The results of ongoing systematic tests with maps of various qualities will be presented. The same mathematical models of electron density are being used for the improvement of indices that measure the quality of a model on a residue-by-residue basis. They are also being used at low (~20 Å) resolution in the development of methods to orient and position domains of known structure within electron micrograph images of large assemblies. The authors will summarize the theoretical foundation common to all of these applications, and present some of the recent results that demonstrate the success of this approach.