Towards realization of a steady-state tokamak reactor, establishing operational scenario with a plasma of high normalized beta (β_N) and high bootstrap current fraction (f_{BS}) is a key issue. Modelling and simulation of high β_N tokamak plasmas is one of the most challenging problems in this domain of fusion research. Because various physics processes characterizing such plasmas exist and are tightly related to each other. In particular the formation and sustainment of an internal transport barrier (ITB) would play a key role and is strongly correlated with the current profile that is dominated by the bootstrap current driven in the ITB region. Validity of the physics model of the energy transport is a key for more reliable simulation. So called integrated modelling codes, CRONOS developed in the EU and TOPICS developed in Japan, along with several transport models have been validated against each other using experimental data obtained both in JET and JT-60U in a wide extent in the plasma domain from H-mode to ITB plasmas. Use of validated physics model is necessary but not enough to simulate complicated system such as high β_N plasmas. Because the integrated modelling code should treat physics models appropriately and as self-consistent as possible. Especially, treatment of the radial electric field (E_r) is important. TOPICS has been developed so as can treat E_r and other physics module self-consistently. Therefore it can include 3D magnetic field effect to evaluate the toroidal rotation (V_t) more accurately. Use of validate transport model and self-consistent simulation platform enables us to predict future plasmas more reliably. For example, effect of the V_t profile on Resistive Wall Mode stability, which has been also improved by treating kinetic effect more rigorously in the RWM modelling in the RWMac code. Coupling of the core integrated code and the SOL/Divertor code, SONIC, is developing for evaluation of the impurity accumulation.

Application of validated transport model and self-consistent simulation platform, performed both in EU also using other codes such as JINTRAC ASTRA and so forth and in Japan, on prediction of JT-60SA plasmas, especially of high β_N will be presented to highlight progress in integrated modelling.