The increasing availability of coherent light sources at short wavelengths from the extreme ultraviolet to the hard x-ray regime has paved the way for widespread use of coherent diffraction imaging (CDI) techniques in the past decades. In contrast to classical microscopy, CDI does not require an objective lens between the sample and the detector, therefore it enables spatial resolution without any lens-imposed limitations. In contrast to classical CDI, imaging of wide field-of-views can be achieved by performing CDI in scanning mode. This approach is commonly known as “ptychography” following the work of Hegerl and Hoppe on electron microscopy in 1969. However, while ptychography with current and future synchrotron-based x-ray sources is very versatile, the main advantage of its high spatial resolution is diminished by the inherently limited temporal resolution in obtaining 3D images. In this talk I will talk on a set of new computational methods that can yield tomographic reconstructions at high-speed or photon-limited imaging conditions when implemented as an integral part of the imaging setup.