Multi-element structures that are nominally identical are, in reality, different because of variance between their individual members. Furthermore, there are variations in the system response of an individual structure caused by unmeasured conditions (such as temperature or humidity) that are present during experiments. Finally, noise is present in any measurement of structural excitation or response. For these reasons, error is always associated with the characterizations made about structural dynamic systems and descriptions of results must be in statistical or probabilistic terms. This study identifies and assesses the sources and the degrees of randomness in the metrics of structural dynamics.