Patterns in Design and Analysis of Randomized Data Structures

Design without analysis does not provide a guarantee and has limited value. Therefore, design should enable analysis.

randomized BST (construction)
- uniform pivot/split selection
- expectation bound on sorting a static set with in-order traversal by reduction to randomized quicksort
- expectation bound on height → a few constructions, choose best

randomized skip list (construction)
- geometric distribution to “sparsify” splits at upper levels
- w.h.p. bound on search steps → single construction

vEB (space reduction)
- hash tables instead of arrays
- worst-case O(1) search time in hash table → worst-case query time as with arrays
- w.h.p. O(1) insert time in hash table → close to worst-case in maintaining dynamic set