Over the years a great deal has been learned about how bacteria attach to surfaces. They form pili, flagella, holdfasts and polysaccharides as well as protein adhesins to help with this. However little is known about molecular mechanisms of bacterial surface sensing and response that result in attachment. The Wsp signal transduction system in *Pseudomonas aeruginosa* is activated when cells are grown on a surface. Surfaces initiate Wsp-catalyzed phosphotransfer reactions leading to the production of c-di-GMP, a compound that promotes increased exopolysaccharide production by cells and biofilm formation. We are investigating features of the Wsp system that are critical for cells to respond to surfaces to produce c-di-GMP and we are investigating other conditions that may stimulate c-di-GMP production by the Wsp system.