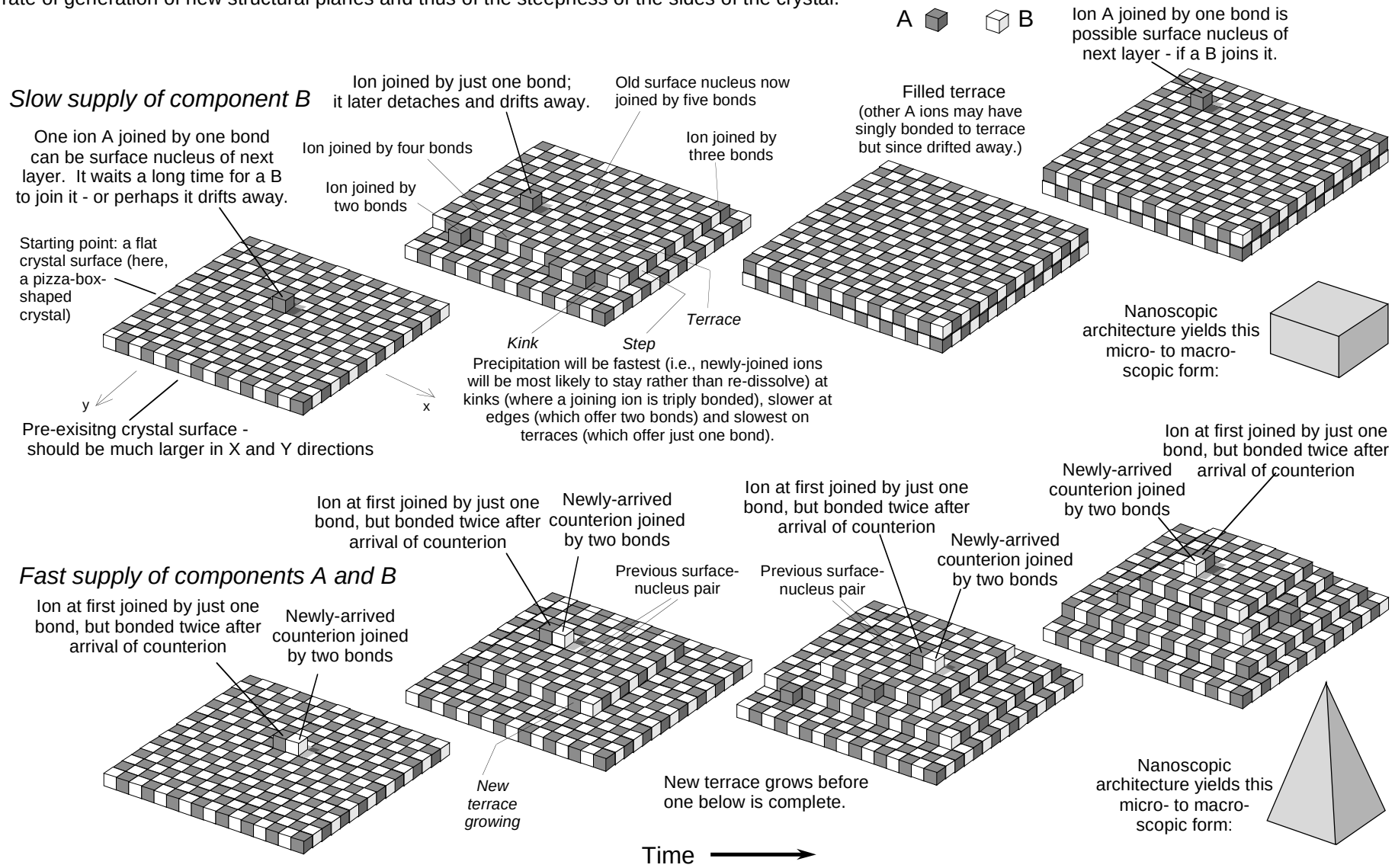
How rate of solute supply can control crystal morphology

The sketches below show the general case of a more abundant ion A and less abundant counterion (ion of opposite charge) B precipitating from solution to form mineral AB. If a singly-bonded ion A has a residence time of *n* nanoseconds on a terrace before it detaches and drifts away in solution, but it will not drift away if a counterion B joins it to make it doubly bonded, the probability of the arrival of new B ions (i.e., their rate of supply) determines the rate of generation of new structural planes and thus of the steepness of the sides of the crystal.



This model, in its general principles, explains why rapid precipitation promotes elongate crystals. Common examples are chalcedony (elongate) rather than quartz (equant) or elongate to fibrous calcite rather than equant calcite.