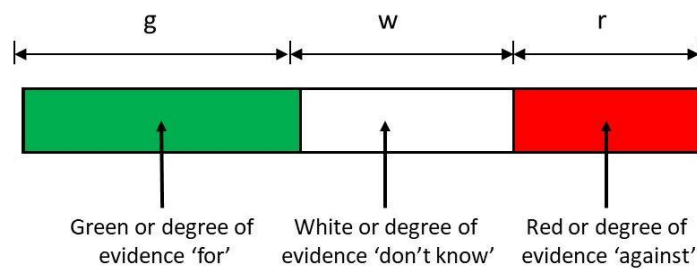# Italian Flags

An Italian Flag of evidence is a colourful way of monitoring the progress of a process towards eventual success and avoiding failure. They are an interpretation of interval probabilities as shown below. If the flag below represents the dependability of the evidence that a process *A* will be successful then *p(A) = [g, (1-r)].*

This expresses the idea that *g* is a lower bound and *(1-r)* is an upper bound on *p(A)* – a measure of the degree to which the process owner believes that the process will be successful. The green interval of length *g*

Italian Flag – evidence of dependability for a purpose

represents the evidence for the dependability that process *A* will be successful as *p(A) = [0, g]*, the red interval of length *r* represents the evidence that A will fail and *p(not A) = [(1-r), 1]* and the white interval of length *w* represents the evidence that we don't know whether *A* will be successful or not as *p(incomplete A) = [g, (1-r)].*

Italian Flags help us to identify and manage uncertainty which we characterise using three structural attributes (FIR) i.e., Fuzziness, Incompleteness and Randomness.

- Fuzziness is vagueness or lack of precision. For example, we talk of a *tall* person whereas more precisely we could say (if we have the information) that he is *1.8 m*, or *1.82 m* or *1.8288 m* with increasing precision. But the more precise we are the less dependable is the evidence.

- Randomness is the lack of a specific pattern or purpose in some data. It is explicit in probability theory and its derivatives such as reliability theory. These theories address only this one aspect of uncertainty, randomness, making it difficult to include epistemic uncertainty in models of the physical phenomena.

- Incompleteness is that which we don't know. It can consist of known unknowns (evidence we know but judge to be irrelevant) or unknown unknowns (evidence that we don't know we don't know, and which will be a surprise to us).

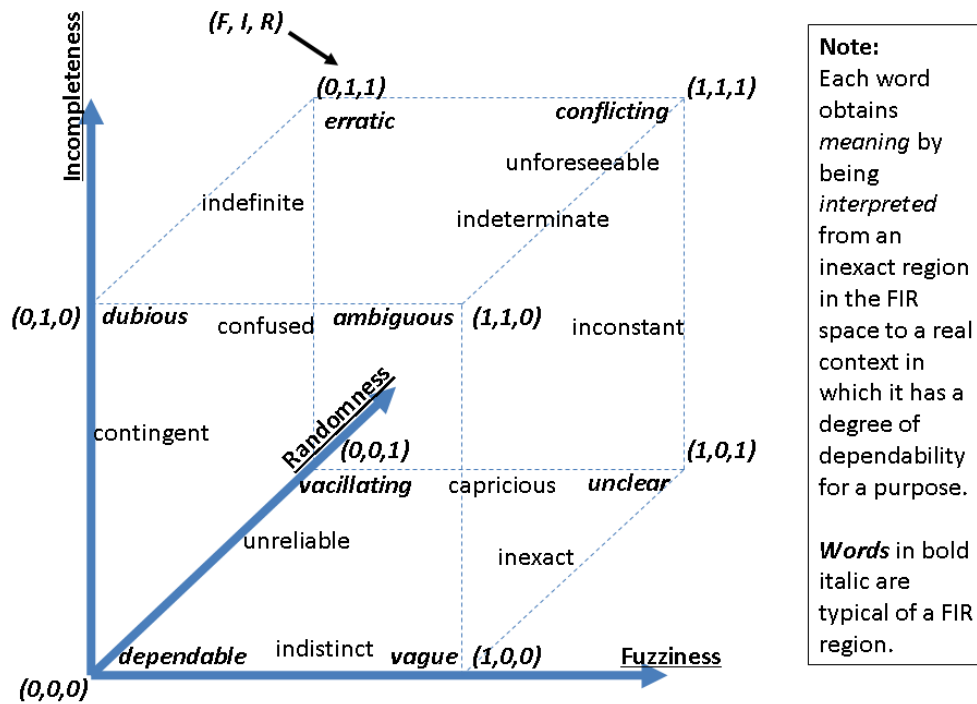We can show many various interpretations of uncertainty using these three attributes as shown below.

Figure 1 Some interpretations in the FIR space of uncertainty

Figure 2 indicates one set of possible 'mixes' for these expressions of uncertainty in natural language. However, each usage will have a different mix of FIR depending on specific interpretations in particular contexts. So, for example ambiguity (Figure 1) emerges from interacting fuzziness and incompleteness that gives rise to a potential for more than one interpretation of the meaning of a statement. It is associated with dubiety where one hesitates to believe through mistrust due to incompleteness even when there is no explicit fuzziness. Erratic uncertainty emerges from interacting incompleteness and randomness so that interpretations are deviating, wandering, and not fixed. The worst kind of uncertainty is where there are conflicting interpretations that are either not comparable or are incompatible or simply disagree. This can happen when there is a high level of all three parameters of

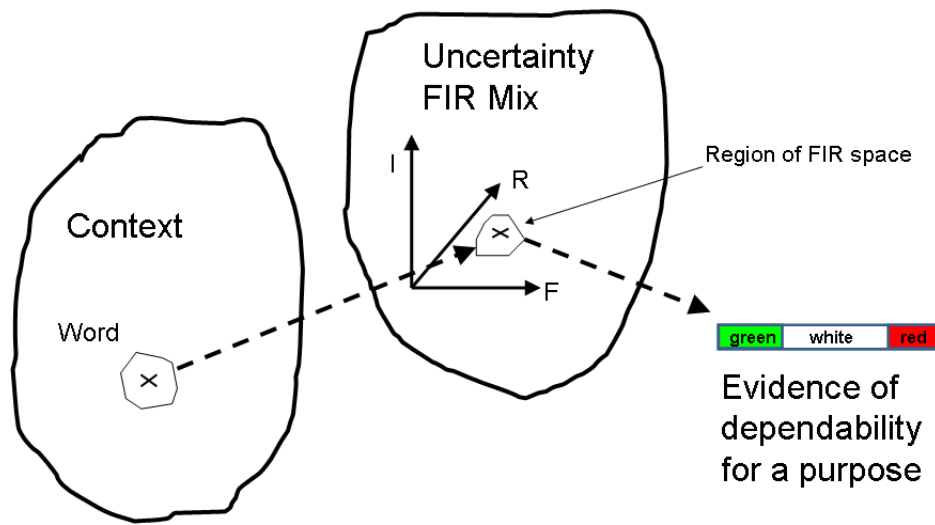uncertainty (FIR) occurring simultaneously.

Figure 2 A mapping from context to FIR space to an Italian Flag

In summary the Italian Flag represents the degree of evidence that any process will be successful. Fuzziness is captured in the precision of definition of the process. Incompleteness is captured as the white interval. Positive evidence for success by the green interval and possible evidence against success by the red interval.

An example
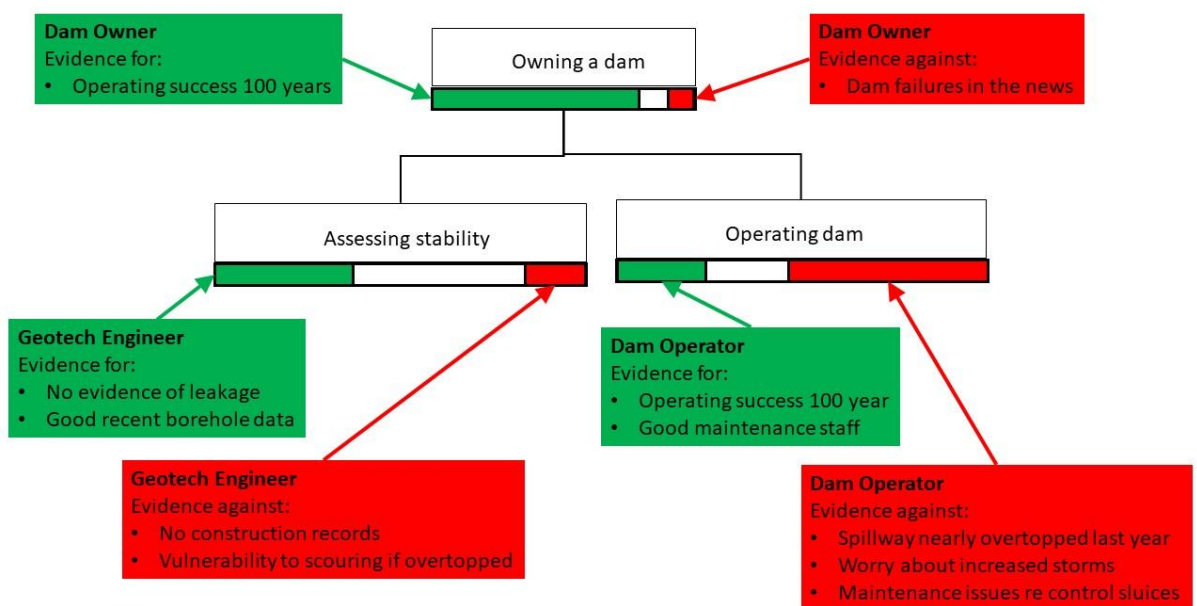
The diagram shows only three processes at two levels in a hierarchy of processes for simplicity of explanation. The top one is the total 'whole' system holon of 'Owning a dam'. The bottom two are a simplified version of the holon systemic processes which must be successful for the top process. A different person and his/her team hold the responsibility of managing a process to success. They each draw their own Italian Flags at a moment in time as shown. When they share them (say through an intranet system) they realise there is a problem. The dam owner thinks all is well. The geotechnical engineer is concerned, and the dam operator is very worried. Through sharing their Flags they spot a potential problem (possibly an incubating 'accident waiting to happen') and so can come together and decide what needs to be done.