Some recent developments regarding the relationship between coarse-grained (CG) magnitudes in real space and chemical bonds are examined, with special emphasis on QTAIM [1] regions. We show how CG density matrices establish a statistical link between electron number distribution functions [2,3] and bonding. A theory of resonant structures in real space may be constructed from it [4], and a set of bond descriptors defined. Diagonalization of CG exchange-correlation densities gives rise to effective one-electron orbitals [5], which hide a clean statistical interpretation [6] not reported up to now, and that may be used within our IQA [7,8,9] approach to partition the non-classical contribution to any given interfragment interaction into molecular orbital-like bond contributions. Only those orbitals delocalized over the fragments are shown to contribute to bonding.