Over the past decades, thanks to the advances in medical image acquisition, visualization and display, surgical tracking and image computing infrastructure, a wide variety of technology has emerged that facilitates diagnosis, procedure planning, intra-operative guidance and treatment monitoring while providing safer and less invasive approaches for therapy delivery. However, while real-time visualization is critical for guidance in absence of direct vision, effective therapy cannot be delivered without the appropriate equipment and instrumentation that enables access to the internal organs through small, less invasive entry routes inside the body. Cardiac interventions have been among the last disciplines to adopt the minimally invasive treatment techniques, mainly due to the challenges associated with access and visualization inside the beating heart. My doctoral research on multi-modality imaging environments for cardiac interventions proposed new paradigms in terms of image-guidance technology for beating heart procedures. These efforts can be further complemented with the development of more suitable equipment and technology to deliver therapy, while guided by virtual or augmented environments. These technologies include miniature electro-mechanical devices, compatible with traditional imaging modalities, which can be guided inside the body via minimally invasive access ports and remotely manipulated and integrated with commercially available platforms for image-guidance. This lecture will focus both on the technologies (image acquisition, surgical tracking, visualization and display) and techniques (image analysis, modeling, evaluation and validation) currently available and also under development for image-guided (cardiac and not only) interventions, along with their engineering limitations and challenges in translation from bench to bedside. Potential avenues will be highlighted on how to leverage the available infrastructure and expertise in the community, together with the available clinical support and collaborations, to further promote and overcome the slow progress in the clinical translation of image-guided interventions.