A number of new concepts for structure and dynamics of the inner core (IC) have been proposed recently to explain different types of observations. Due to a lack of an experimentally controlled environment, it is challenging, although possible to scrutinize competitive hypotheses using seismology. With the current configuration of receivers and earthquakes worldwide, we are still far from achieving a fully satisfactory sampling of the IC in all directions important for the understanding of its anisotropic structure, except for the paths nearly parallel to the equatorial plane. The most recent expansion of the ocean bottom seismometers has the potential to significantly enhance spatial sampling of the IC, however PKP waves have not yet been convincingly observed on these instruments due to a significant effect of noise near the frequencies at which they are dominant. In addition to improving the characteristics of these instruments, studying other core-sensitive phases is desired. While the hemisphericity in absolute velocity structure of the IC emerges as an intriguing and robust result stemming from the differential travel times of core-sensitive waves, the same cannot be said for any simple model of anisotropy. A conglomerate of anisotropic domains in the IC combined with the inhomogeneous structure of the mantle is a likely concept that reconciles observed complexities in differential PKP travel-times while preserving a net IC anisotropy that is required to explain anomalous splitting of Earth's free oscillations. The nature of the IC boundary holds the key to important clues about the dynamics of the IC.