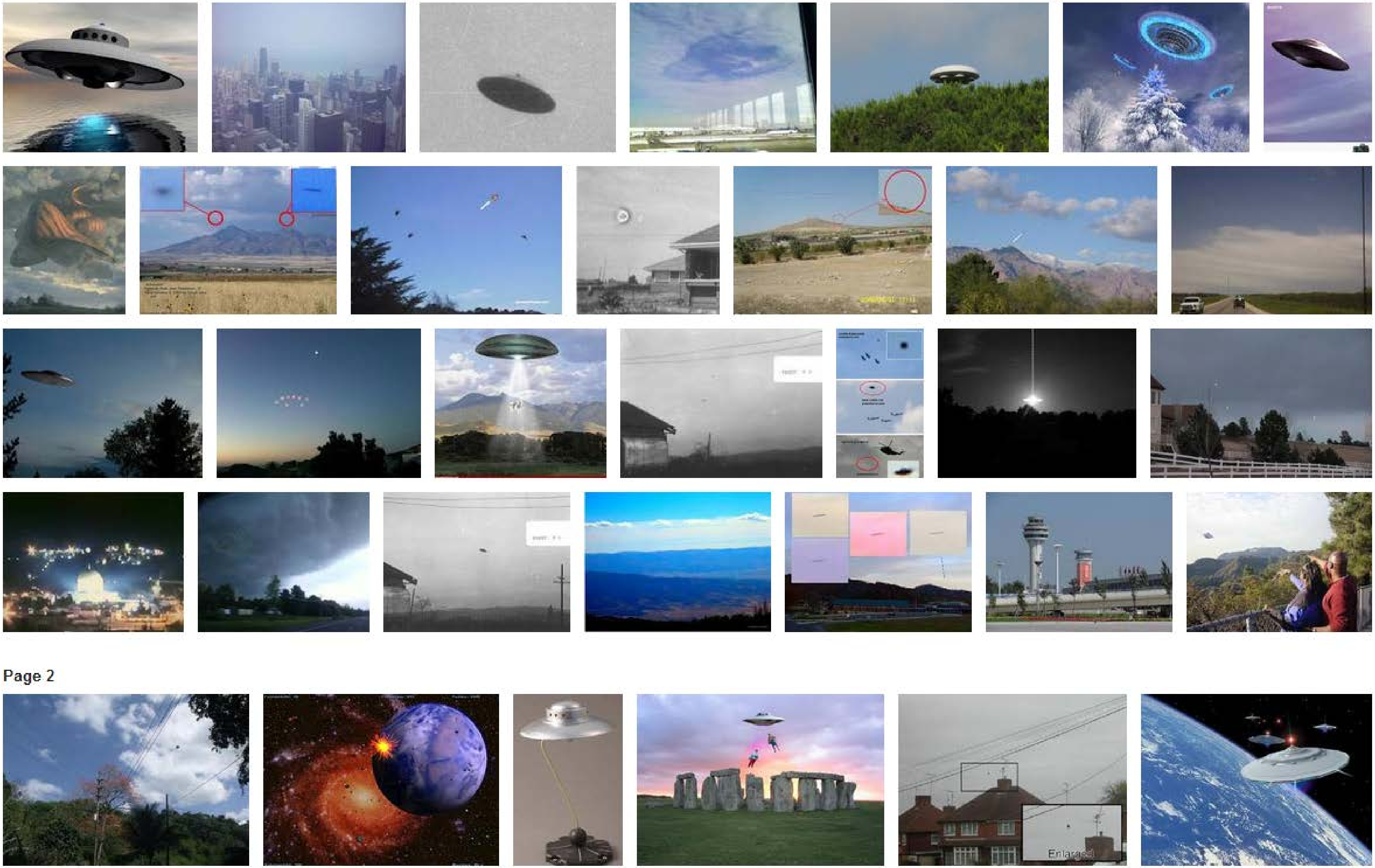
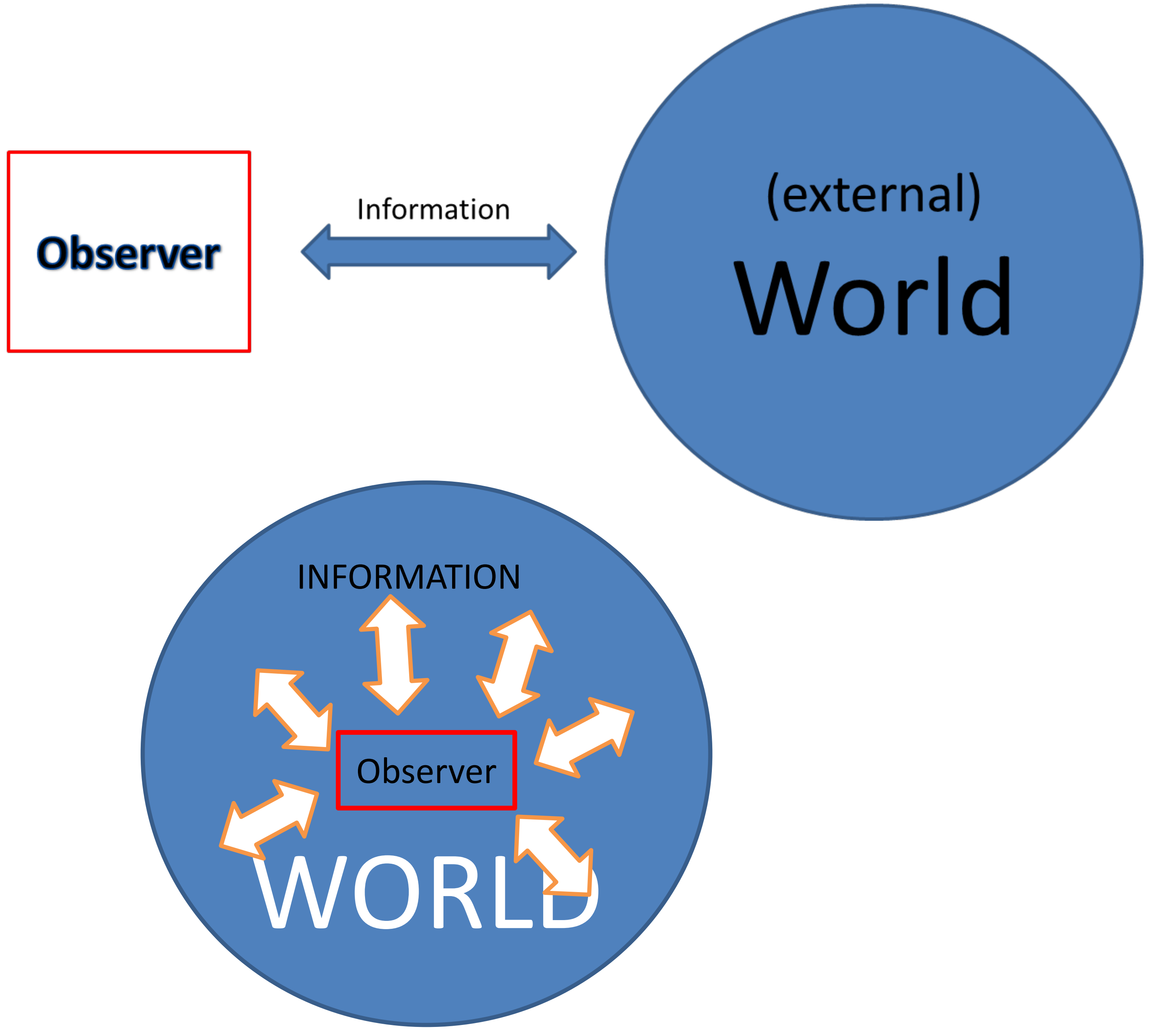


ILL STRUCTURED PROBLEMS – DEFINED AS RESIDUALS – AS “NOT X”


Observer
Information
(external)
World
INFORMATION
Observer
WORLD

INFORMATION IN SIMON, AND RITTEL & WEBER

- The term appears 53 times in Simon, 13 times in Rittel & Weber, and 9 times in Rittel (1972)
- Each understands information differently.
- The word “judgment” does not appear in Simon. It appears frequently in Rittel & Weber, and in Rittel (1972)
- Rittel & Weber do not differ with Simon on the availability of information, but on its use.

RATIONALITY IN SIMON, AND RITTEL & WEBER

Bounded Rationality (Simon, Models of Man 1957)

Rationality is limited by
(1) Availability of information
(2) Cognitive ability
(3) Time

The Paradox of Rationality (Rittel 1972)

Rational behavior “*means trying to anticipate the consequences of contemplated actions.*”

1. Consequences all the way down.
2. There is no rational reason to stop being rational
3. The better one is at being rational, the less useful this is.
4. Self-containment – in order to evaluate the consequences, a model is needed, which would have to include itself.

SOME DIFFERENCES

SIMON

Information is the matter that constitutes the system (problem, external world, extended memory, well formed functions)

Information is "stuff" common to the mind and the world.

RITTEL & WEBER / RITTEL (1972)

Information is not meaningful absent a problem. It both constitutes and shapes the situation – the problem and the solution simultaneously.

Information is used in the 'bildung' sense.

1. Rules for testing solutions must be available
2. The problem and its possible solutions must be representable in the same form (can exist in the same "problem space")
3. The problem space must be sufficiently robust so as to represent all considerable moves – legal or otherwise
4. Knowledge about the problem must be representable in the problem space
5. The Problem Space (or Representational System) must be able to represent the external world
6. The Problem must be defined such that it is computable (in a practical sense)

1. There is a definite criterion for **testing** any proposed **solution**, and a **mechanizable process** for applying the criterion.

2. There is **at least one problem space** in which can be **represented** the initial problem state, the goal state, and all other states that may be reached, *or considered,* in the course of attempting a solution of the problem.

3. Attainable state changes (legal moves) can be represented in a problem space, as transitions from given states to the states directly attainable from them. But considerable moves, whether legal or not, can also be represented - that is, all transitions from one considerable state to another.

4. Any knowledge that the problem solver can acquire about the problem can be represented in one or more problem spaces.

5. If the actual problem involves acting upon the external world, then the definition of state changes and of the effects upon the state of applying any operator reflect with complete accuracy in one or more problem spaces the laws (laws of nature) that govern the external world.

6. All of these conditions hold in the strong sense that the basic processes postulated require only practicable amounts of computation, and the information postulated is effectively available to the processes--i.e., available with the help of only practicable amounts of search.

REQUIREMENTS OF WELL-STRUCTURED PROBLEMS (WSPs)

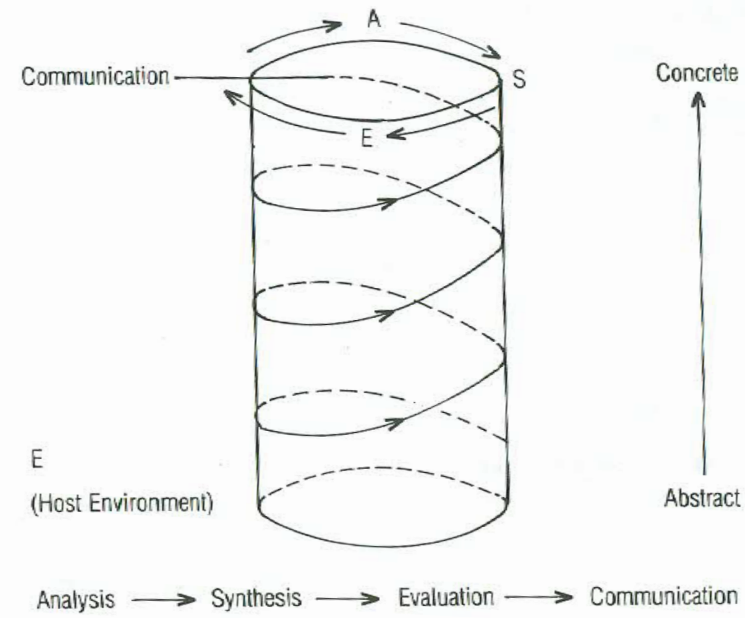
1. A Way to Test A Solution To Check If A Problem has been Solved

2. A common set of terms for describing initial state, preferred state and intermediate states

3. A Set of Operators (A way to make legal or considerable moves)

4. A Set of Differences (To test and compare states)

5. A way to connect difference to operators so that these can be reduced or removed



13
An iconic model of a design process.

The Systematic Design Process (From Rowe 1987)

(1) A description of the solution state, or a test to determine if that state has been reached

(2) a set of terms for describing and characterizing the initial state, goal **state and intermediate states**

(3) a set of operators to change one state into another, together with conditions for the applicability of these operators

(4) a set of differences, and tests to detect the presence of these differences between pairs of states

(5) a table of connections associating with each difference one or more operators that is relevant to reducing or removing that difference.

GENERAL PROBLEM SOLVER

Chess

Computability (as a practical matter); The problem of the "best move"

EXAMPLES OF WSPs

Theorem Proving

“If this condition is imposed, a problem that admits restructuring through the introduction of such new resources would be an ill structured problem.”

Why wouldn’t it simply be a **re-structured well-structured problem**, as long as the “new resources” can also be available in the same “problem space”?

"In general, the problems presented to problem solvers by the world are best regarded as ISPs.

They become WSPs only in the process of being prepared for the problem solvers.

It is not exaggerating much to say that there are no WSPs; only ISPs that have been formalized for problem solvers."

BUT

"Nevertheless, there is merit to the claim that much problem solving effort is directed at structuring problems, and only a fraction of it at solving problems once they are structured."

SIMON'S CONCLUSION ABOUT WELL-STRUCTURED PROBLEMS

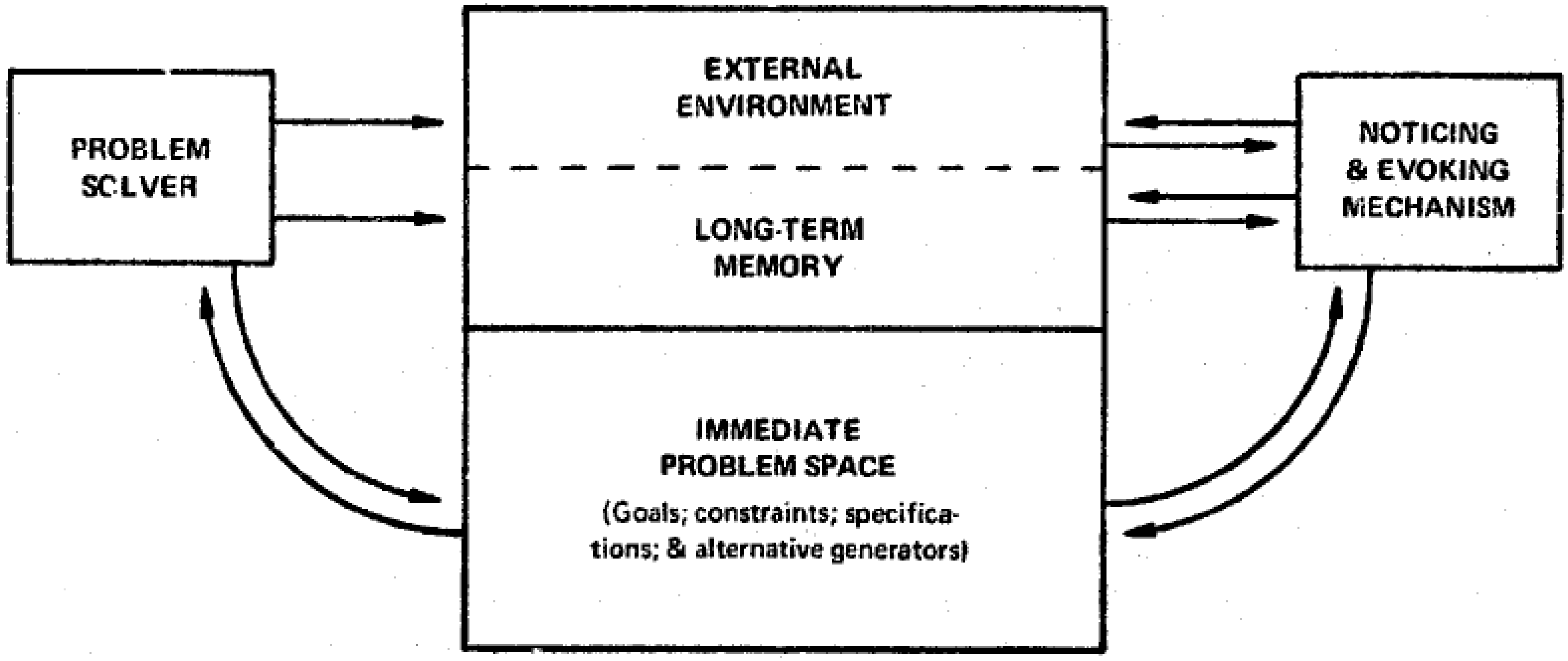
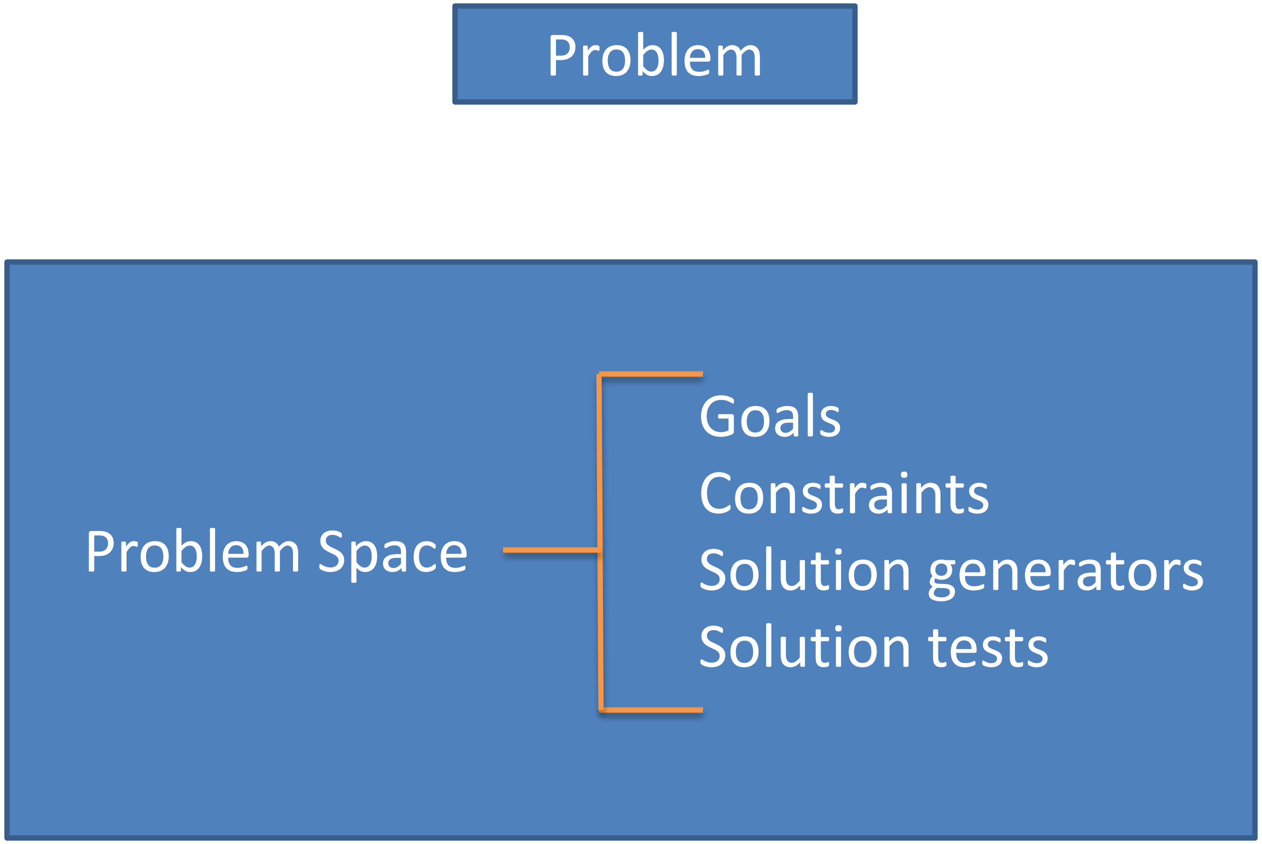
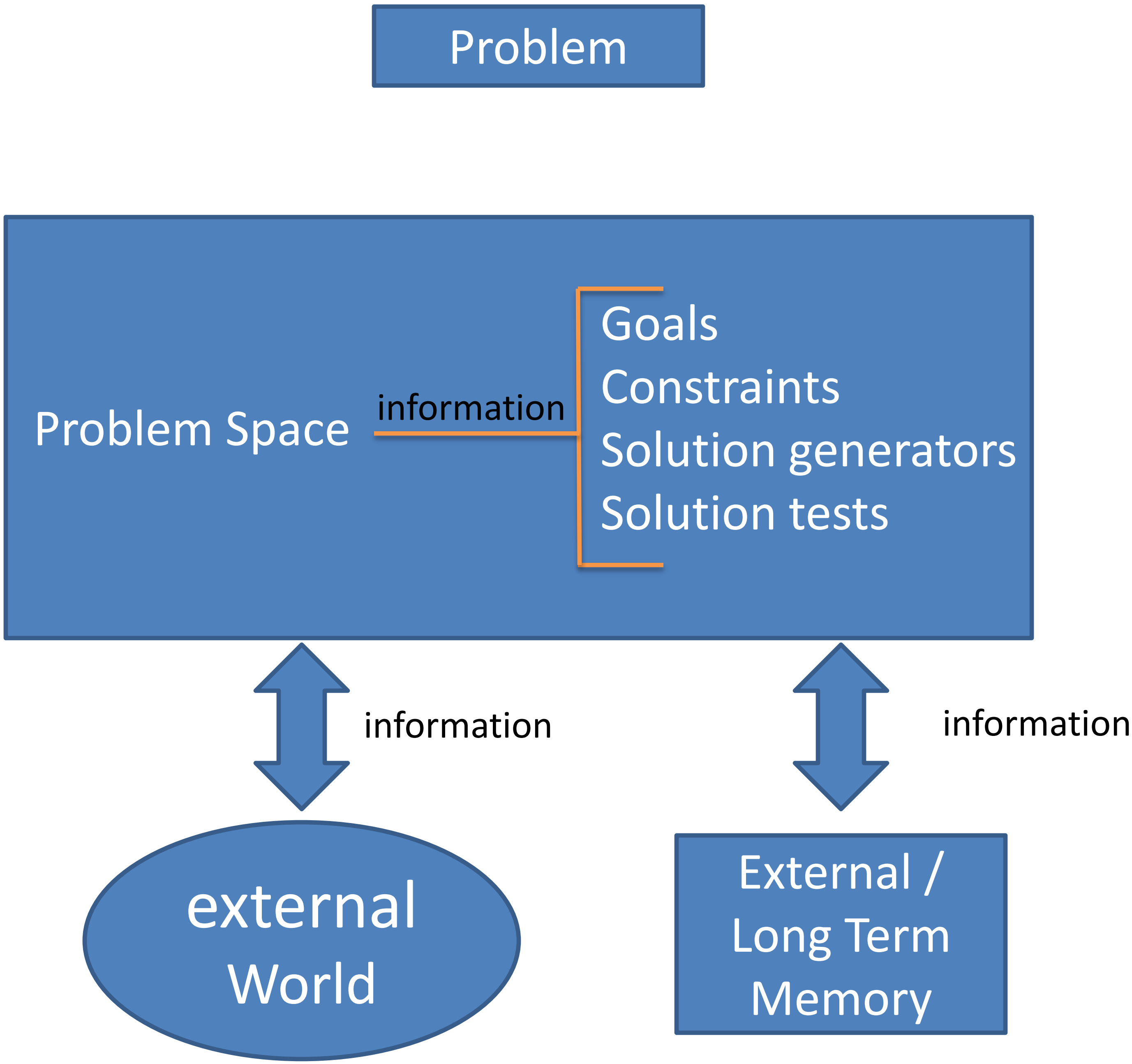
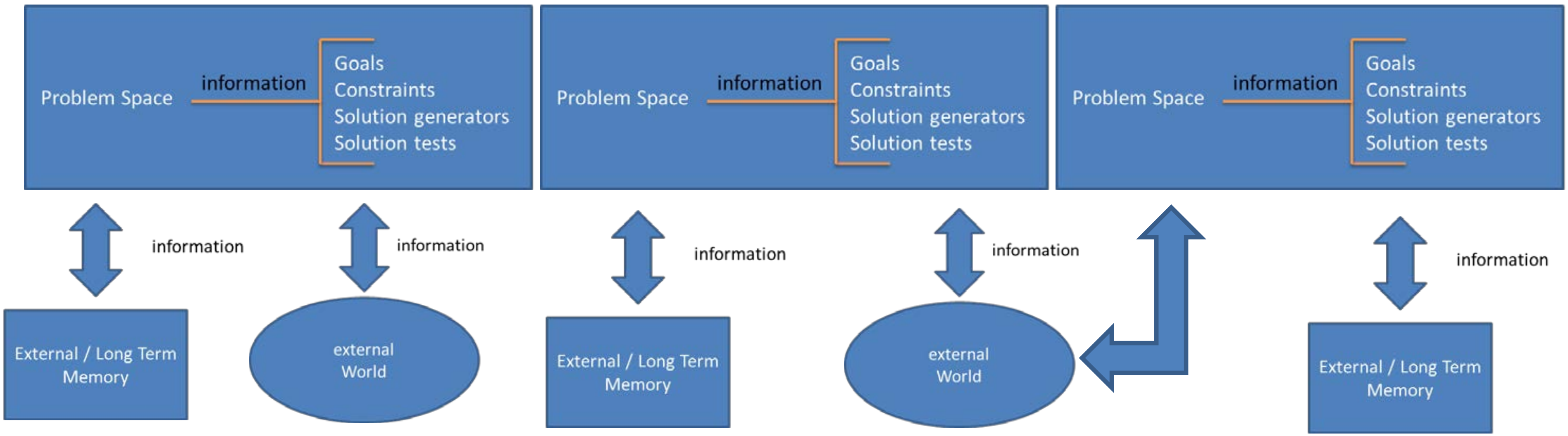


FIG. 1. Schematic diagram of a system for ill structured problems. It shows the alternation between a problem solver working on a well structured problem, and a recognition system continually modifying the problem space.


Problem
Problem Space
Goals
Constraints
Solution generators
Solution tests


Problem
Problem Space
information
Goals
Constraints
Solution generators
Solution tests
information
information
external World
External / Long Term Memory

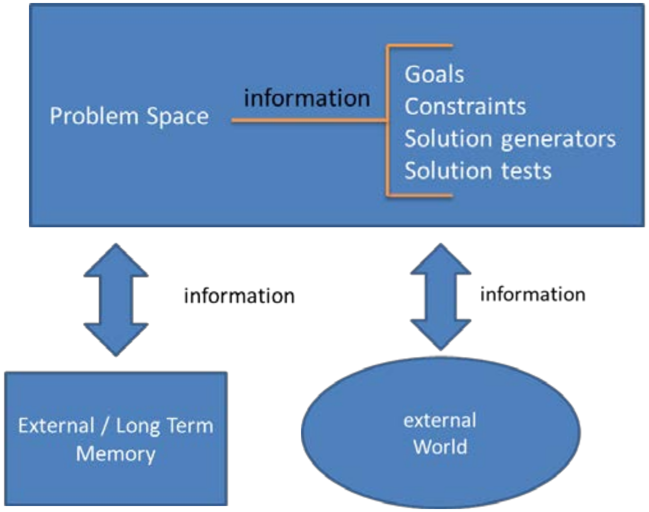
Problem


Problem Space
information
Goals
Constraints
Solution generators
Solution tests
Problem Space
information
Goals
Constraints
Solution generators
Solution tests
Problem Space
information
Goals
Constraints
Solution generators
Solution tests
information
information
information
information
information
External / Long Term Memory
external World
External / Long Term Memory
external World
External / Long Term Memory

Rittel and Weber (1973)

1. The information needed to *understand* the problem depends upon one's idea for *solving* it.

- a “problem” is in itself a solution to a prior problem.
- The “problem-space” precludes the shape of the solution.



2, 4. There is no stopping rule. There is no logical end point to the solution of a ‘wicked’ problem.

- The are no solution tests or goals (since the formulation of the goal is itself a problem)

3. Solutions are not true-false, but good-bad

- The quality of the solution depends on which interested party is asked.

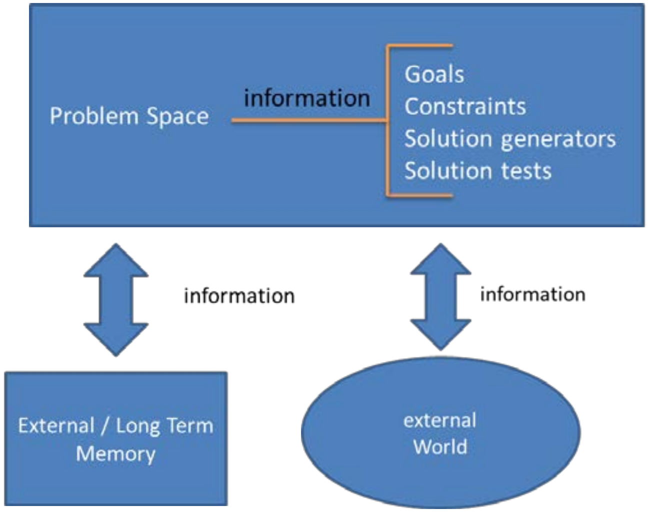
5. Every solution to a wicked problem counts significantly

6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan

- All considerable (let alone legal) moves are not knowable. (See criteria of the GPS)

7. Every wicked problem is essentially unique; 8. Every wicked problem can be considered to be a symptom of another [wicked] problem.

- Rittel's most far reaching critique of the systems approach



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