Gas-phase metallicities track the growth of stellar mass and the pollution from massive stars into the interstellar medium (ISM), providing a unique tracer of galaxy evolution. With VLT/MUSE optical integral field spectroscopy, the PHANGS team now has a wealth of emission line maps that trace different ionization sources and physical conditions at the 50pc spatial scales needed to isolate individual ionized regions (e.g. HII regions, supernova remnants, planetary nebulae) from surrounding diffuse ionized gas. I will present our most recent results measuring the gas phase oxygen abundances for 19 massive and 14 low mass galaxies, where we move beyond simple radial gradients to search for signatures of azimuthal abundance variations. Regions with enhanced abundances have high ionization parameter and are associated with younger star clusters and higher molecular gas densities, indicating a correlation between recent star formation and locally enriched material. We find correlations between metallicity variations, gas turbulence and SFR, driven principally by dilution rather than pollution, demonstrating the role of mixing in regulating the ISM. Finally, I will describe how SDSS-V and its new Local Volume Mapper (LVM) program is mapping direct method metallicities within resolved Milky Way and LMC/SMC HII regions, allowing us to make detailed comparisons between metallicity variations and stellar feedback processes, and compare/contrast the integrated vs resolved views.