Iterative Learning Control (ILC) and its sister field Repetitive Control (RC) ask to iteratively converge to zero error in control system hardware that repeatedly performs a command, or is subject to periodic disturbances. Examples include high speed robot tracking, spacecraft vibration isolation mounts, and spacecraft laser communications disturbed by CMG vibrations. Some ILC history is presented. Viewed from a mathematical perspective ILC can make one work on apparently very relevant research problems, but the grand results are useless in the world. One expects simulations to help focus research directions, but simulations are shown leading to wrong conclusions. The experimentalist might take over to make things work in the laboratory, but again he can come to wrong conclusions. This case study shows that the interplay between theory, simulations, and experiments has been fundamental to the development of ILC. Each approach helped the others focus on the real issues.