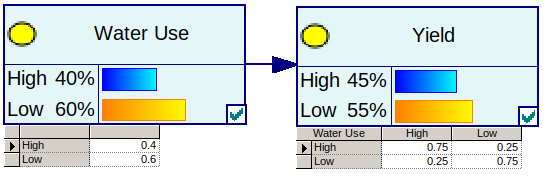
**Bayesian Network Design Workshop**

Bayesian networks are used to model complex problems in an easily understandable and intuitive manner. They consist of ideas that are linked together, such as water use to yield. Each idea is called a node, and each node has a table of how it interacts to the nodes it is connected to, for example:

In this example we say that 2 in 5 vineyards likely use more water than others. And, that 3 out of 4 vineyards that use more water have a higher yield. These measures allow the calculation of how many vineyards will have a higher yield. The end result will be models informed by experts and data to help describe the affects both accurately and with proper causation.

What is this workshop all about?

* Connecting important vineyard outcomes to their causes.
* Attributing levels of importance to different vineyard operations and resources.
* Relating these connections and outcomes to sustainability.

What do we hope to achieve?

* A better understanding of what drives sustainability.
* A map of cause and effects for vineyards.
* Vineyard sustainability score cards based off this expert elicitation.

What will you have to do?

* Construct a network by connecting different vineyard properties together.
* Weigh in on the level of influence/importance a vineyard property has on other properties.
* Debate the influence of vineyard elements on the economic, social and environmental outcomes.

This workshop will commence with short introductions. Participants will be introduced to an example Bayesian Network that predicts yield. We will show how these networks can be improved using expert knowledge and where this fits into the research that is being conducted on sustainable viticulture.

Participants will then be introduced to a straw man Bayesian Network linking vineyard elements to sustainability. This Network will consist of well known vineyard factors such as water and fuel. Where possible each vineyard element will be limited to strong/good and weak/bad measures to limit the complexity of our final product. Participants will be asked to add new nodes and to fill out the impact these nodes have on elements they are linked to.

As vineyards are unique and complicated entities, we understand that not one model fits all. We want to embrace this as part of the problem and intend to include nodes/elements that may only apply to some vineyards but not all. Multiple models can be created, different ones for more nuanced situations using the inputs from this session.

**Supplementary material:**

A straw man model is a weak or sham argument set up to be easily refuted. It will be used as a starting point for determining connections.

Below is an example of an expert informed model for the diary industry. Connecting important factors to three major outcomes: Farm, Factory and Market.

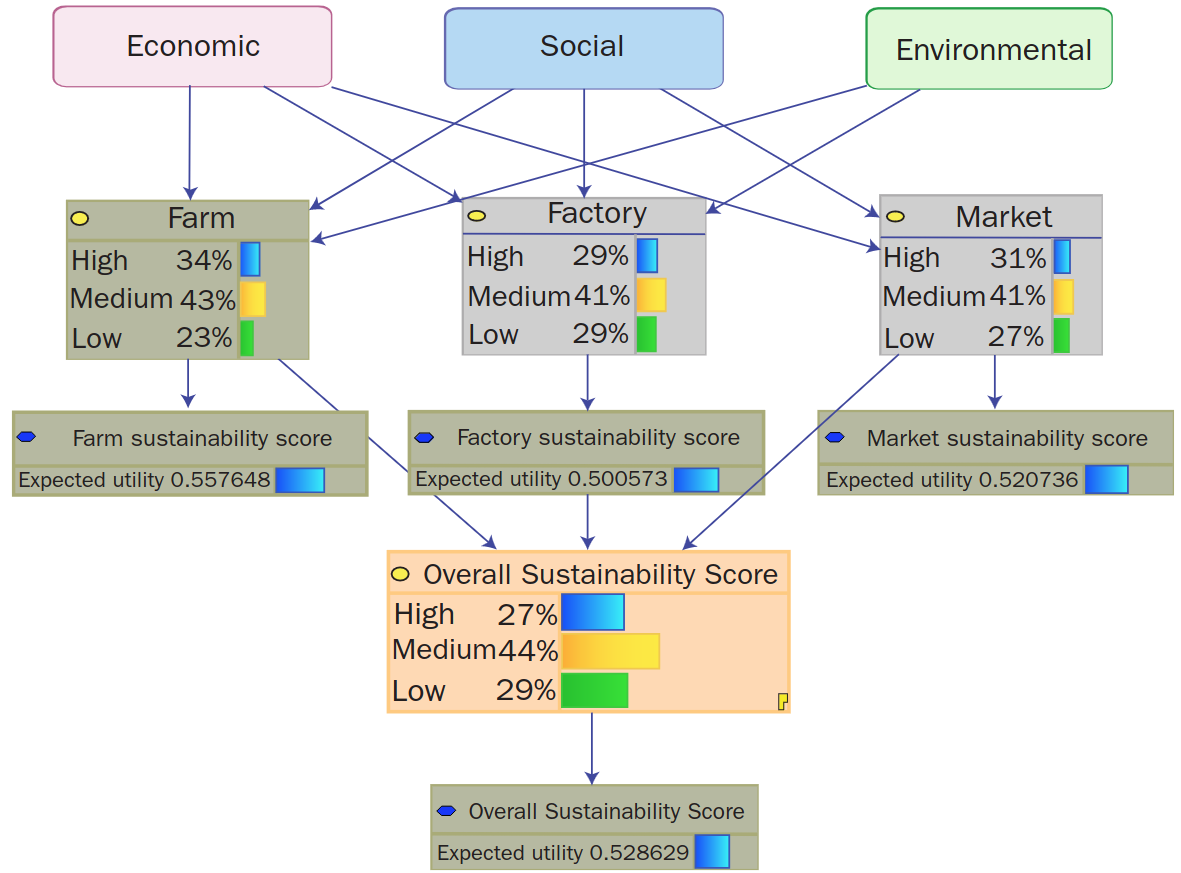
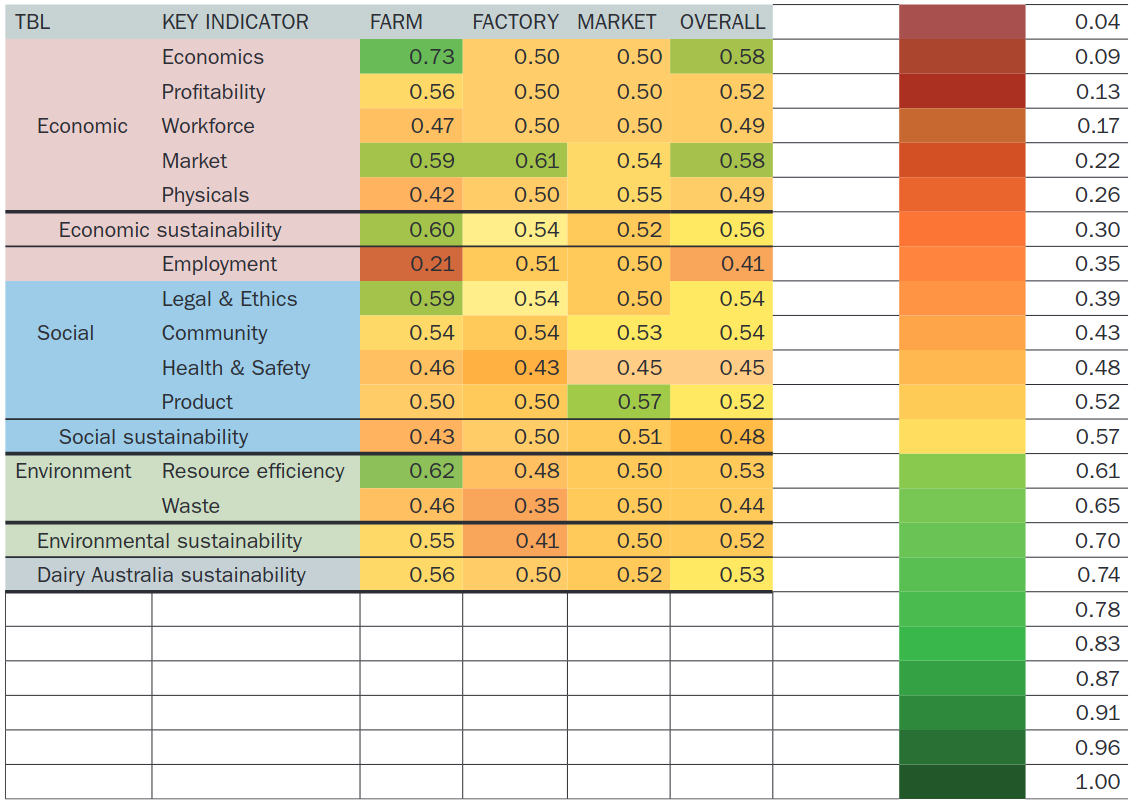


Figure 1: This is an example of different nodes depicting the connection between outcomes in the dairy industry and overall sustainability. The example is taken from *A Triple Bottom Line Planning Tool for Measuring Sustainability* by Laurie Buys, Kerrie Mengersen, Sandra Johnson, Neil Van Buuren and Evonne Miller.

The impact of different factors in the diary industry are depicted below as score cards. These can be used to help focus on agreed upon issues and inform other industry members. We can also inform the potential outcomes of different scenarios by setting known circumstances within the model to see how the outcomes will change.

**Figure 2:** Dairy Australia sustainability scorecard created using the expert informed Bayesian Network. The example is taken from *A Triple Bottom Line Planning Tool for Measuring Sustainability* by Laurie Buys, Kerrie Mengersen, Sandra Johnson, Neil Van Buuren and Evonne Miller.