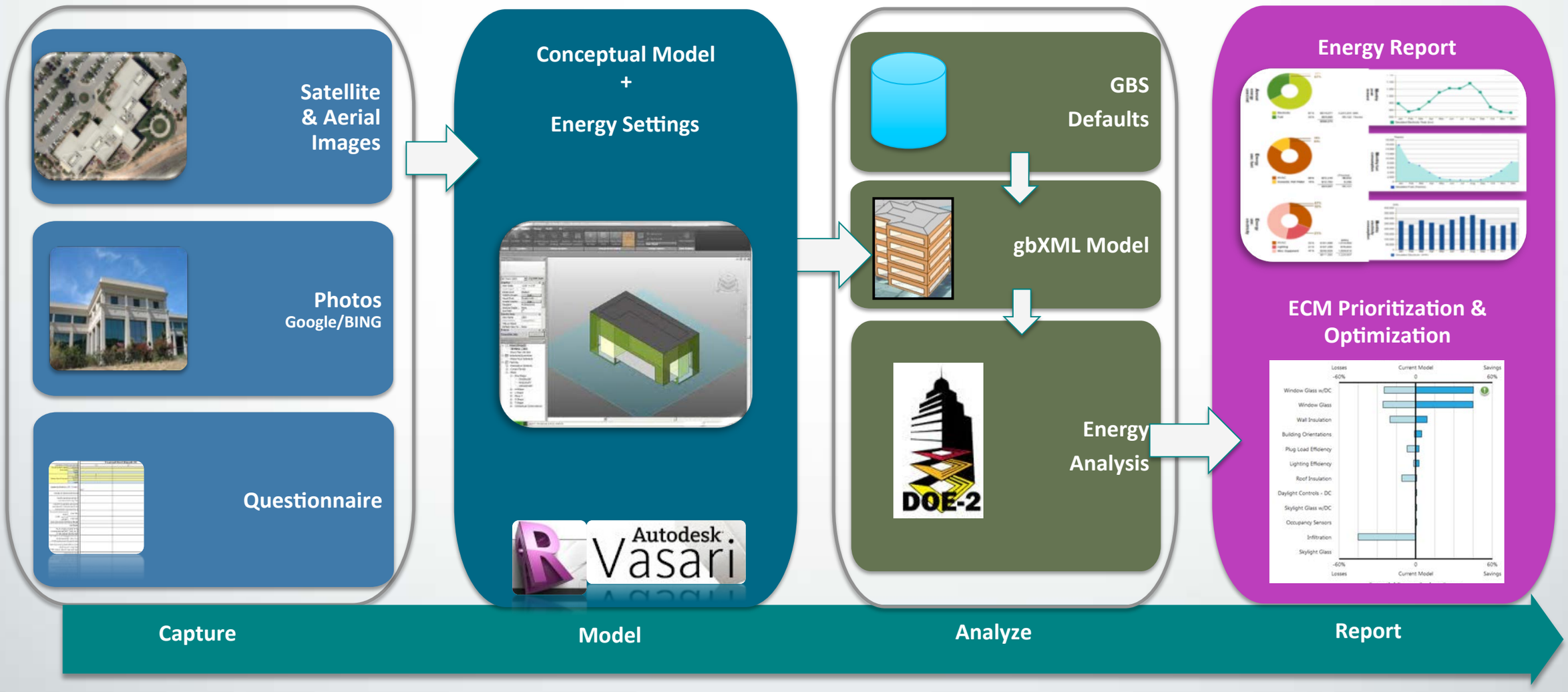
What is the Smart City?

Rapid Energy Modeling at the city scale

- Input to REM is simple and/or automated
- Simulation engine and data model are complex and complete.



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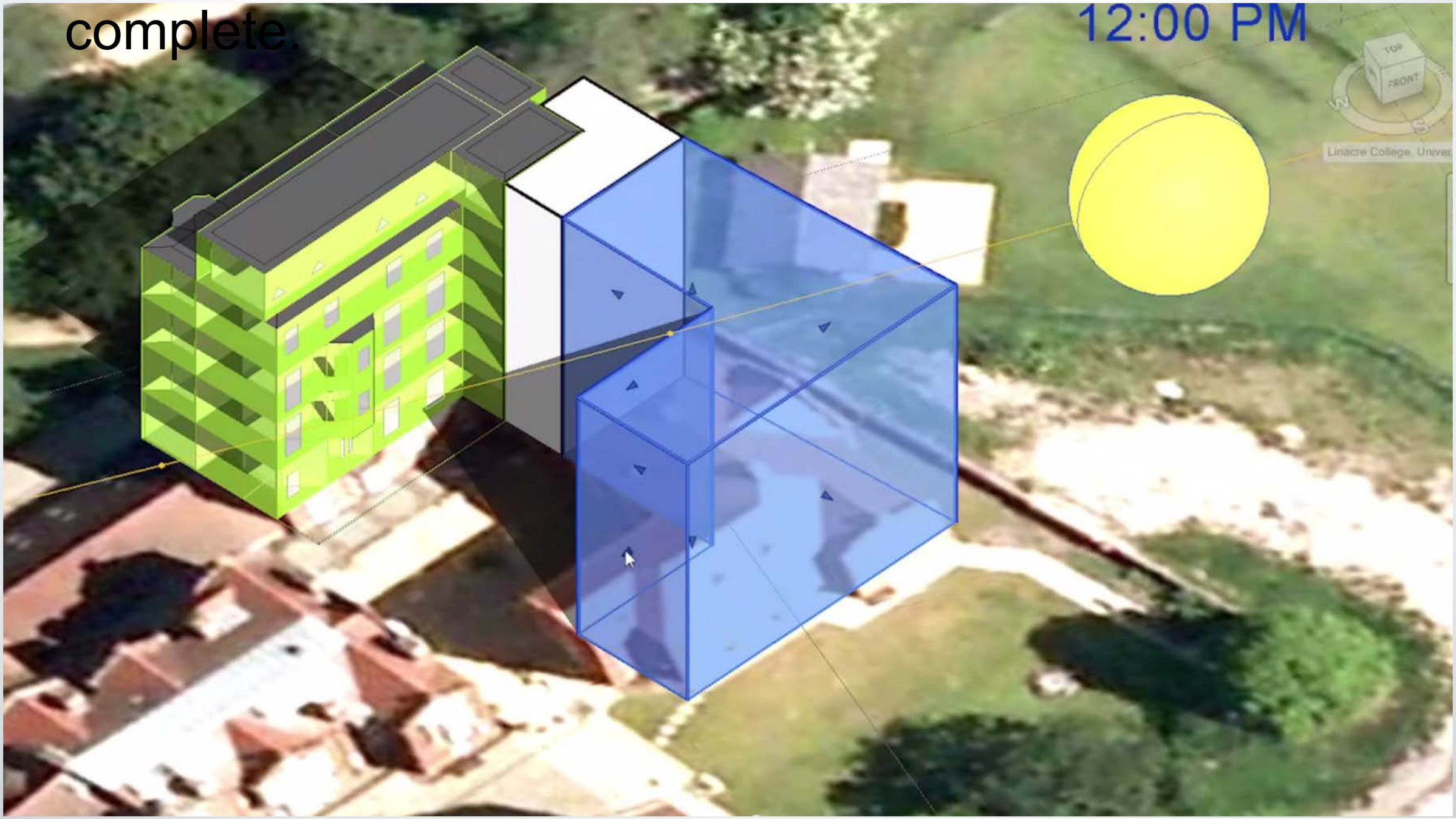

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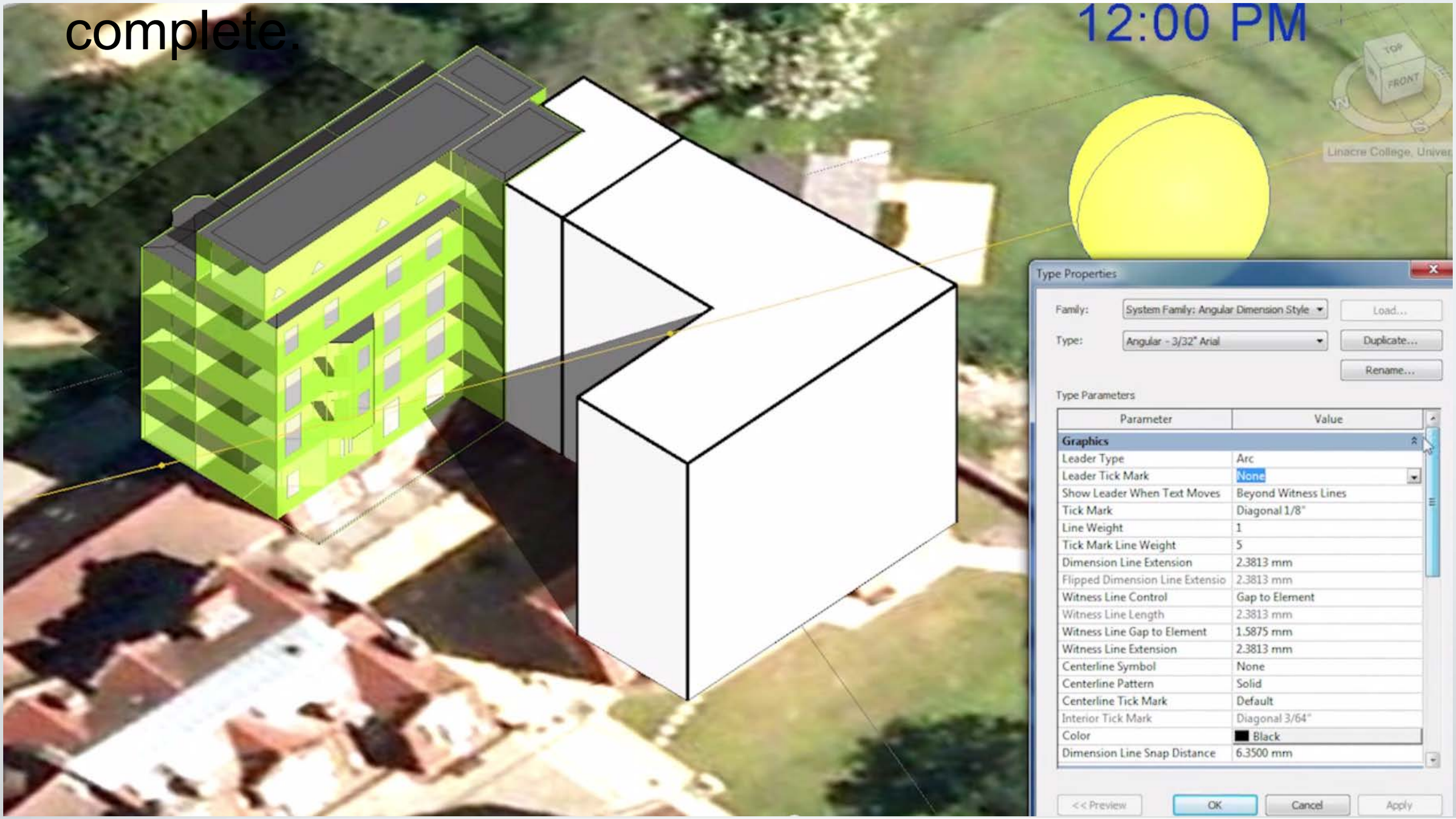

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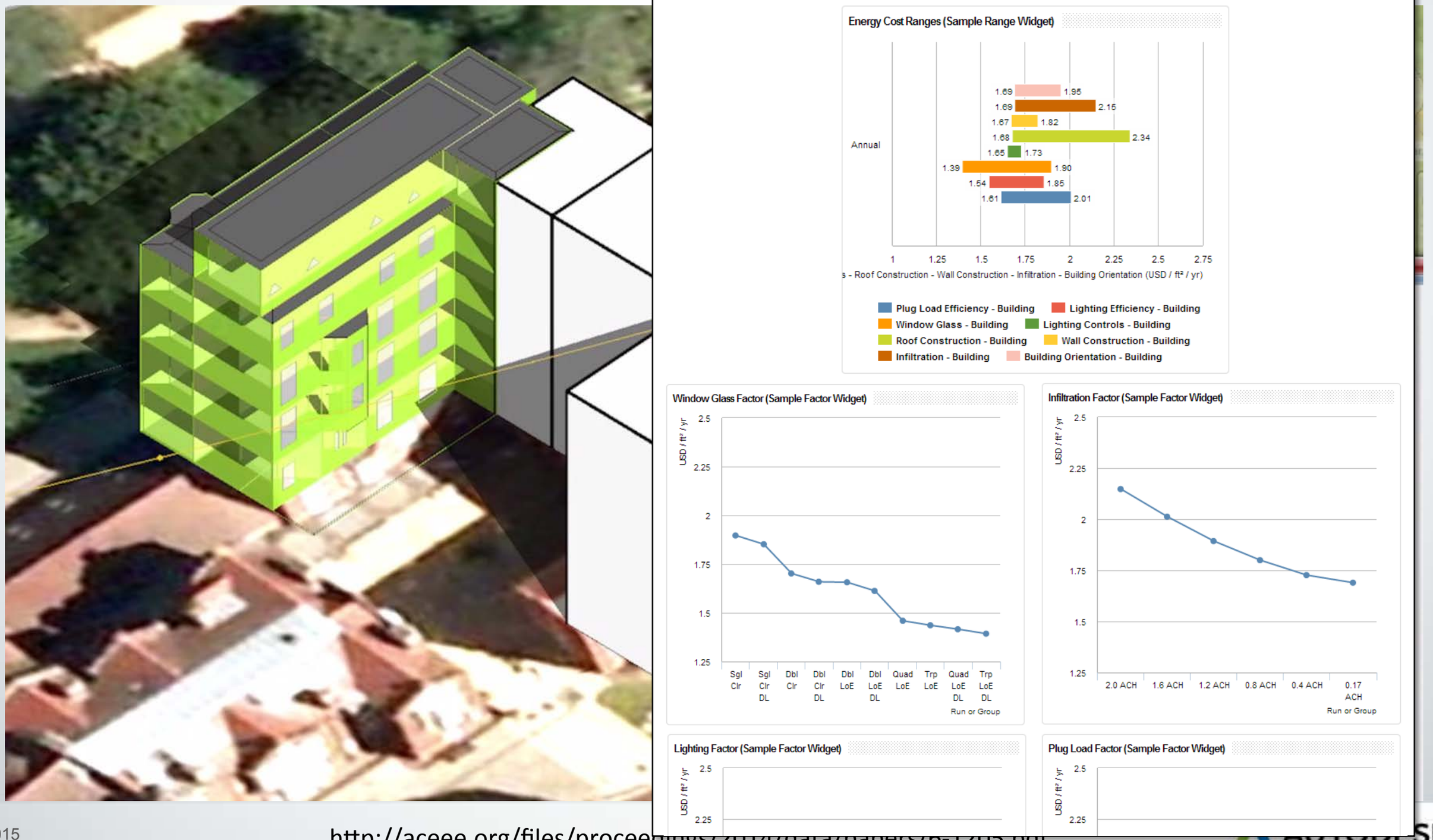
What is the Smart City?

- Output informs inputs, accuracy is a process.
- Output is useful from the start.



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What is the Smart City?

REM is based on the idea of output driven input; the idea that information can be useful whether it's precise and accurate or not. If the model is acceptable, the conclusions made from analyzing the model must be useful even as the inputs are being refined.

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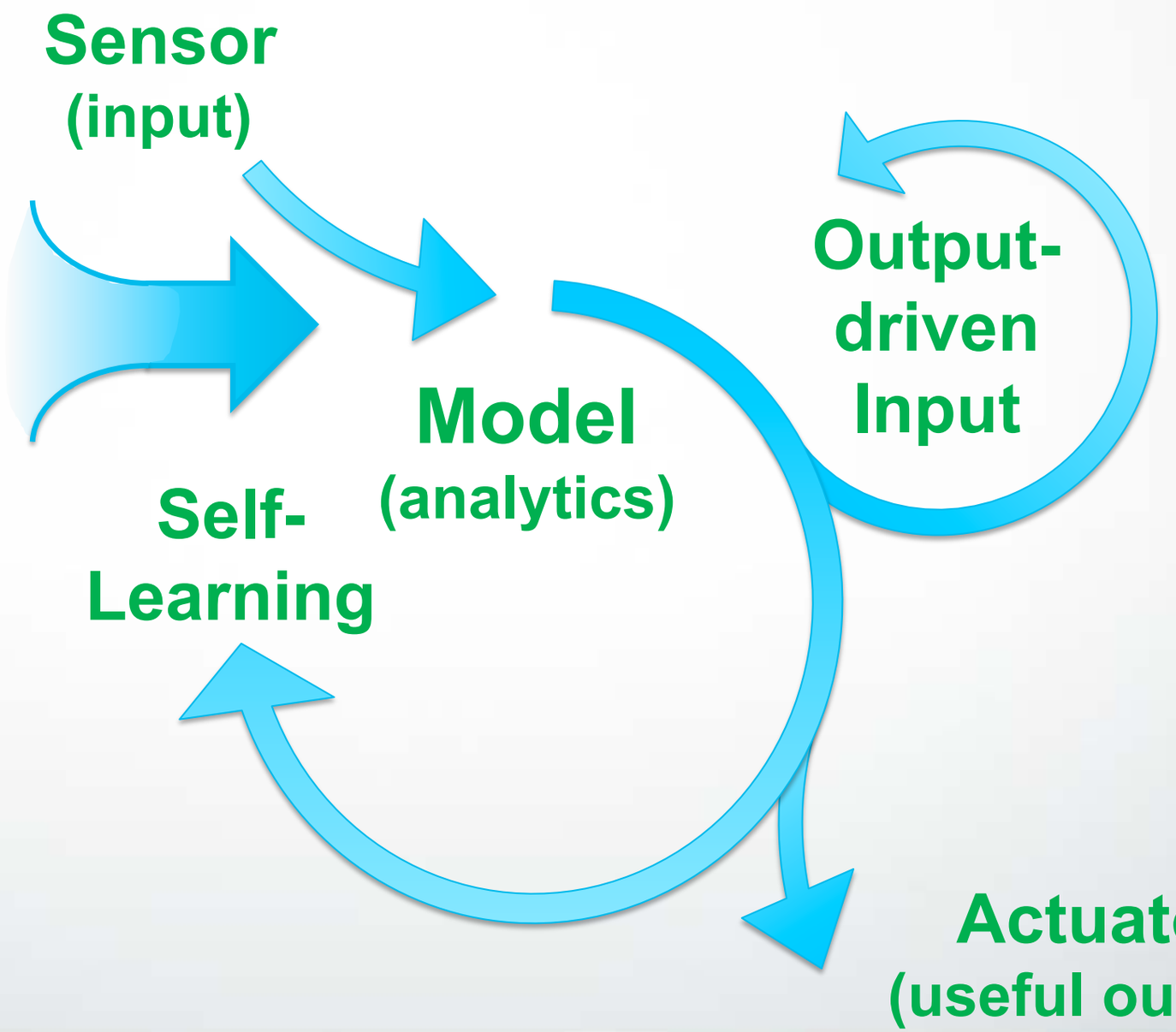
Output driven Input



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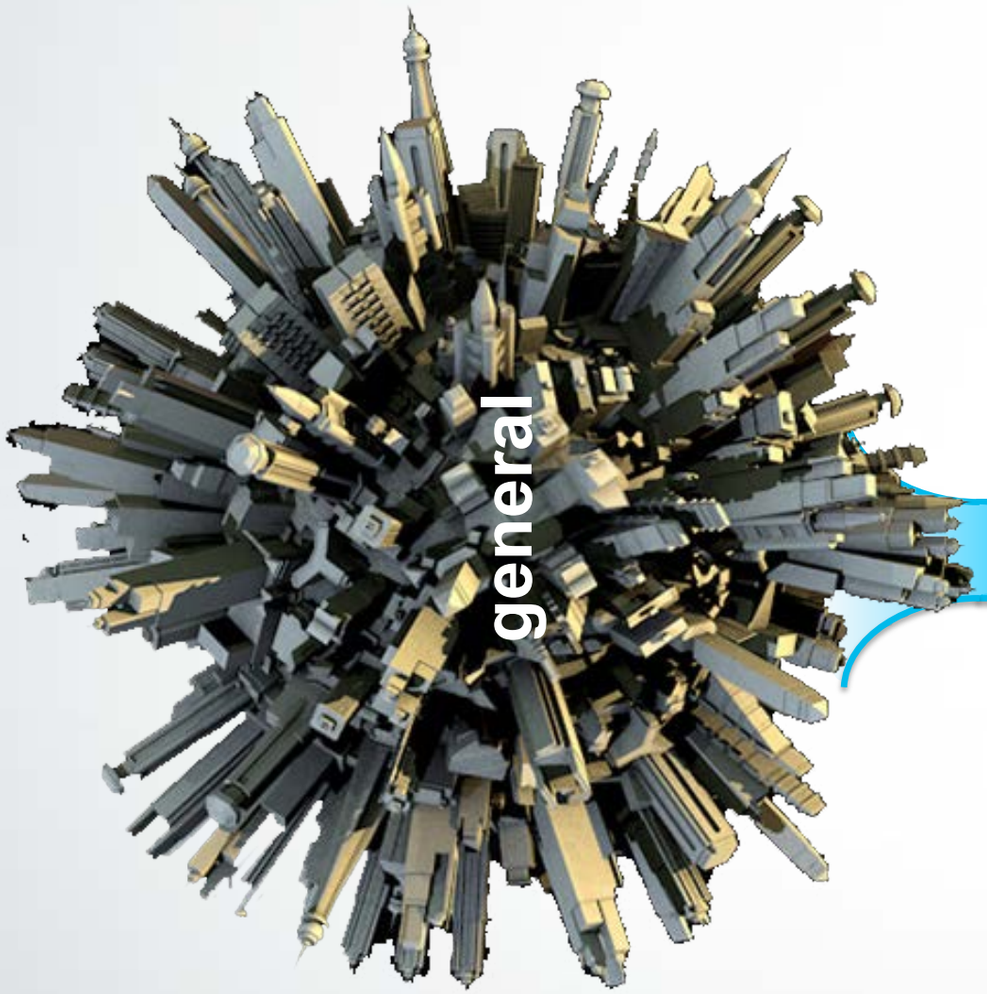
Output driven Input



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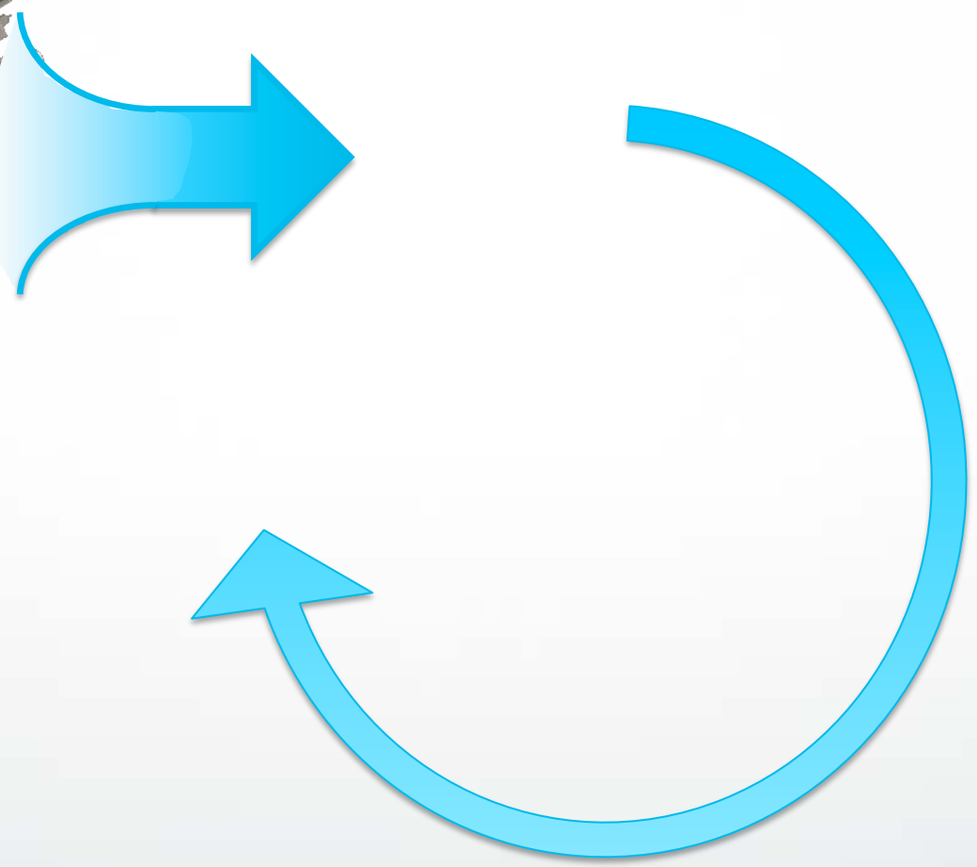

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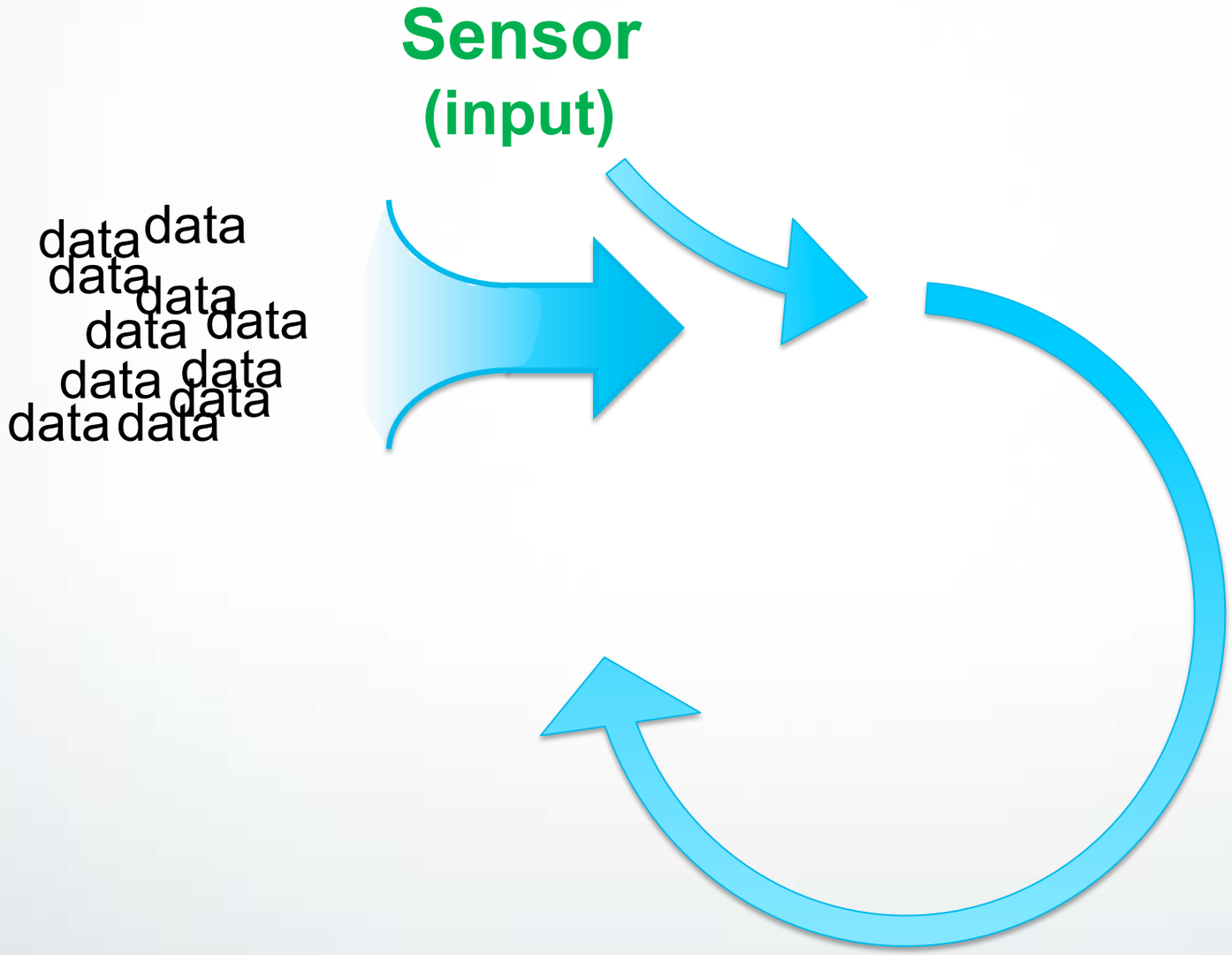

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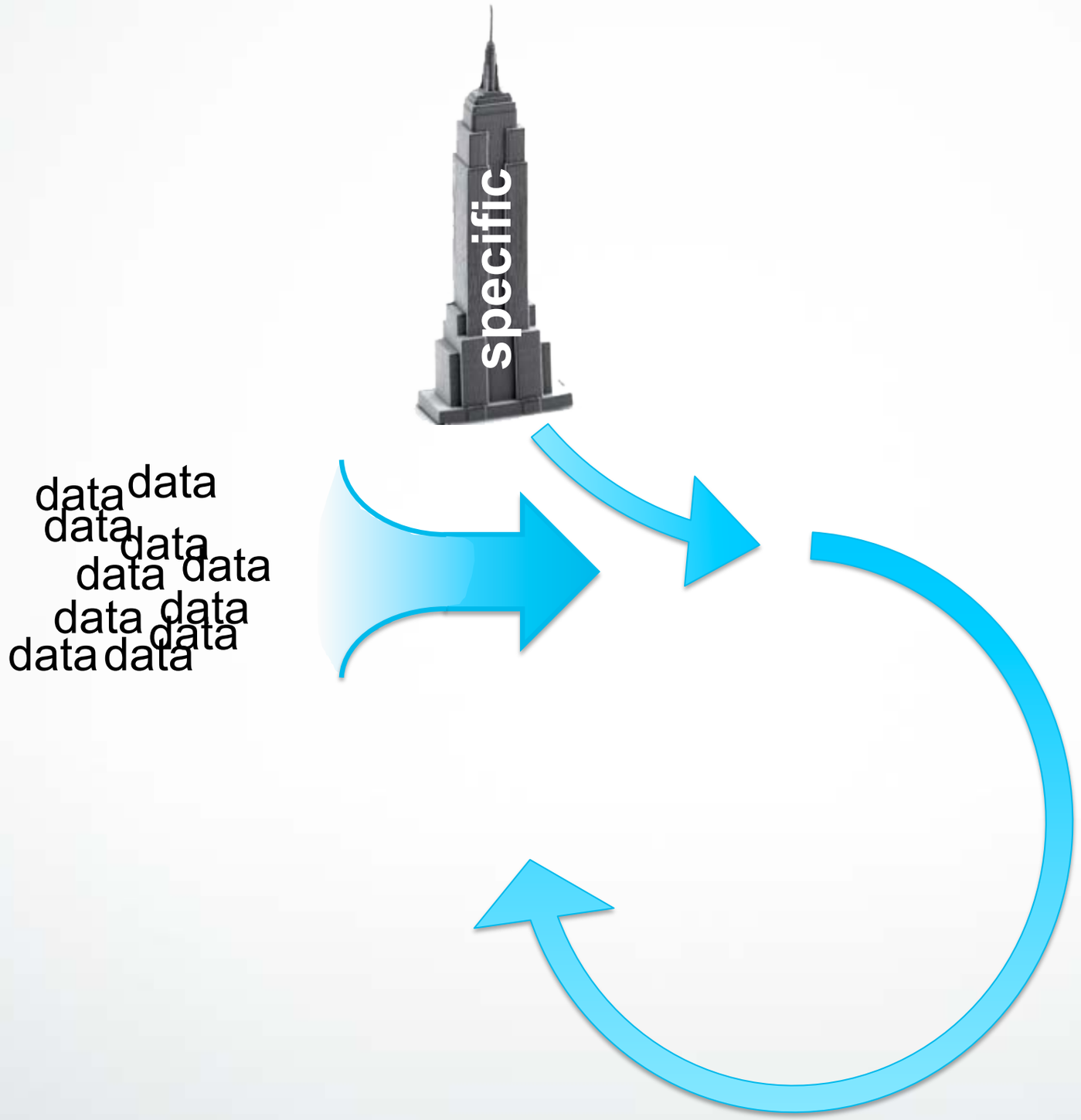

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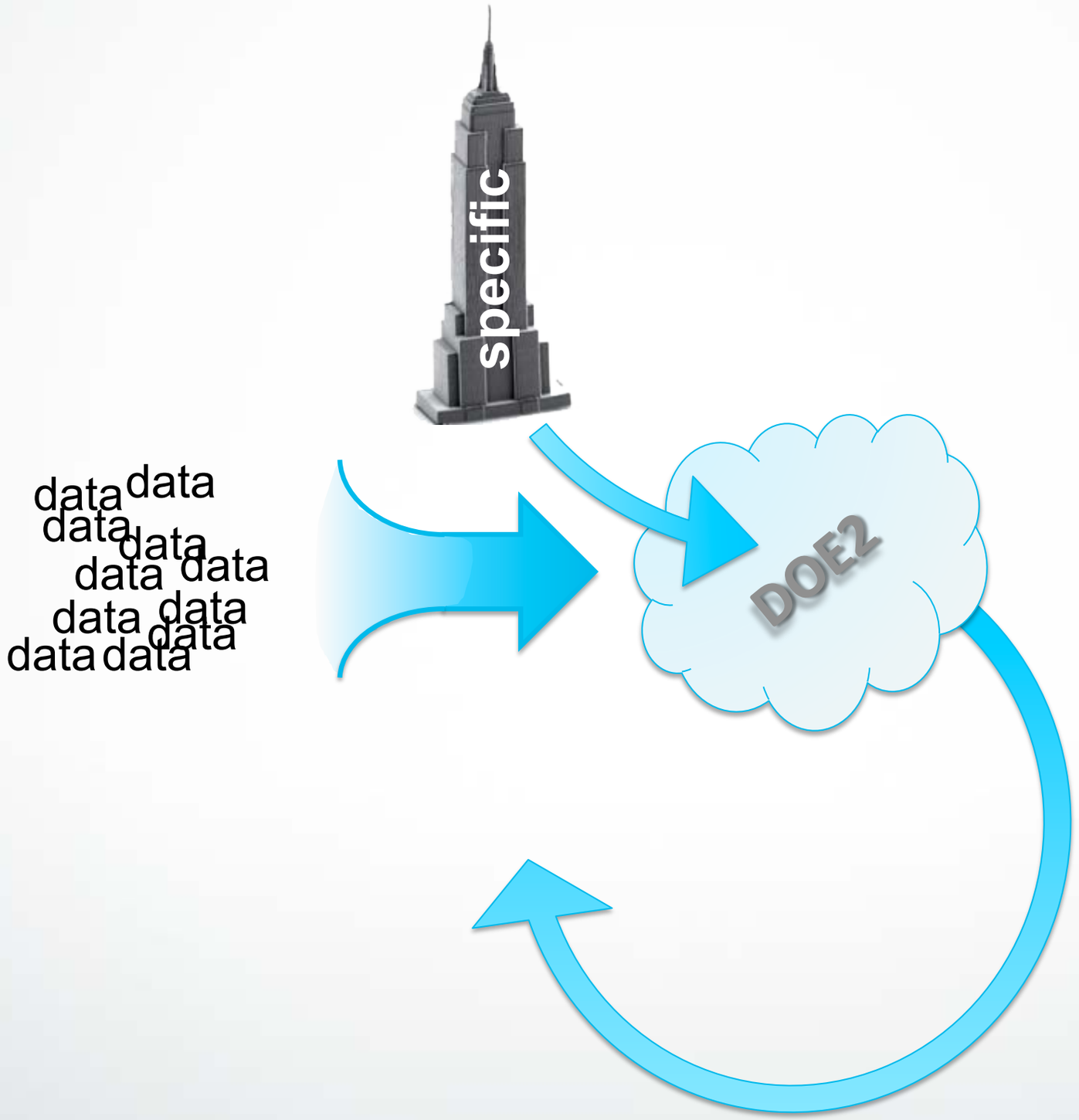

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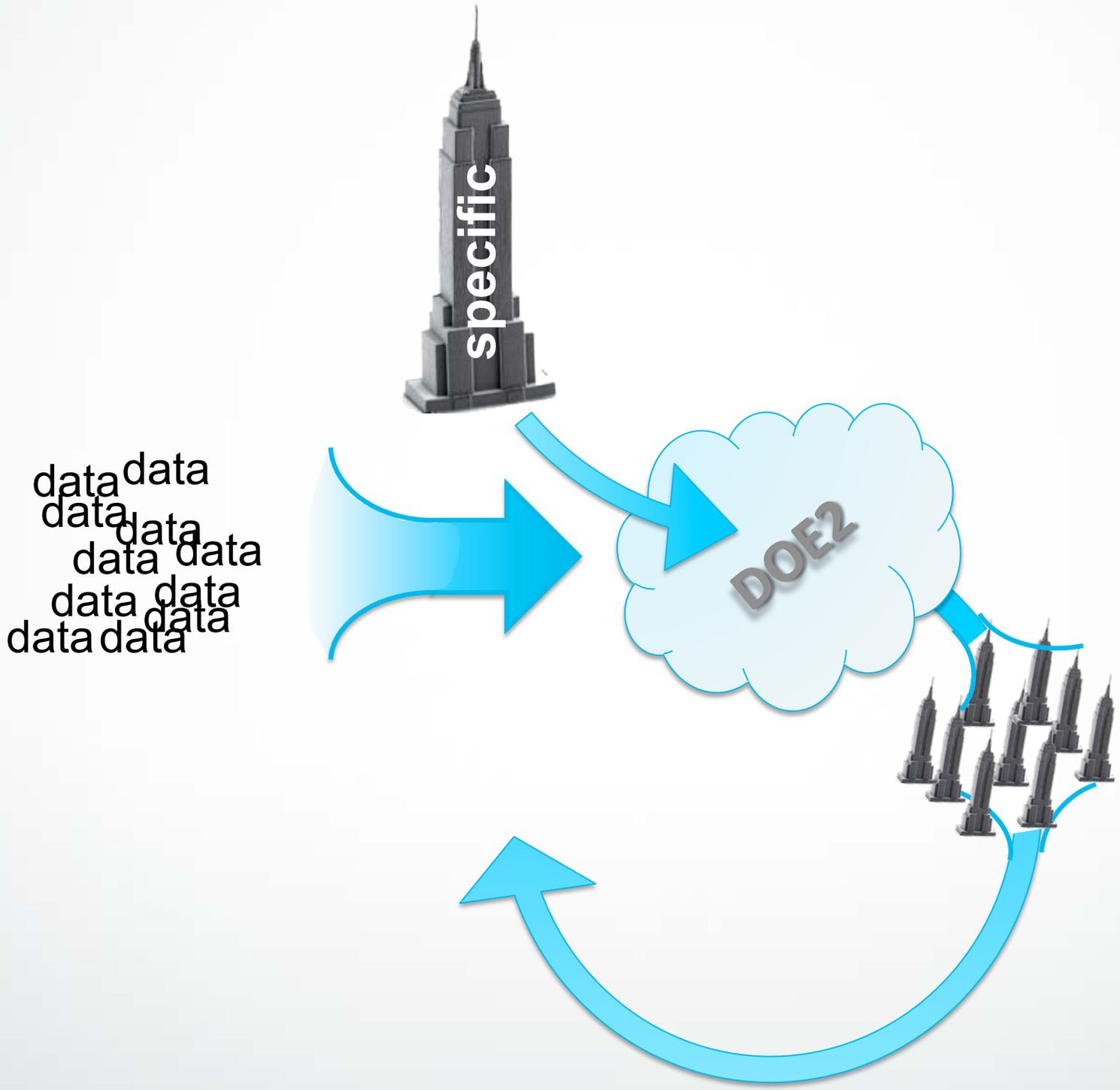

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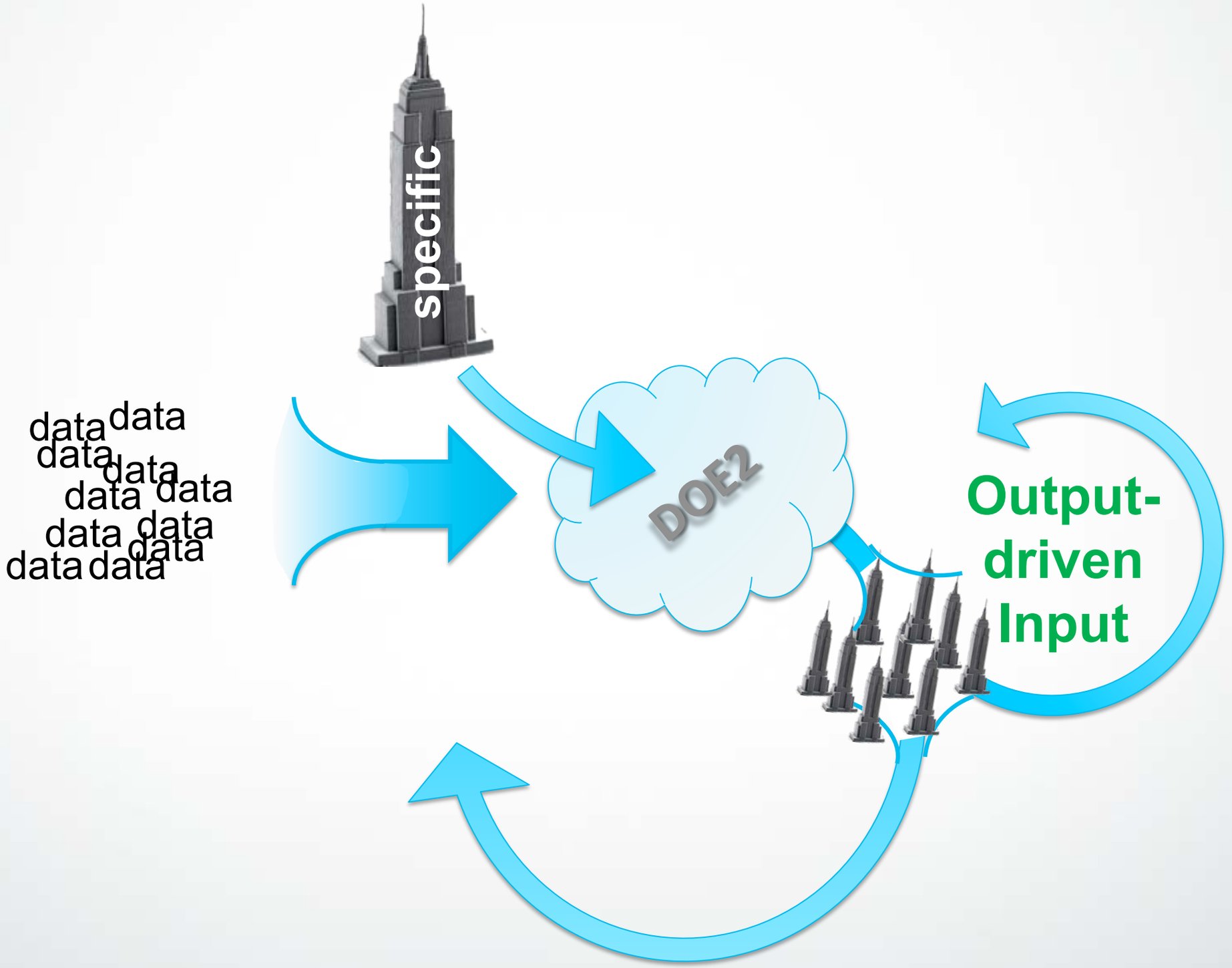

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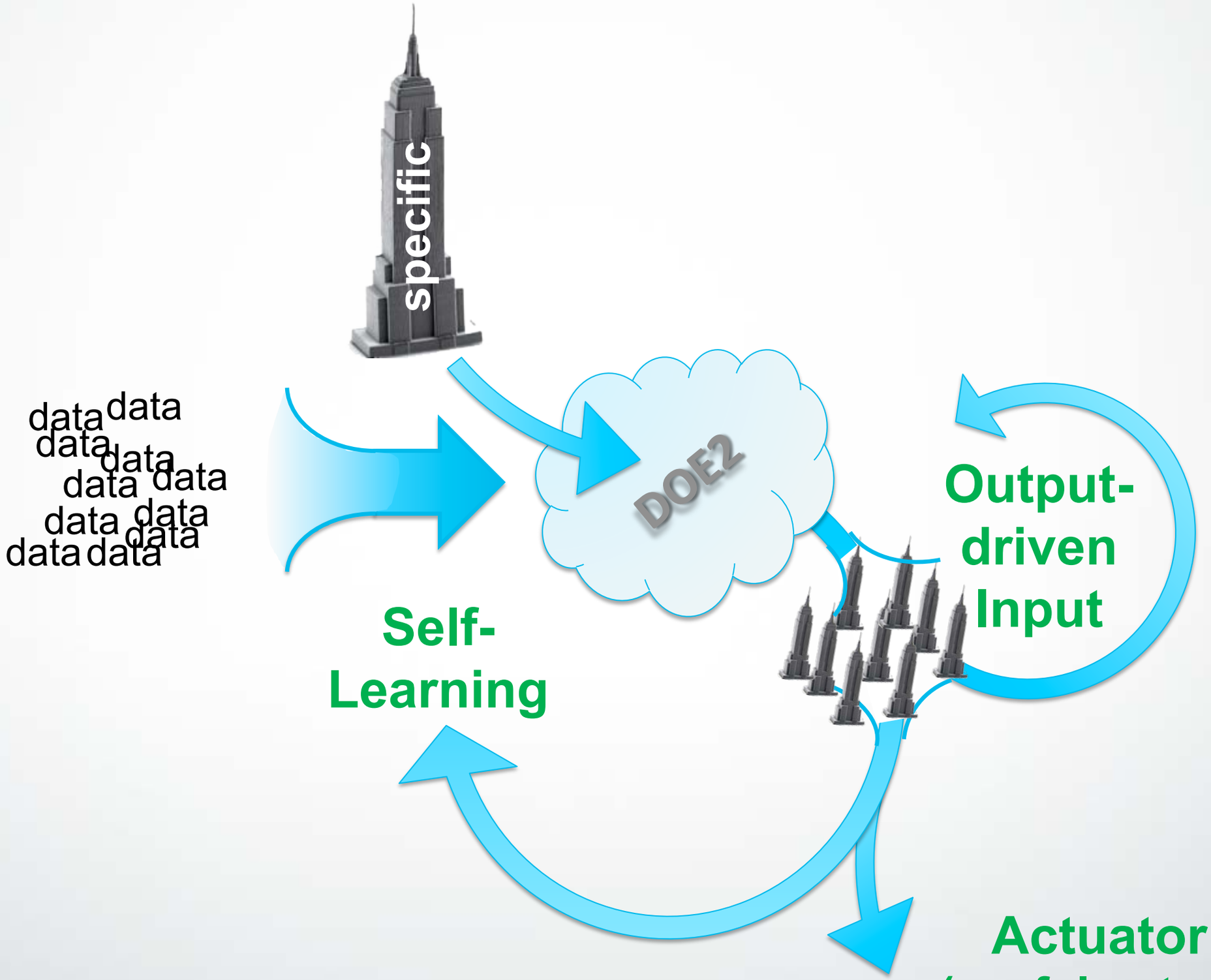

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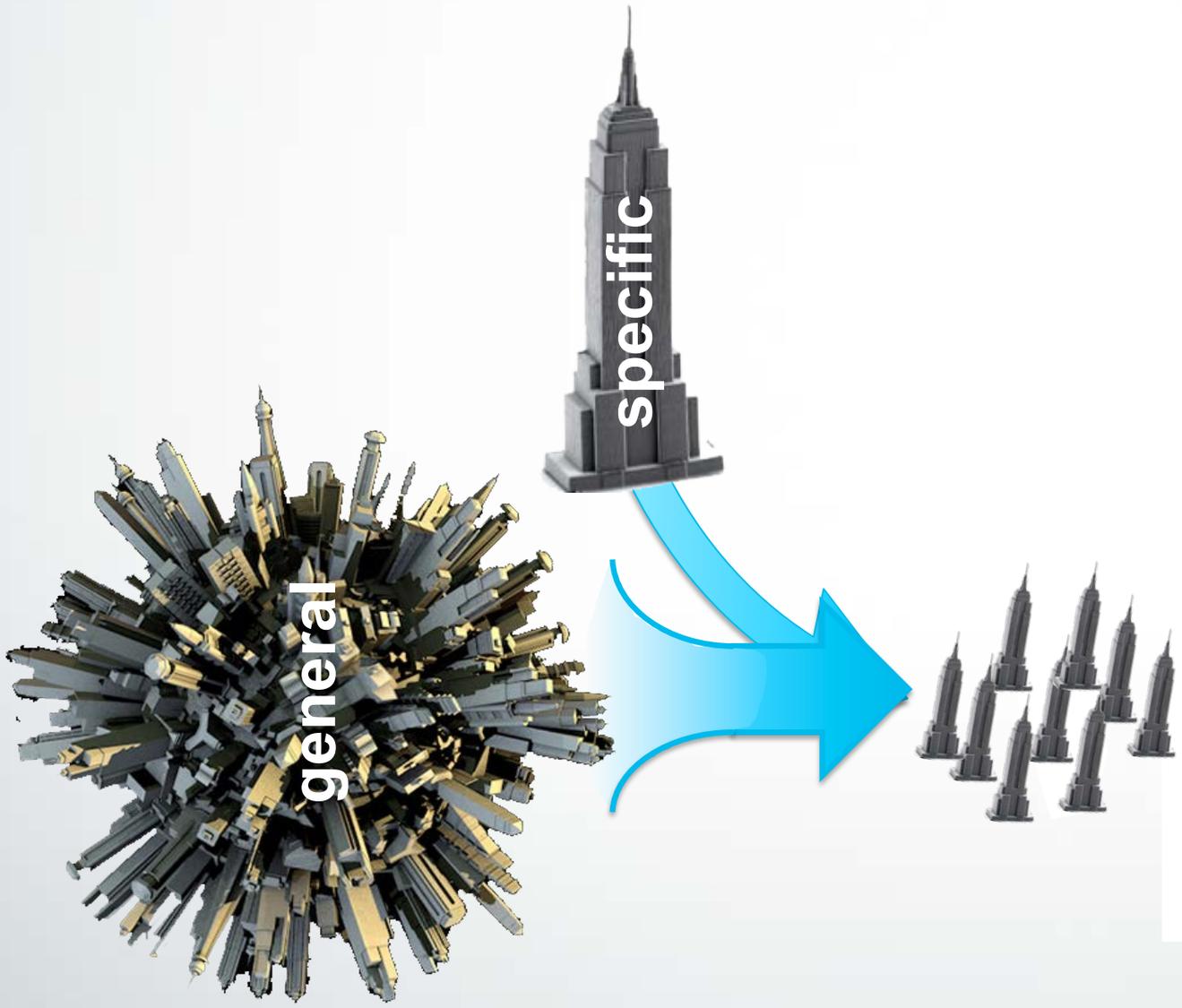
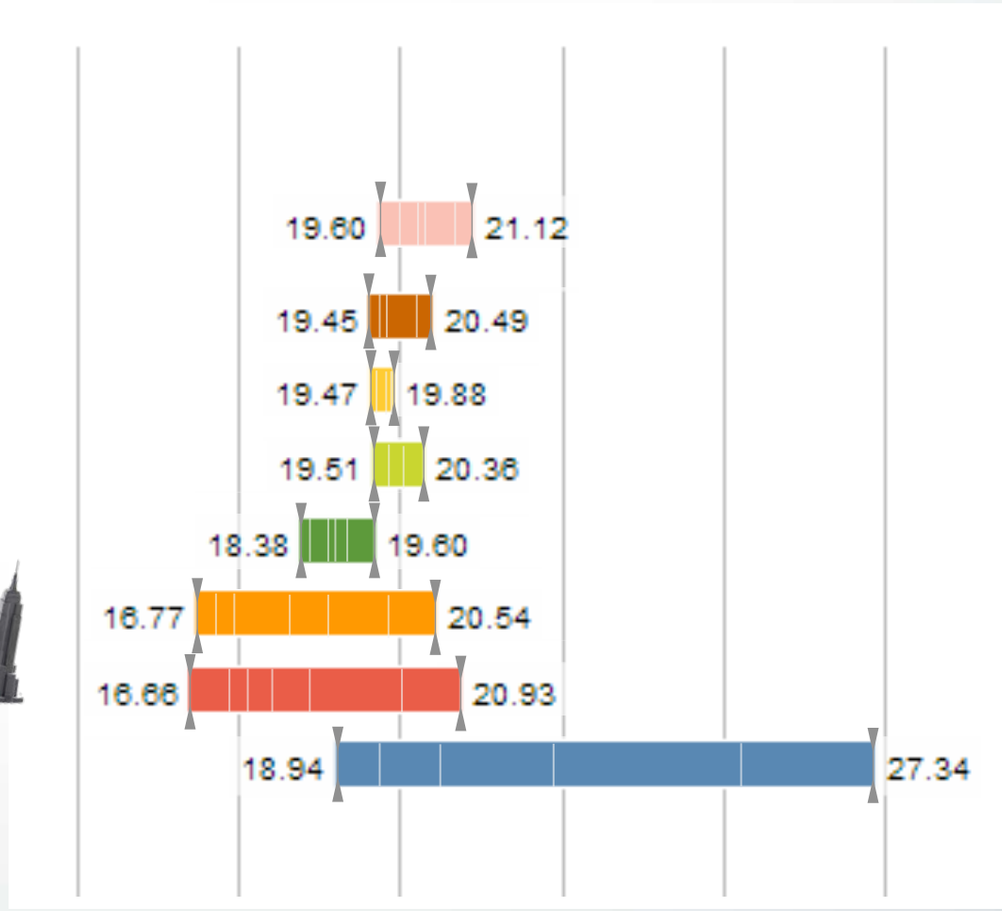
Output driven Input

Output driven input moves from the general to the specific, starting with a smart model and some specific inputs to tease out specific likely scenarios.





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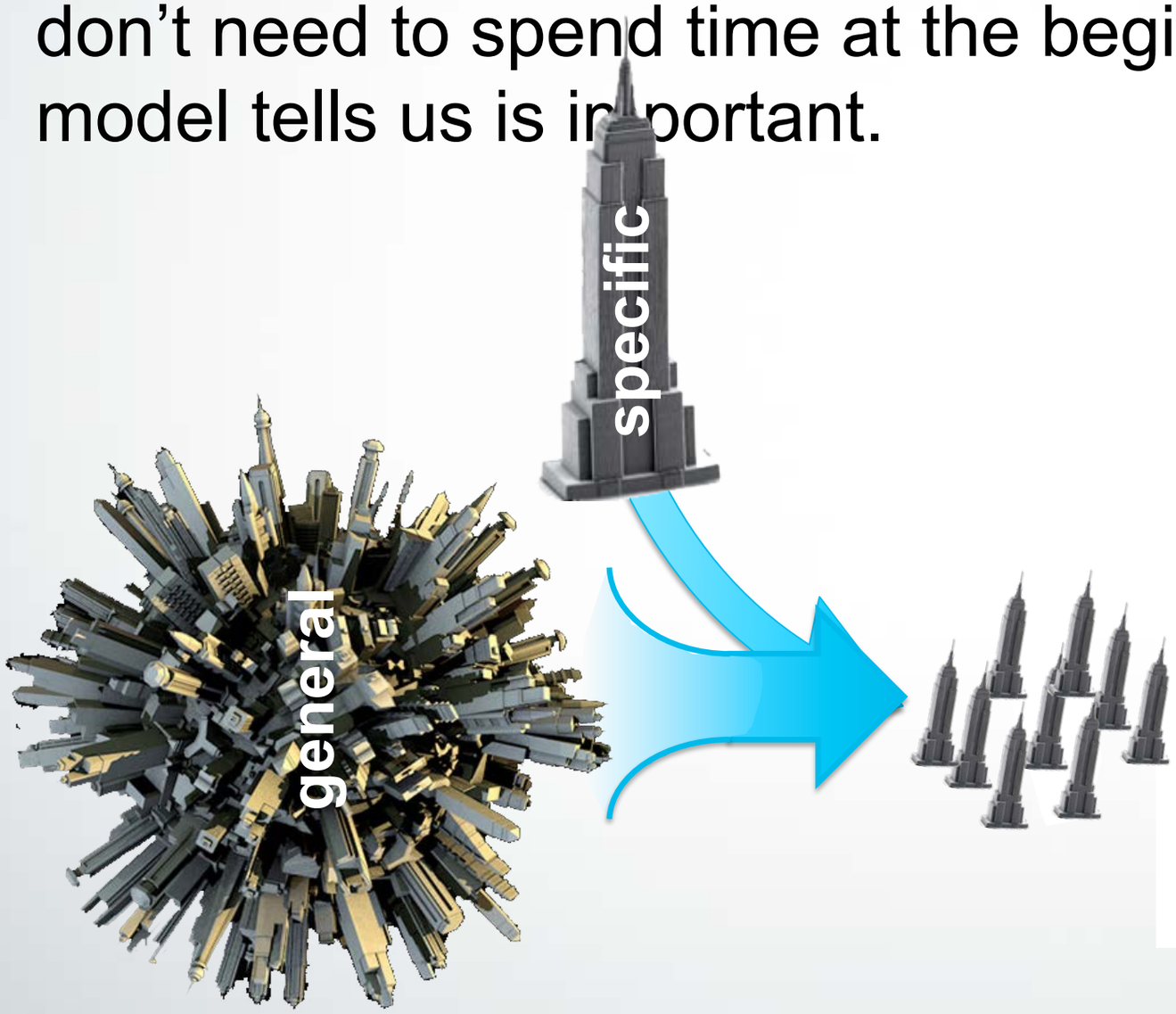
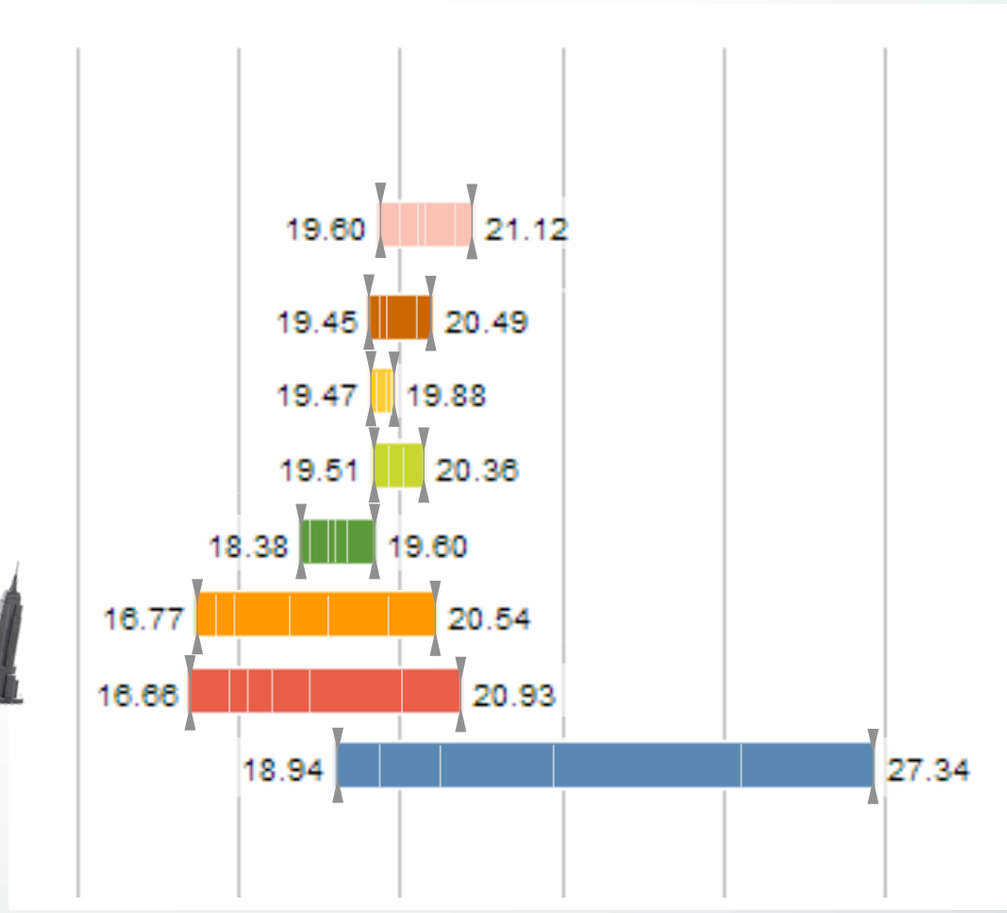
Output driven Input

The process is fast (hence the term ‘rapid’), as the answer is already contained in the predictive model and smart general input data. With the answer already in the output from the model, we don’t need to spend time at the beginning before we see what the model tells us is important.





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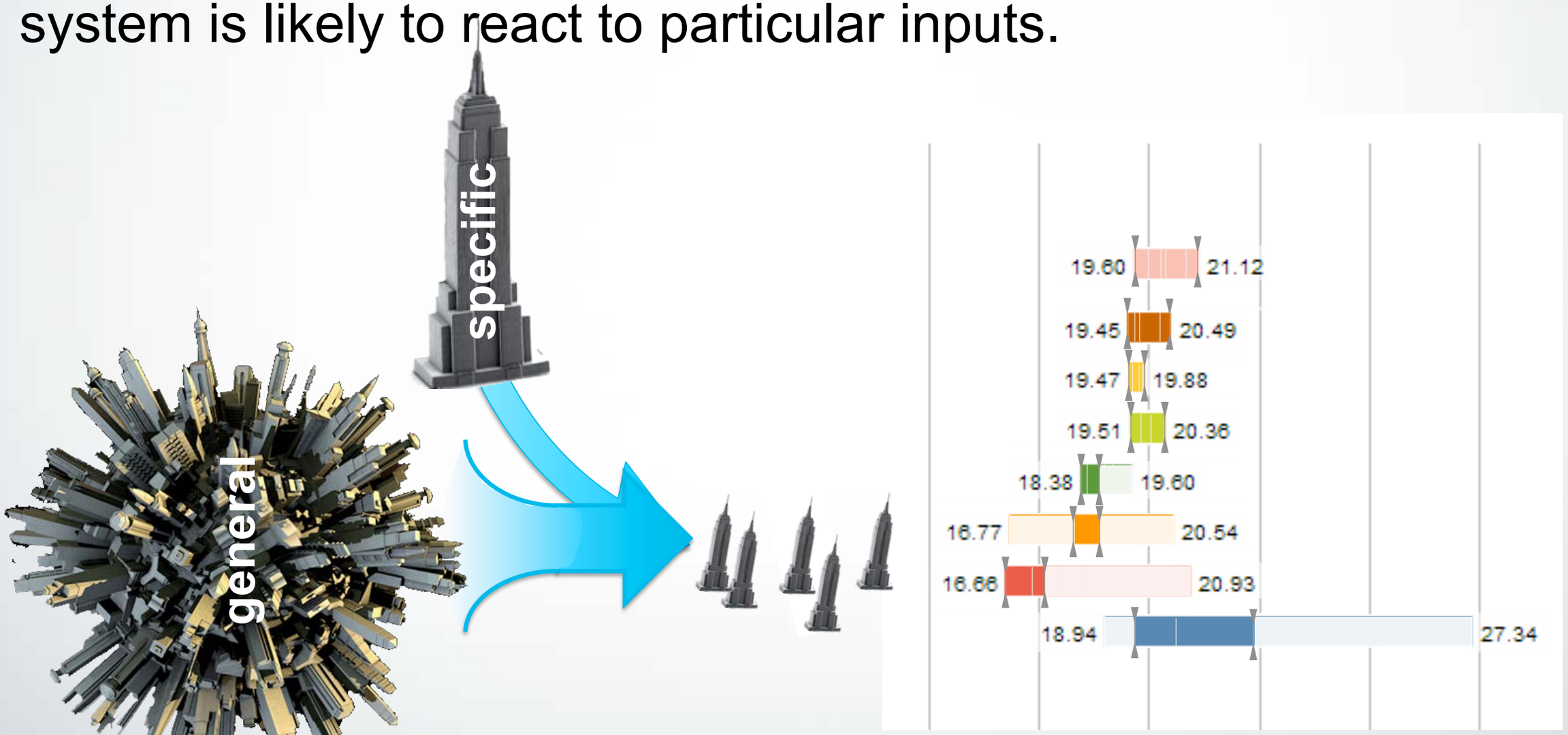
Output driven Input

We can now navigate the data to finding what is useful, what we should care about, and what is not important for improving the model. Right from the start we have information about how the system is likely to react to particular inputs.



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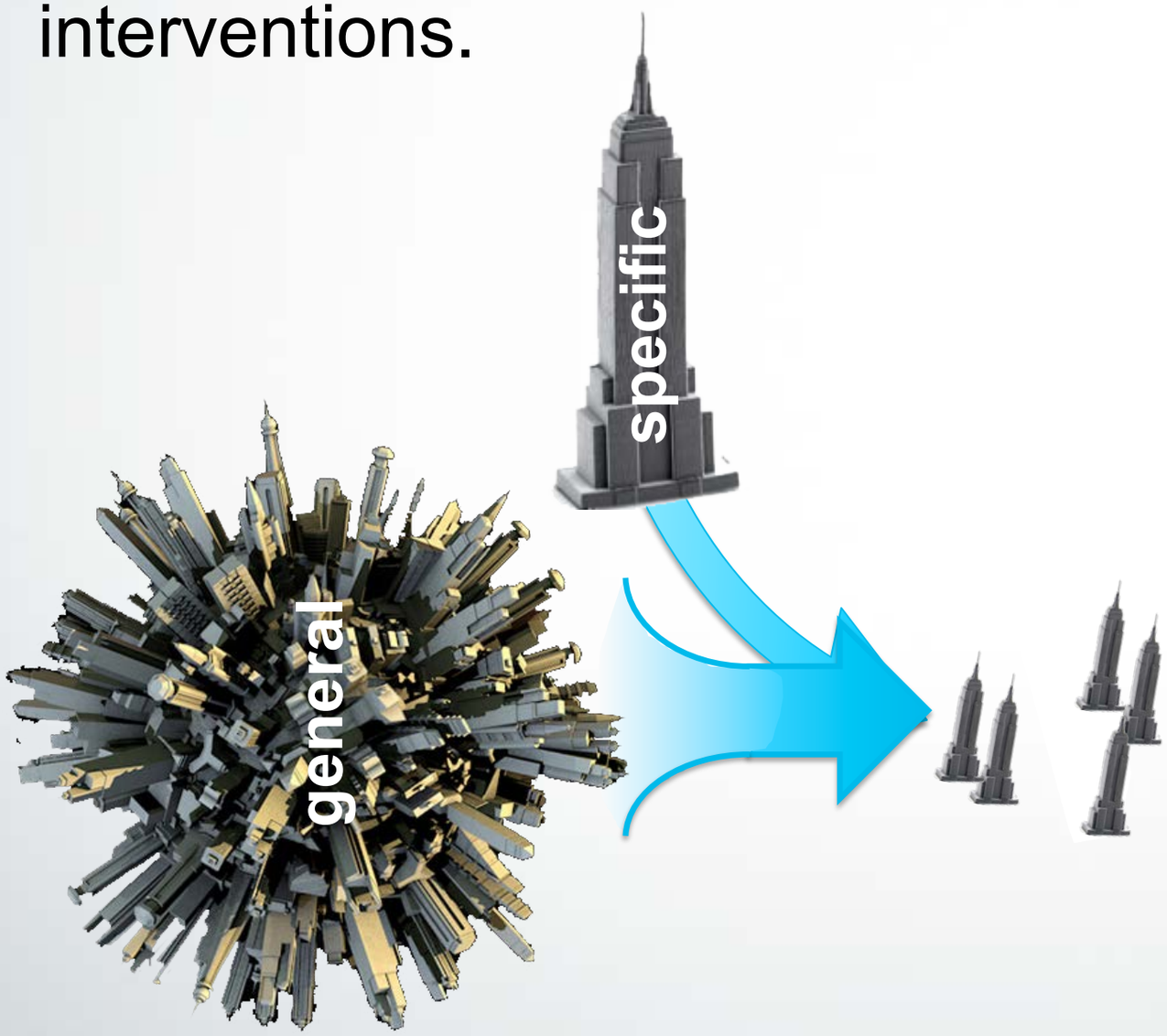
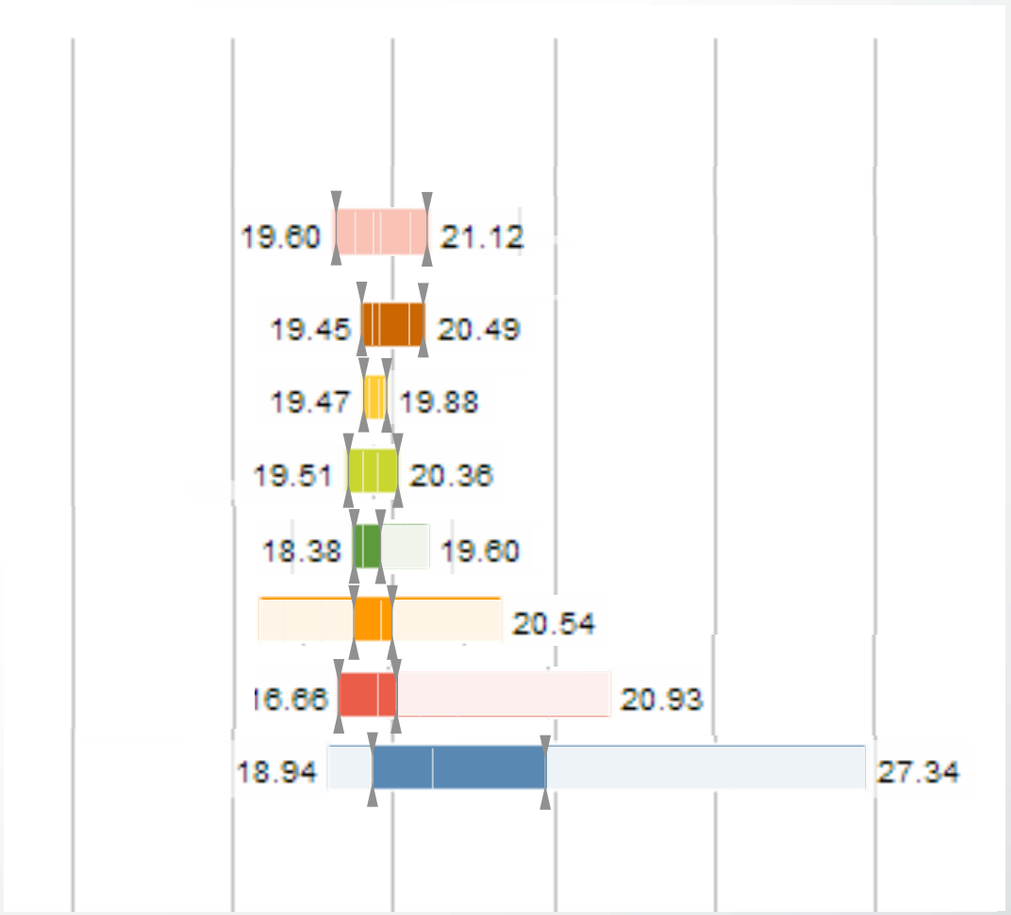
Output driven Input

By knowing what is important, we an more easily make the next iteration of the model more precise, and we can use that information to make fast decisions about possible results of urban interventions.





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What is the Smart City?

http://www.greenbiz.com/microsite/100409/video/autodesk-emma-stewart-big-data-smart-cities-bad-design

When we talk about Smart Cities, most think about sensors and automation, the internet of things. And that is correct that that's a part of the smart city. But even once we have everything sensored up and automated, how smart is it really? Will we simply have created a Pavlov's dog, reacting to assigned triggers applied by rules created by the subjective perspective of some mad scientist? Sensor pads to control that state of a traffic light are certainly an improvement from simply timed models, especially in the middle of the night, but can't we do better than that?

There are two other main elements critical to the 'smart city':
One is how all the sensor data is parsed, managed and understood through pattern learning to feed back into the system and hopefully make it smarter. By my definition, for a city to be smart, it has to be able to learn from the effects of its actions. But this isn't quite enough yet. Some say the verdict is still out about whether the government wire-tapping approach of collecting everything then looking for patterns that might be useful can actually get us to useful results. That system has only two of the three critical pieces of the smartcity: Sensors and data parsing. Though something good might have come of it ornot, it's certainly an obnoxious and expensive approach that could be greatly improved with the third piece.

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Interventions on the Smart City

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Interventions on the Smart City

- *How can we distribute incentives for building lighting (or other) retrofit to reduce energy consumption for the city, and how much a program is likely to save”*

- *What are the energy impacts of planning decisions like adding X sq.ft. of office space to the District, or converting Y sq.ft. of offices to residential.*

- *“As a policy maker, I want to use Benchmarking Data to establish baseline metrics that can be used to report changes over time and guide policy decisions to reach target energy use goals for the city.”*

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Interventions on the Smart City

- Current software platforms can create City Models very quickly. Benchmarking data can be used to enrich the model, to analyze and visualizes the data

- Energy simulations can prioritize which buildings should be targeted for retrofit

- Data can be used as a baseline when evaluating “what-if” technology and policy scenarios

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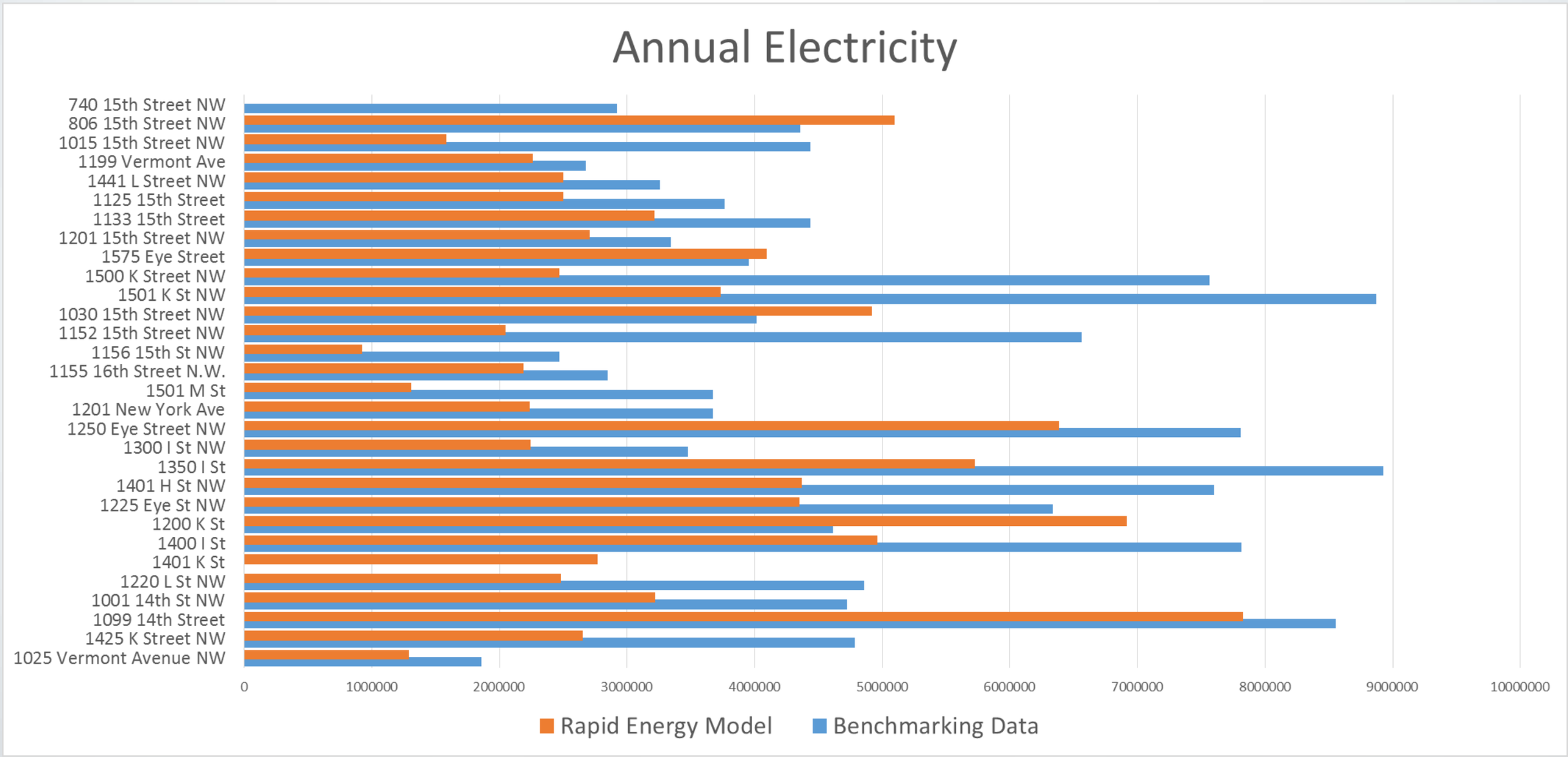
Feedback and Benchmarking



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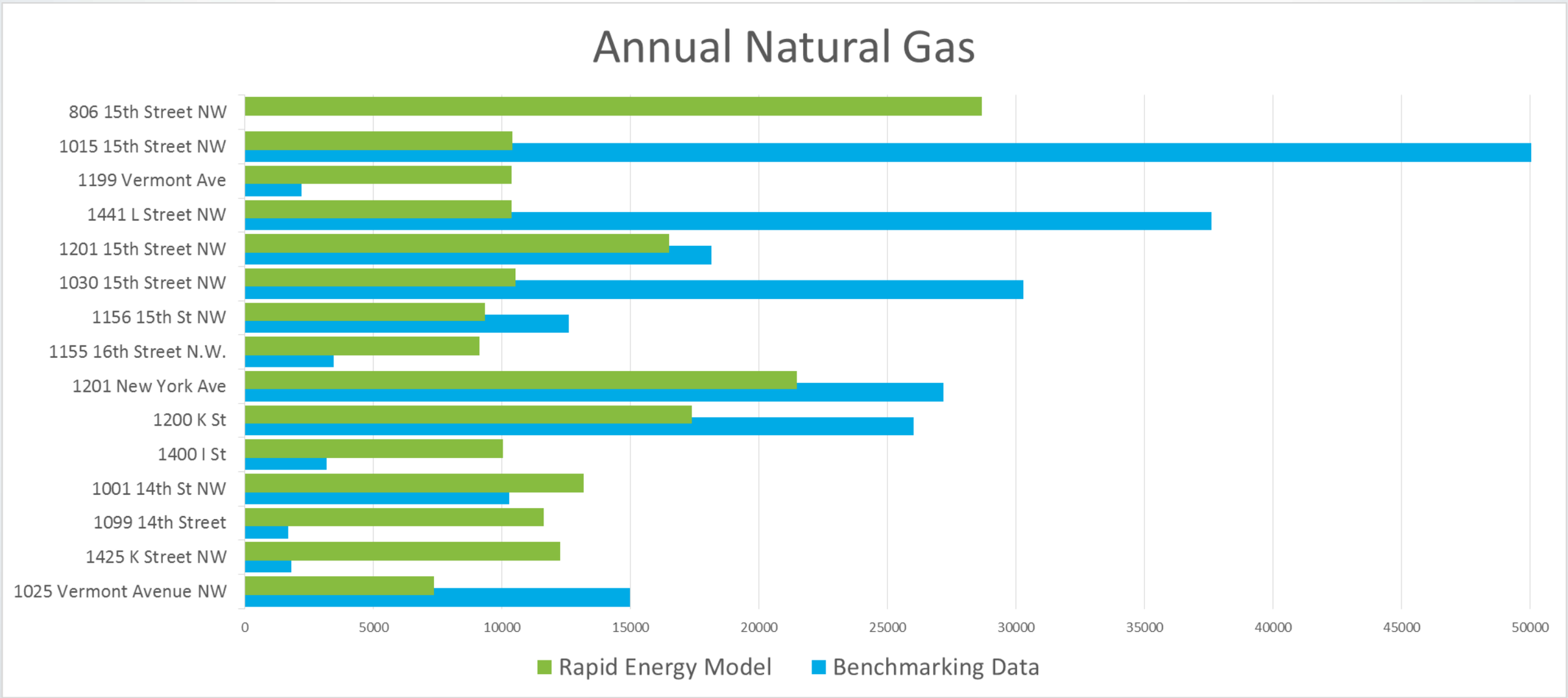

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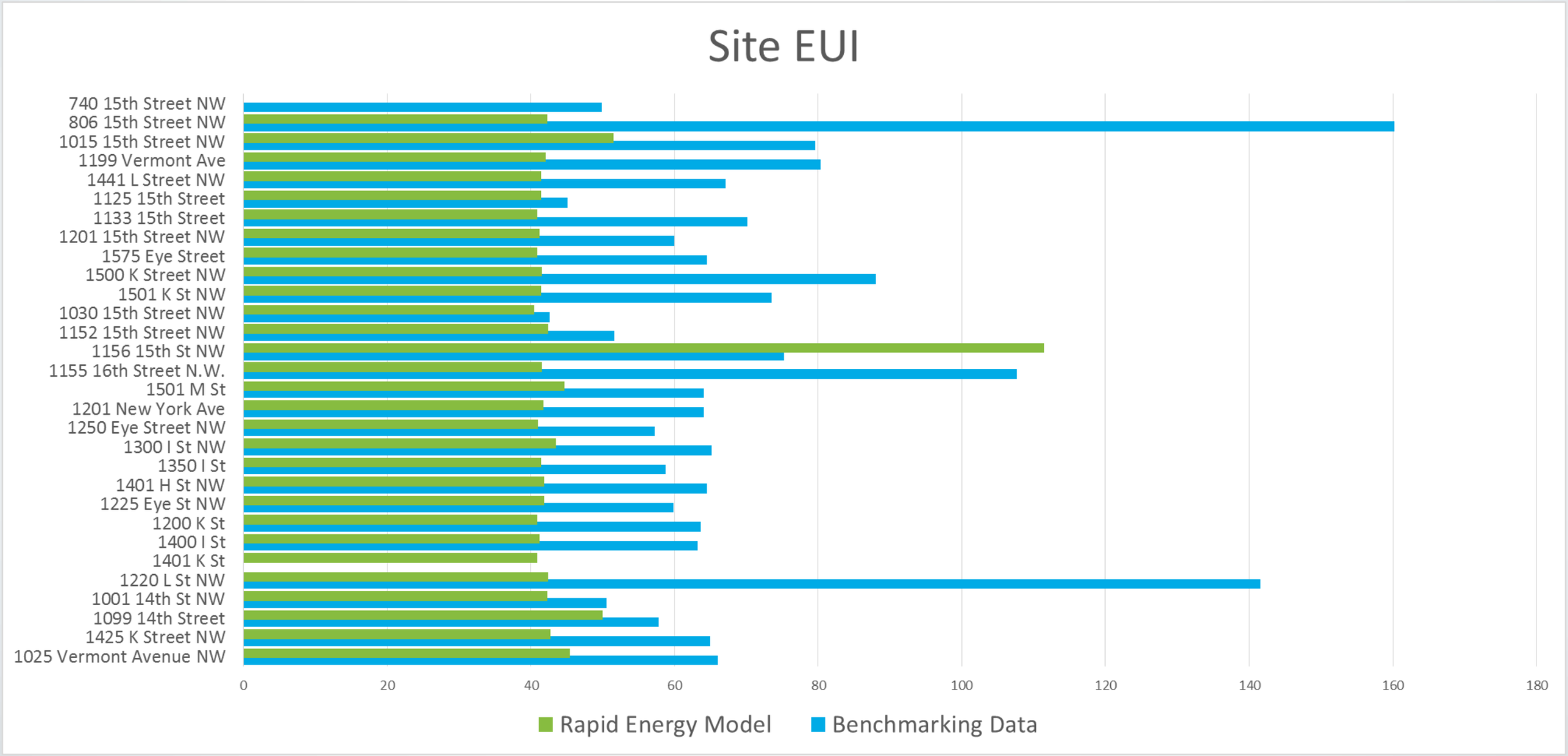

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