Consider some examples of decomposition :

- **Everyday example.** Making cookies is a complex task that can be broken down into smaller, simpler tasks such as mixing up the dough, forming into shapes via cookie cutters, and baking.
- **Academic example.** Writing an essay is a complex task that can be broken down into smaller tasks such as developing a thesis, gathering evidence, and creating a bibliography page.
- **Engineering example.** Designing a solution to construct a bridge by considering site conditions, technology available, technical capability of the contractor, foundation, etc.
- **Computer Science example.** Writing a computer program/software by determining a well-defined series of smaller steps (mostly in the form of modules and functions) to solve the problem or achieve a desired outcome.

AMPLE 1 *Decompose the task of creating mobile app.*

OLUTION To decompose the task of creating a mobile app, we would need to know the answer to a series of smaller problems :

- what kind of app is to be created.
- who the target audience for the app is.
- what the user interface of the app will be (what all screens, type of input etc.).
- what the app's graphics will look like.
- what audio will be included.
- what software/ platform will be used to build the app.
- how the user will navigate the app.
- what additional services will be required for the app, *e.g.*, database etc.
- how the app will be tested.

This list has broken down the complex problem of creating an app into much simpler problems that can now be worked out.

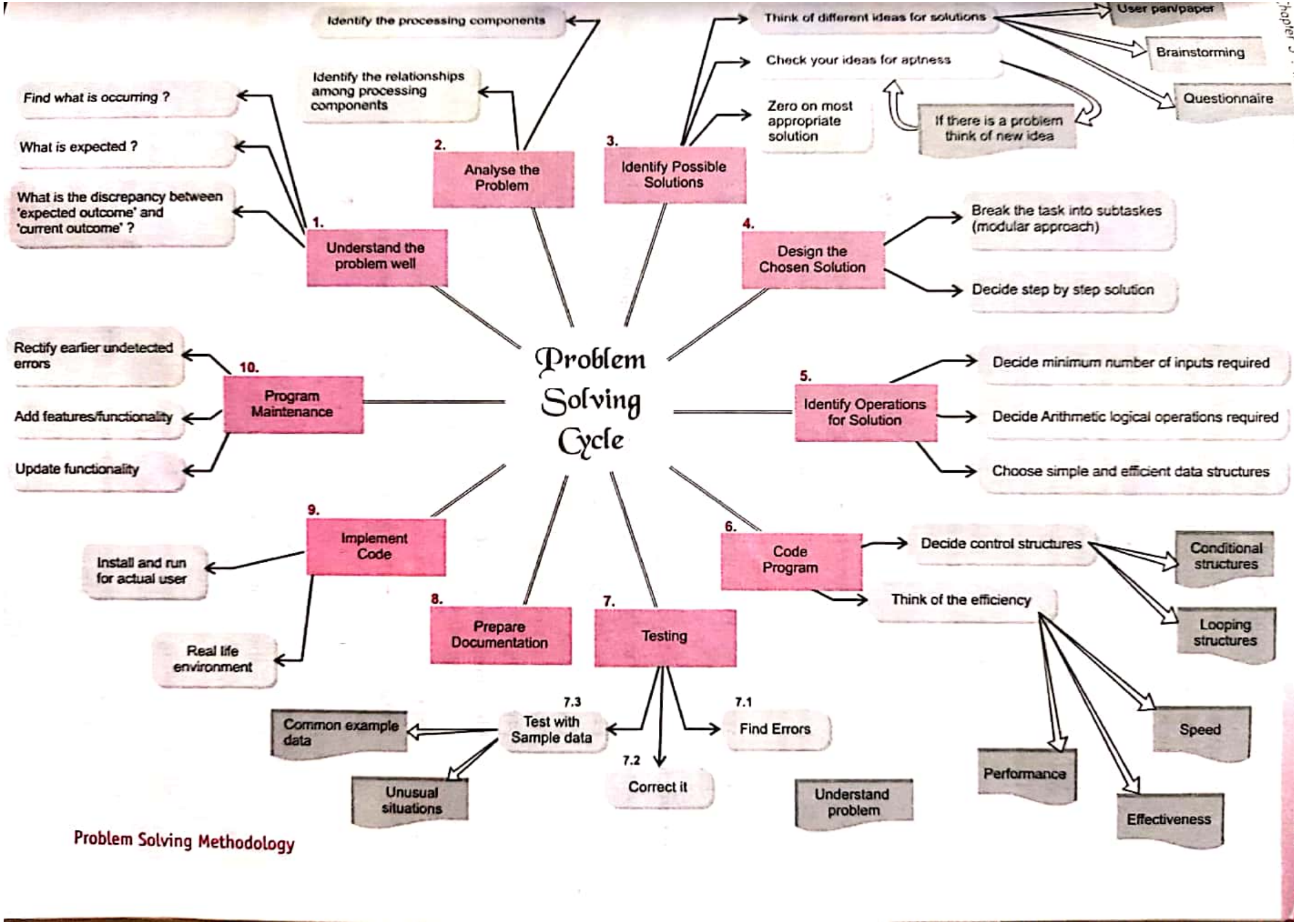
Need for Decomposition

Decomposition is the process of breaking a large problem into more manageable sub-problems. It is very important to decompose a problem into smaller sub-problems, reason being that large problems are disproportionately harder to solve than smaller problems. It's much easier to write two 500-line programs than a single 1000-line program. Larger a problem is, harder and more difficult it is to program as compared to a smaller problem (*see figure).*

Once you know how you can decompose a problem in smaller steps, you can create its solution by designing algorithms for it.

NOTE

Decomposing a problem into smaller sub-problems is important because large problems are disproportionately harder to solve than smaller problems.



Problem Solving Methodology