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Technologies Corporation

The Known, Unknown, and Unknowable

How the laws of nature and technology interfere with our needs

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What is **Known Data**

Data is known if it is *recorded with acceptable accuracy*

• Known data is always historic

• Recording is from the user's perspective, what is known to you may be unknown to anyone else

• Accuracy could be very different for each user and application.

    – Measuring temperature within 1% is needless precise for a casual user, just right for the manager of an industrial process, or completely useless for a scientist

    –Same person has different needs at different times.

• Before recording the data the user needs to measure, estimate, or guess its value depending on the desired accuracy and available technology.

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Data Measurement

Good accuracy requires to **measure the data** and follow certain procedures to process the results.

Measuring the data implies:

1. Intrinsic knowledge about the environment
2. Clear understanding of the meaning of measured value

Data Estimation

With lax accuracy requirements we could ***estimate the data*** which involves a mental model for deriving the unknown data from the known.

If the mental model (***observer***) is very well defined mathematically and supported by the natural laws then the estimate could be as good or even better than a direct measurement.

Example. A meteorologist may not be able to directly measure the temperature inside of a remote cloud but he considers the temperature known because based on the absorption of radio waves and an appropriate mathematical model he can estimate the temperature with 5% accuracy, better than what he needs.

Data Guessing

If we don't really care about the accuracy then we could ***guess the data***.

Guessing could be an educated guess or a speculation.

Intuition and experience sometimes may allow very good guessing.

To decide how to dress for an outdoor activity all I care about is to guess the outside temperature with accuracy better than 5 °C.

Unknown and Unknowable Data

What is *not recorded* is either **unknown *or* unknowable**. When the *desired accuracy goes beyond the natural limits* the data becomes **unknowable**.

• If we don't care much about data's accuracy the concept of unknowable disappears

• To the other extreme if the accuracy is high then we need to measure the data. Neither guesses not estimations will satisfy us

• Unknown and unknowable could refer to data from the past or the future.

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Unknown and Unknowable Data (cont)

To avoid separating the unknown from the unknowable with a fluid and untrustworthy threshold we rely on natural laws. Otherwise due to technological progress what is unknowable today may become a simple unknown tomorrow.

Threshold components

- Natural law limitations like **Heisenberg's uncertainty principle**

- Other sciences have their accuracy limits imposed by their **own natural laws**

- Impossible to measure data with **arbitrarily high precision**

- **Minimum amount of unavoidable disturbance** caused by the measurement process

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