

# Chapter I

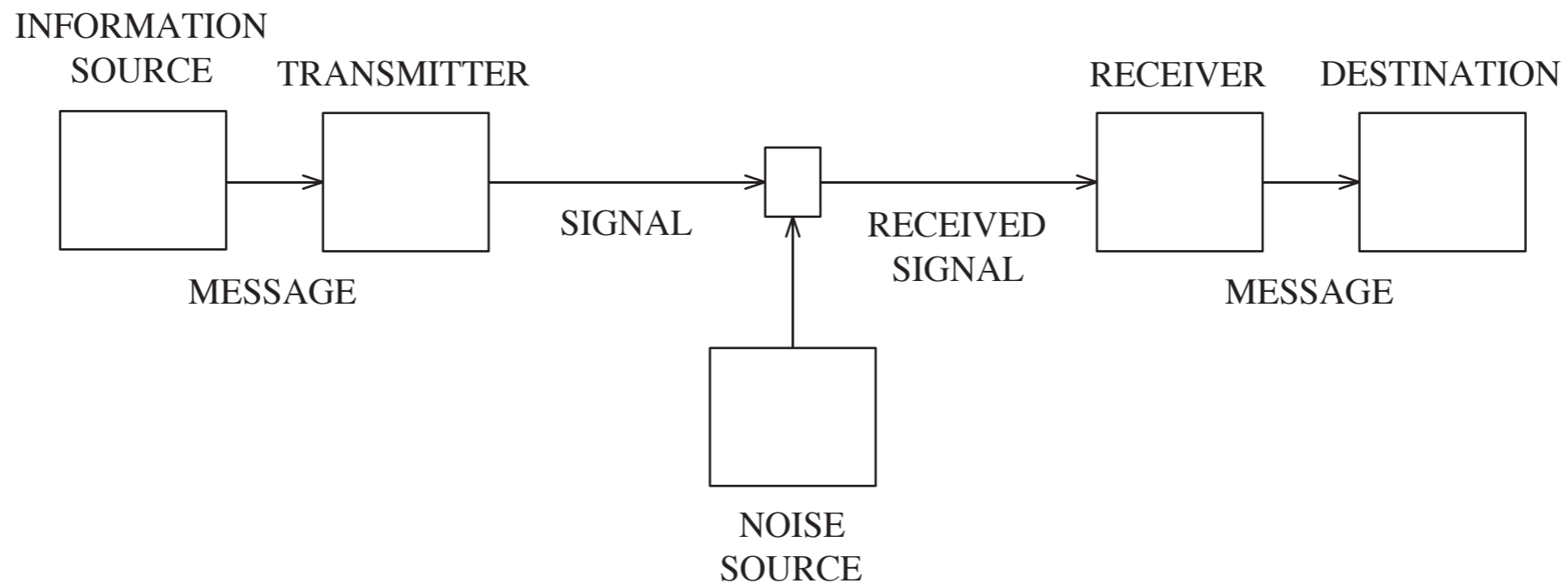
# The Science of Information

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# Information Theory

- Founded by Claude E. Shannon (1916-2002)
- “The Mathematical Theory of Communication,” 1948
- Study fundamental limits in communications: transmission, storage, etc



# Two Key Concepts

- information is **uncertainty**: modeled as random variables
- information is **digital**: transmission should be 0's and 1's (bits) with no reference to what they represent

# Two Fundamental Theorems

- Source coding theorem
  - fundamental limit in data compression
- Channel coding theorem
  - fundamental limit for reliable communication through a noisy channel