Gerald Jay Sussman: Designing for Applications Unanticipated by the Designer

It is hard to build robust systems: systems that have acceptable behavior over a larger class of situations than was anticipated by their designers. The most robust systems are evolvable: they can be easily adapted to new situations with only minor modification. How can we design systems that are flexible in this way?

Observations of biological systems tell us a great deal about how to make robust and evolvable systems. Techniques originally developed in support of symbolic Artificial Intelligence can be viewed as ways of enhancing robustness and evolvability in programs and other engineered systems. By contrast, common practice of computer science actively discourages the construction of robust systems.