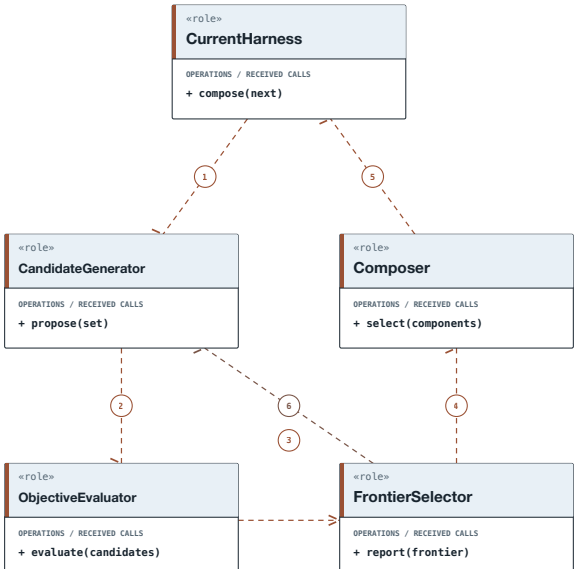
E04 Multi-objective evolution and composition

Evolution / UML CLASS VIEW / ANALYTICAL MODEL

Search among competing objectives.

UML CLASS VIEW

dashed arrow: call dependency · brown: return/failure · analytical, not an observed trace



POINTCUT / PATTERN INTERFACE

CONTEXT	Candidate harnesses differ across at least two measured objectives.
TRIGGER	Evaluation yields an objective vector.
STRUCTURE	Declared objectives, constraints, candidate set, and Pareto or scalar selection.
EFFECT	Selected candidates preserve documented trade-offs rather than one hidden score.

CONTRACT / REQUIRED BEHAVIOR

REQUIRES	Objective direction, weight, and constraints are explicit.
ENSURES	Selection records candidate vectors and dominance or scoring rationale.
INVARIANT	A hard constraint failure cannot be hidden by strong average quality.
VIOLATION	Missing objective or incomparable candidate is marked ineligible or ambiguous.

RELATIONSHIPS / ANALYTICAL CALLS

number · caller → callee · message

1 CurrentHarness → CandidateGenerator propose(set)
2 CandidateGenerator → ObjectiveEvaluator evaluate(candidates)
3 ObjectiveEvaluator → FrontierSelector report(frontier)
4 FrontierSelector → Composer select(components)
5 Composer → CurrentHarness compose(next)
6 FrontierSelector ↩ CandidateGenerator resample()

VARIATION / TEST / NEGATIVE CONTROL

VARIATION	Quality-cost trade-off, Pareto front, weighted fitness, and constraints.
TEST_OBLIGATION	Test dominance, ties, constraint failure, missing objective, and composition.
NEGATIVE_CONTROL	A single accuracy score is not multi-objective selection.