Build biophysical model of cell growth Fit kinetic parameters using data а b Characterize Characterize Primary overflow reaction catabolic/anabolic reactions carbon source (e.g., glucose) Feedback Glycolysis inhibition Uptake Overflow > Precursor = product Overflow (e.g., acetate) 13C MFA OD growth Regulator Coexistence study and model simplification Biomass C alucose acetate alucose acetate specialist specialist specialist specialist Proteome Growth rate is limited resource allocation by carbon or energy $g = min(g_c, g_e)$ gc ~ Jc Riboson Metabolic respiration fermentation enzymes (E) substrate-level phorsphorylation