**Overview of the role of data:**

Data can be used to create a model. A different subset of data can be used to evaluate the quality of the model.

A model may be used to take actions in the real-world, thus impacting what data is produced

**Data import and export:**

Good code – interacts with generic data files, refers to states as numbers/categories, maps to colors for visualization

To import data (loadData):

Ifelse ( file-exists? “data.txt” )

[ File-open “data.txt”

Set x file-read-line (or file-read)

File-close ]

[ user-message “No file exists” ]

Create variables for your data that is set in loadData method, trigger method in setup

Use n-of for exact percentages

Data dictionary – reveals the logic behind data sets, but can mess up data types and make analysis harder

Types of data files – plain text, INI, XML, JSON (only use plain text with NetLogo)

How to export data: File -> Export -> Export World -> Saves as csv

Cleaning data: Attributes are columns, entries are rows, columns should have consistent units and just numbers

**Data visualization:**

Some features can be processed faster than others or have an expected quantitative meaning

Preattentive – if a decision takes a fixed amount of time regardless of the number of distractors

Common mistakes: Unnecessary 3D, don’t get people to compare areas or volumes, hidden data

Bar graph – best for comparing data across categories

Pie chart – to show the relationship between an entity and the whole

Line chart – to show how data changes at equal intervals of time

Scatter plot – good when comparing 2 distributions or trying to find a correlation

Choropleth map – good for geographical data with a single indicator to display

Waterfall chart – to show a bar graph with changes

Heat map – for 1 variable as a function of 2

Parallel axes chart – for more variables or functions

Beware of pictographs and no to funnel charts

**Validation and Verification:**

Verification – ensure there are no bugs, Validation – to ensure its correct enough for use

If the model is good and you have enough data and its worth doing, then you can expand model

Blue book – British way of quality assessment

Four principles: Proportionality of response – balance of cost of assessment

Assurance throughout development – track assumptions and their consequences

Uncertainty identification, quantification, and impact assessment