Threat Evaluation
A Component in the T-core software complex

Threat Evaluation
The function of the Threat Evaluation (TE) component is to compare the threats of the known target candidates (tracks) in order to determine which targets shall be engaged first.

Threat level depends on track classification and the defended assets, e.g., a bomber is a larger threat against ground installations than a fighter, and a helicopter is a larger threat against troops than against buildings.

Threat level also depends on the position, course and speed of the target relative to a defended asset. When a target is far from the asset or moves away from the asset, it has a low threat level. When a target approaches the asset and is close to weapon release distance, it has a high threat value. Assets can be areas, units (points) and tracks.

The TE component evaluates the threat of all target candidates (hostile tracks) in the situation picture. The situation picture (especially track course and speed) can change rapidly, so the evaluation is repeated at short intervals, ideally at each track update.

Each target candidate is assigned a Threat Value.

The outcome of the Threat Evaluation task is a prioritized target list, the target having the highest Threat Value being the highest priority target.

Algorithm Parameters
TE is a framework that allows for easy replacement of the TE algorithm. The parameters immediately available for the algorithm are:

- Candidate targets (tracks)
  - Position, height, course, speed
  - Category (maritime, land, air, space)
  - Classification (type of vessel)
- Assets
  - Units (position, type)
  - Tracks (position, category, classification)
  - Areas (geometry, type)

The algorithm currently implemented is for ground based air defense. It can be customized to fit different weapon types. Algorithms for maritime, land and space tracks can be completely different. The framework allows for different algorithms to co-exist in the system, e.g., one for air tracks and one for space tracks.

The algorithm calculates for each asset a direct flight time from current position assuming constant speed and course directly towards the asset and a traverse flight time from Closest Point of Approach (CPA) also assuming constant speed and course directly from CPA to asset.
The direct flight time is converted to a direct threat factor, using threat curves that are specific to the track class. For instance, the direct threat factor of a fixed wing track will be low while the flight time is large, and maximum shortly before the fixed wing track is at weapon release distance after which it will decrease again.

The traverse flight time is converted to a traverse threat factor, using another set of threat curves. The traverse threat factor has its maximum when the traverse flight time is zero and it decreases when the traverse flight time is large.

Finally the Threat Value is calculated as the product of direct threat factor, traverse threat factor and a factor depending on track classification and type of assets.

**System Specification**

- **Operating Systems:**
  - Windows
  - Solaris
  - Linux

- **Hardware Specifications:**
  The T-Core framework is designed to be able to run on hardware ranging from ruggedized laptops and other portable devices to dedicated servers and workstations. Specific hardware specifications will depend on the system load etc.

**Environment**

The TE component interacts with a few other components. The recognized air picture is maintained by the Track Management (TM) component and hostile tracks are identified and passed to TE. Defended assets are received from the Asset Management (AM) component.

The prioritized target list, that is the outcome of TE, is passed to the Engagement Planning (EP) component that pairs targets and weapons in order to engage all threats in time.

**Interfaces**

Components in the T-Core framework offer the following interfaces:

- Java, RMI
- Web Services (Roadmap)
- Corba (Roadmap)