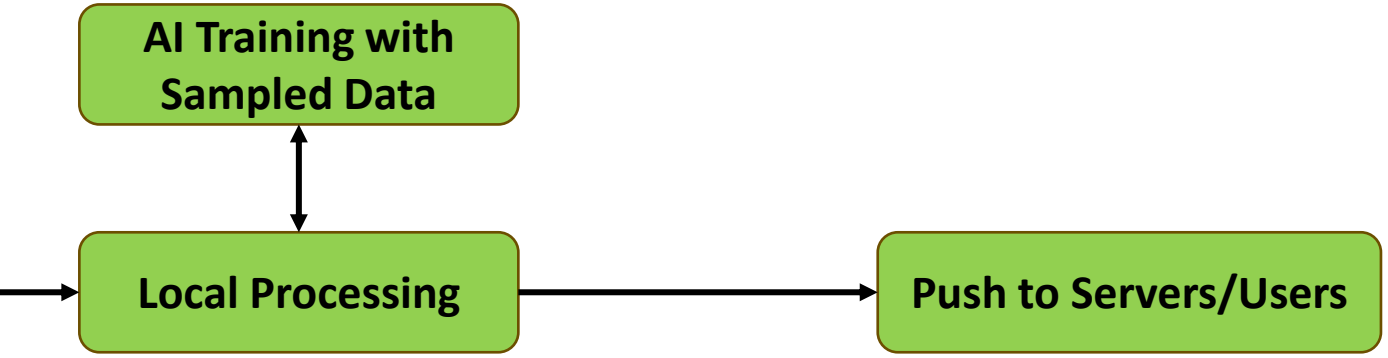
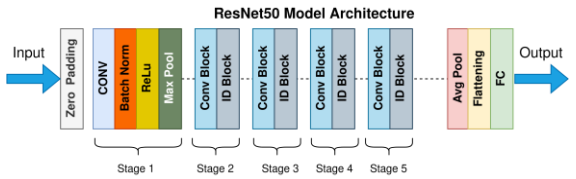
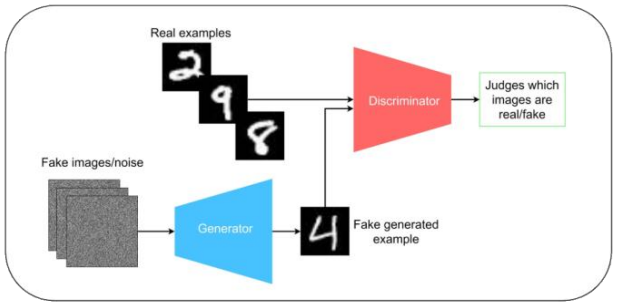
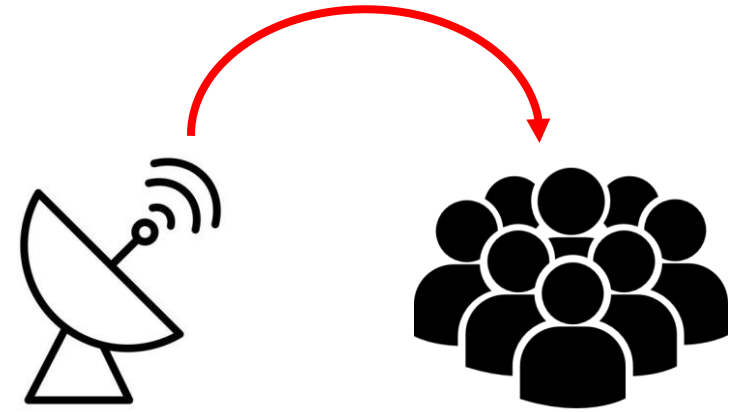
How do Different Data Collection Strategies Affect the Quality of AI Models for Environmental Sensing?

Consider a simple schematic for a sensor network…









In many cases, **most of the data collected is unnecessary.** Hence, the data collection is *inefficient*, and wastes both memory to store it and energy to process and transmit it.

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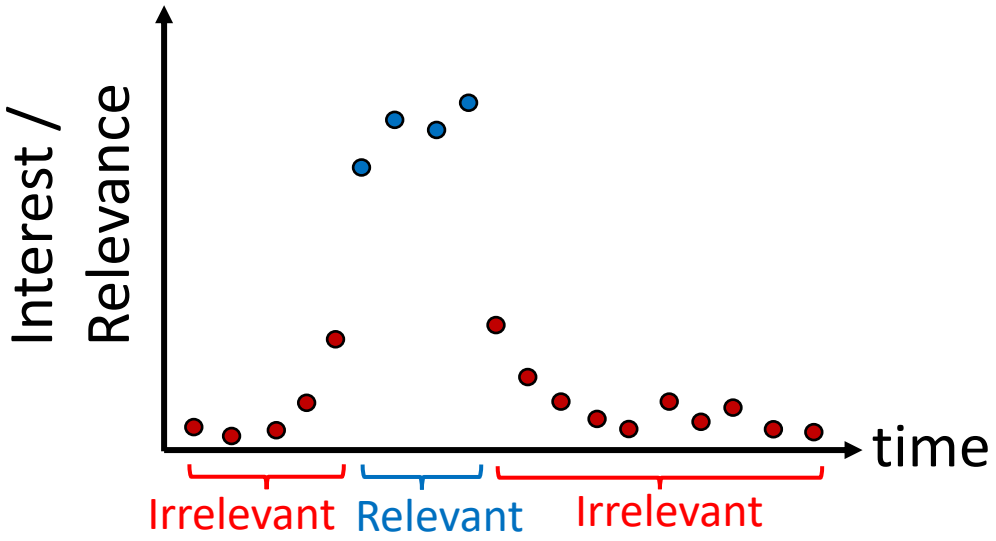
To start this project, we will consider a binary **Relevant**/**Irrelevant** flagging scheme. In many cases, the relevant data (blue) are a minority of the data collected, which is mostly irrelevant (red).



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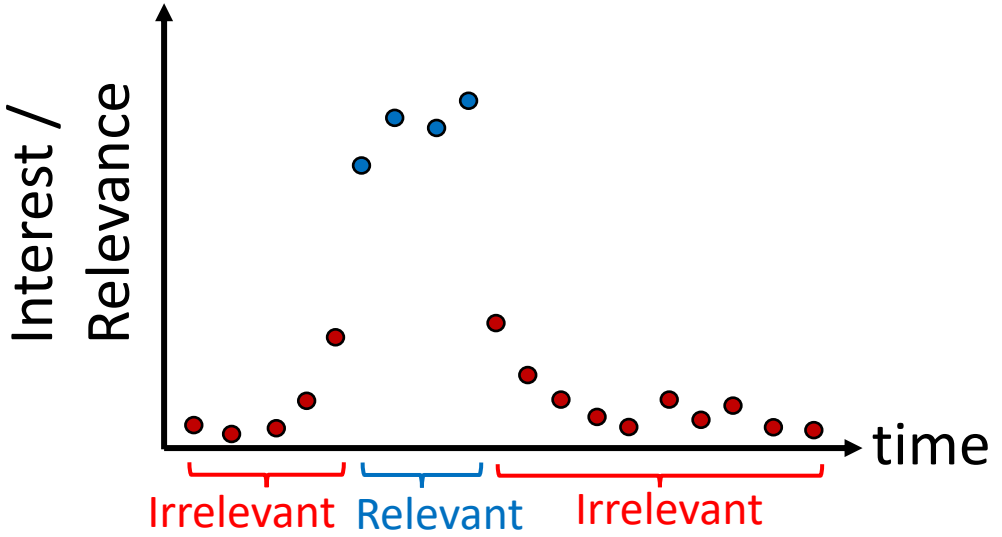
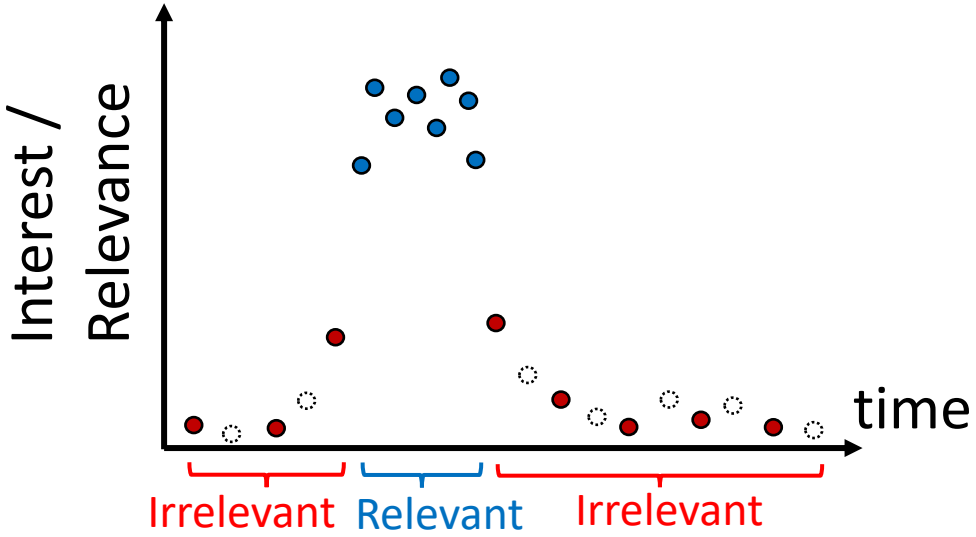


Instead, we can gather data in a smarter way by:

Changing the Sampling Rate



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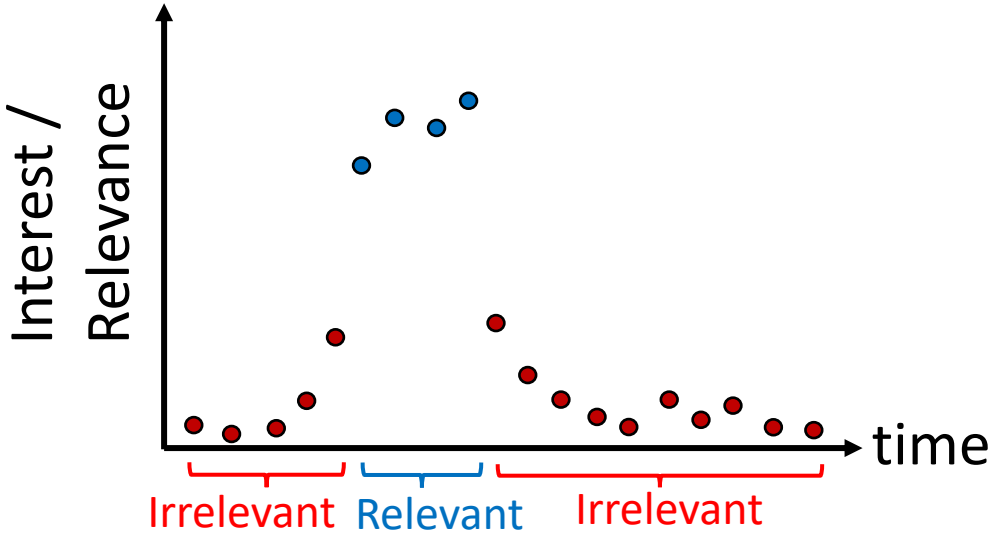
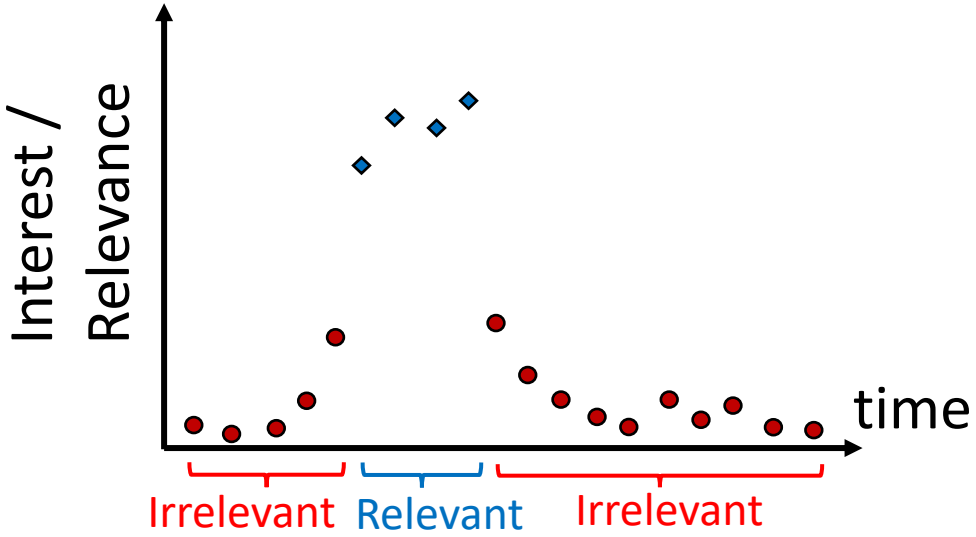


Instead, we can gather data in a smarter way by:

Changing the Sampling Quality



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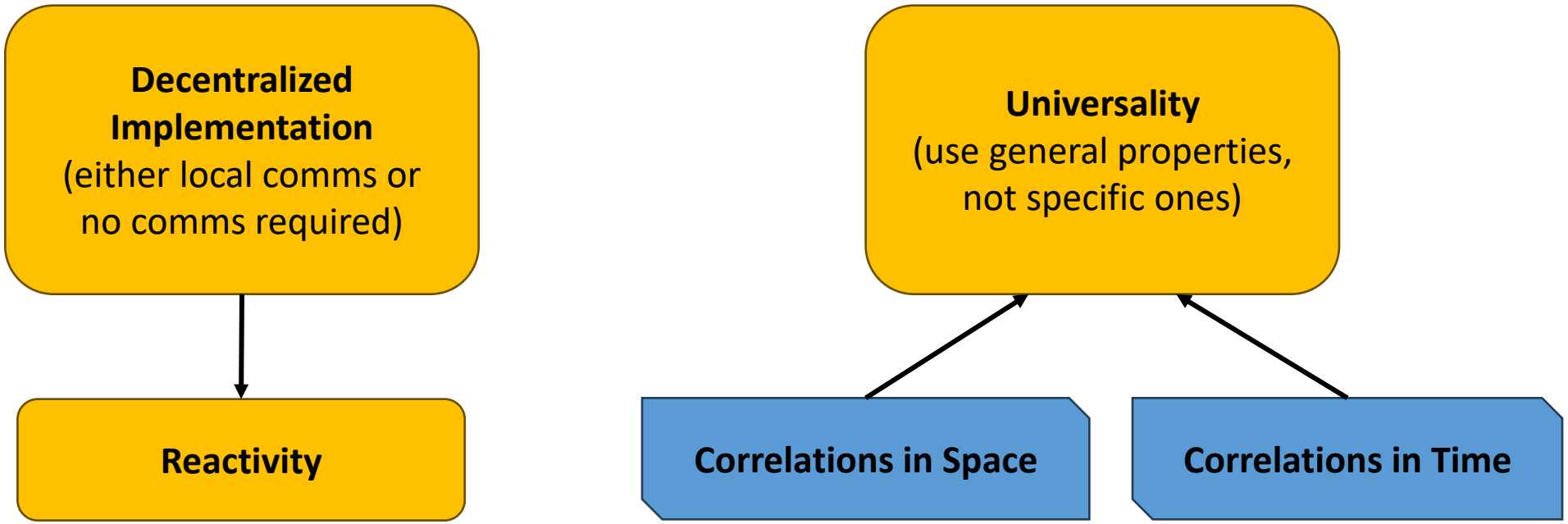
Our goal is to design a few **data collection strategies** to try and gather data with greater *quality* and *efficiency* than a uniform strategy. The strategies we create will all have two main properties:



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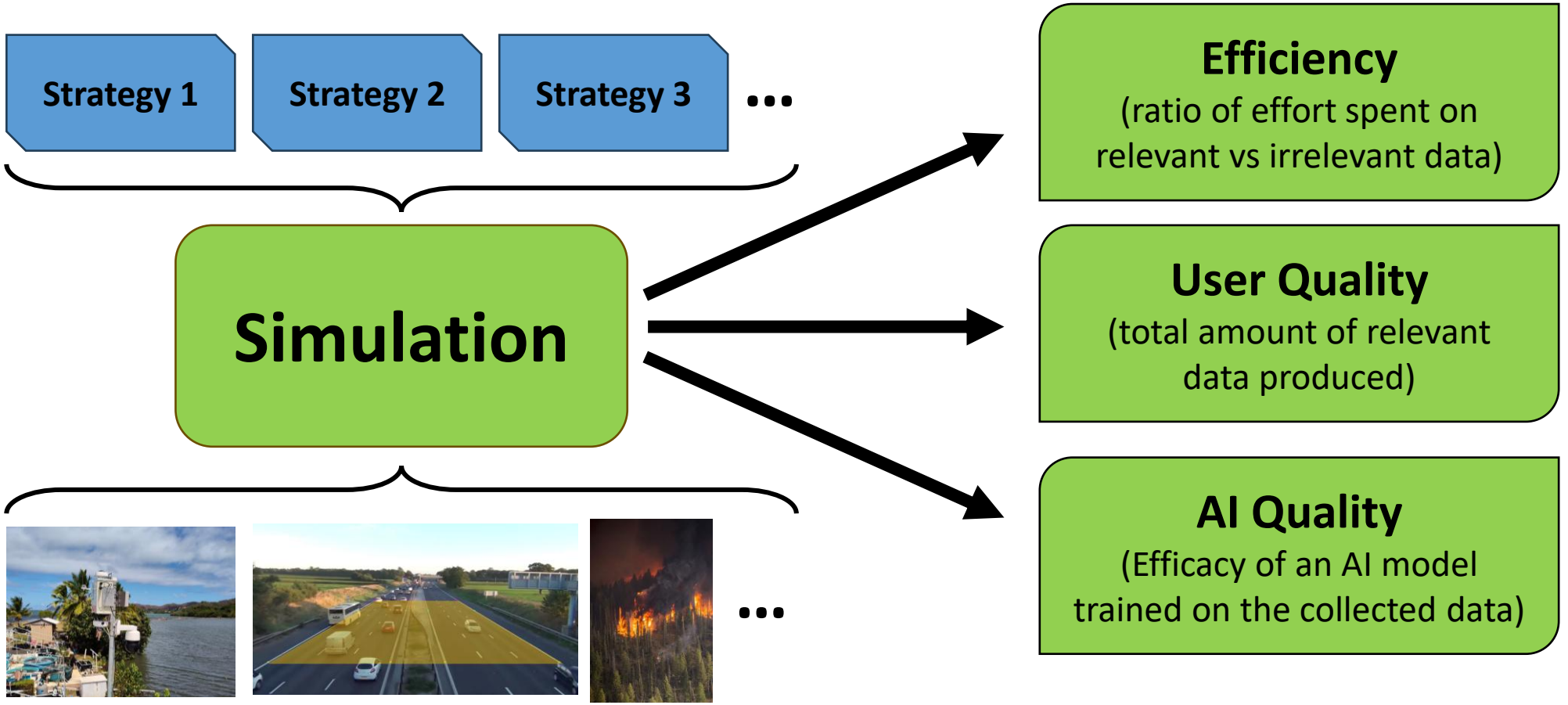
To investigate our strategies' performance, we will use a **simulation** motivated by actual SAGE applications to analyze the *efficiency* and *quality* of the collected data.



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Questions to the users (scientists):

- **Is a binary/discrete flagging scheme preferable to a continuous one?**
  - Discrete schemes may be useful if there are discrete levels of relevance or data quality standards
  - Continuous may be useful if relevance evolves gradually or if the data is often at a “medium” level of interest

- **Are there other types of relevance-correlations in your data? Other types of behaviors that you would want the sensors to have available?**