In computer science, abstract knowledge about a universe of discourse is represented through information modelling. A number of approaches to it have been presented and most of them are what is called snapshot approaches. This means that they represent momentary and static knowledge only and disregard dynamic knowledge, that is, knowledge about changes. However, in recent years, the necessity of the dynamic knowledge is discussed and some approaches to represent it are presented. Whenever there is change, we assume the concept of "time", so, in order to study dynamic knowledge, such concept may be usefully introduced. Actually, every approach to dynamic knowledge takes "time" into account. Furthermore, some kind of property of program and processes, Historical database, etc. are almost impossible to study without "time".

In this paper, in order to formalize the concept of "time", we defined a tense theory; it can deal with such property as non-determinacy and concurrency and the concept of "space". As a result, we got

1. a theoretical foundation of non-deterministic program and
2. a logical formalization of Historical database,

and made
3. introducing dynamic knowledge into database scheme and
4. describing and verifying concurrent processes possible.

By the way, it is said "Much of Artificial Intelligence is about problem solving". In a problem solving process, a lot of knowledge is used. In this paper, in the purpose of maintaining inference processes of problem solving, we formalize a problem solving approach using assumption-based inference.

As its result, we got a logical foundation of

5. updatable knowledge base and
6. knowledge base allowing inconsistent data to be included,

and made
7. some kind of non-monotonic inference and
(8) Some kind of inference using meta-knowledge possible.