



RDECOM

Functional Decomposition Process



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Report Documentation Page

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What is Functional Decomposition?

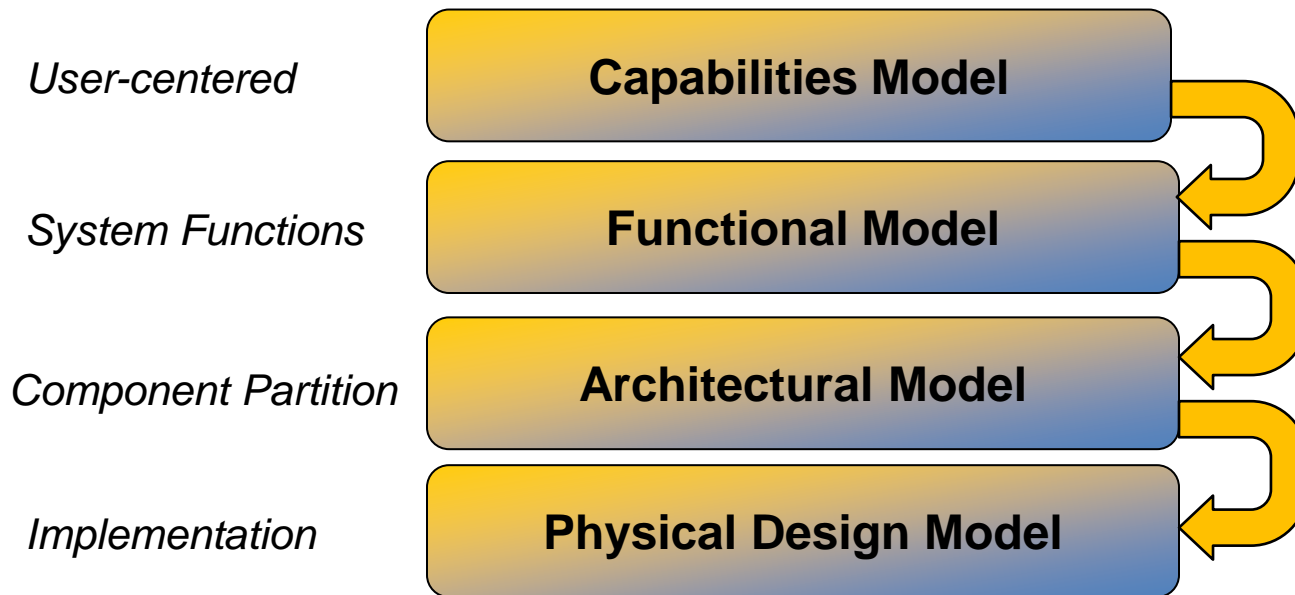
- Functional decomposition is the breaking down of a complex system into smaller pieces which can be more easily managed.
- “... in its most basic form ... is a simple hierarchical decomposition of the functions with associated performance requirements.”

Ref: System Engineering Fundamentals Chapter 5

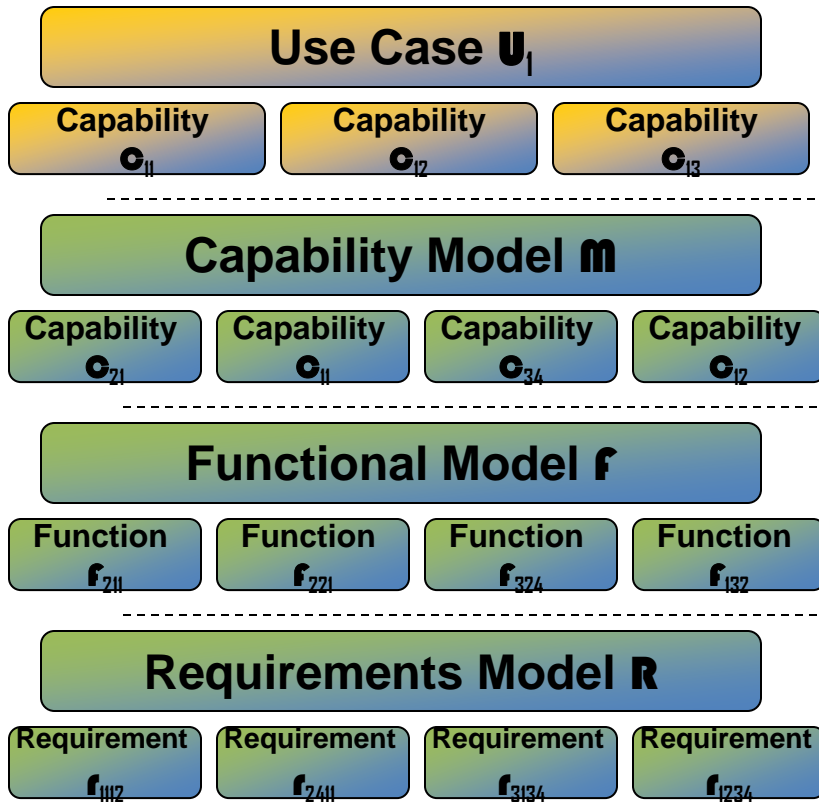
Why would I use it?

- It will make it easier to understand the system, it's interactions and interfaces and is a useful tool in providing requirements insights for both analysis and design.
- It will also allow you to answer the users needs both stated and unstated by providing you with direct traceability to capabilities and on to requirements.

SO...how does it work?

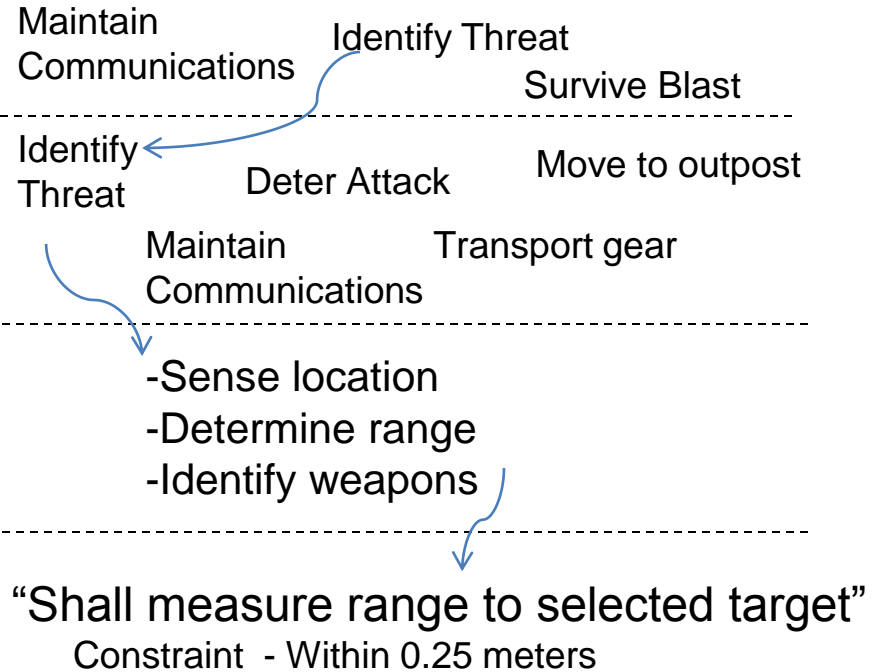


Modeling Flow



Example

Provide Check Point Overwatch



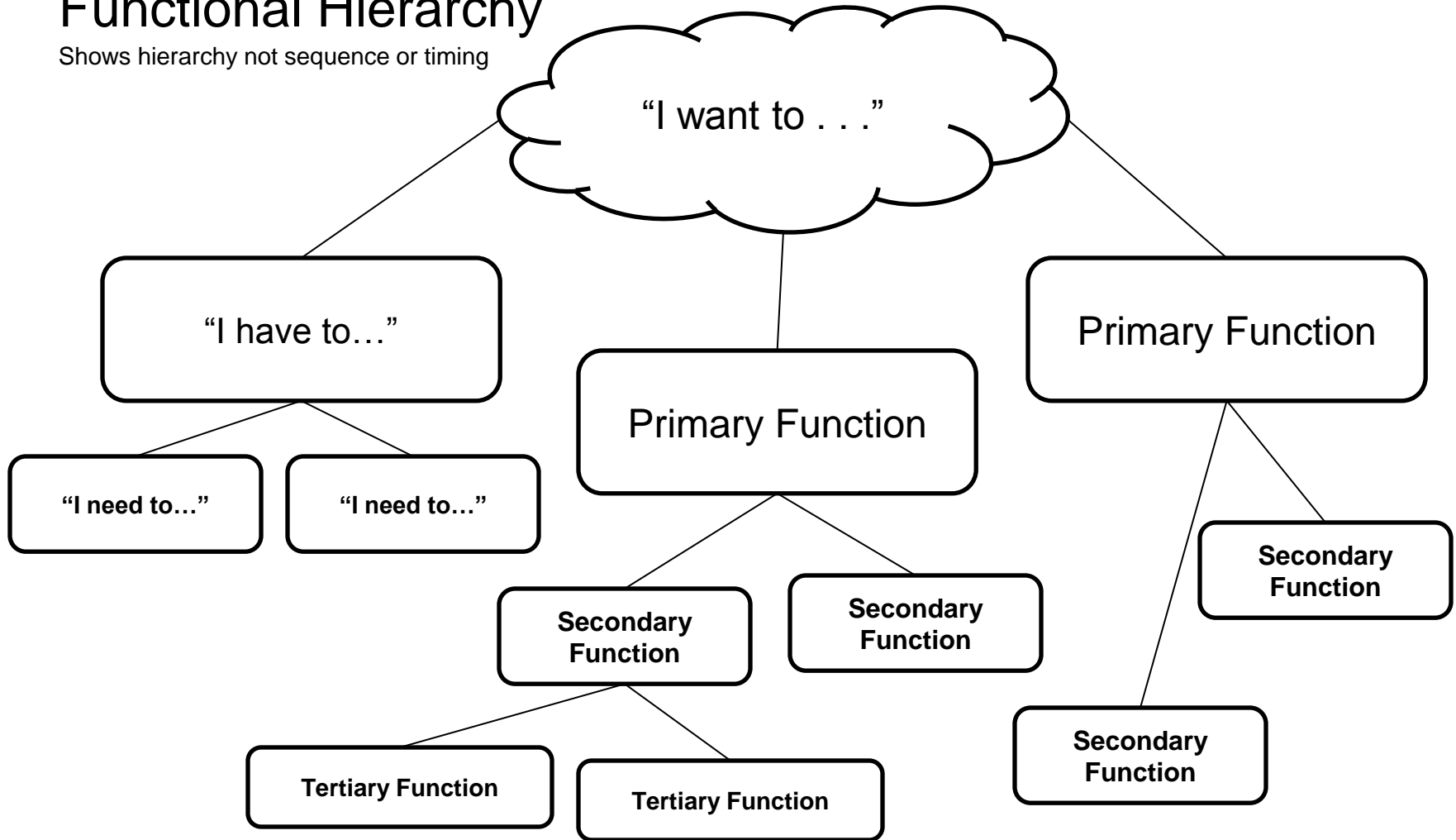
- A Use Case (U) is composed of the various capabilities needed to successfully execute the Use Case.
- A Capability (C_y) is the sum of the functions (f_z) or actions needed to achieve the capability.
- The Capability Model (M) is a compendium of the unique capabilities needed by the various Use Cases.
- The Functional Model (F) is a collection of unique functions (f_z) that support the execution of all capabilities (C_y) within the system Use Cases (U_n).
- A Requirement (r_z) is a function (f_z) bounded by constraints.

Definition of Functional Decomposition:

“... in its most basic form ... is a simple hierarchical decomposition of the functions with associated performance requirements.”

Functional Hierarchy

Shows hierarchy not sequence or timing



Basic Steps in Performing a Functional Decomposition

- Define the system in functional terms (i.e. develop common System Lexicon)
- Decompose the top-level functions into sub-functions (i.e. Level 1 and 2)
- Translate higher-level performance requirements into more detailed functional and performance criteria or design constraints (e.g. Level 3 – down)
- Identify and define all internal and external functional interfaces (e.g. Towing)
- Bin into functional groupings to minimize and control interfaces (functional partitioning) (e.g. Towing)

Functional Partitioning

“Functional partitioning is the process of grouping functions that logically fit with the components likely to be used, and to minimize functional interfaces.”

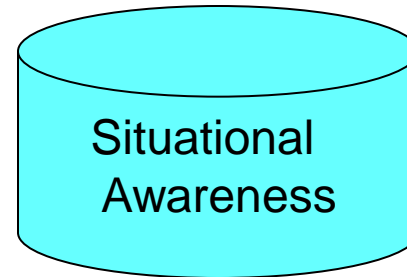
Sample Capability Text

The effects to achieve those outcomes are the ability to interface with decision makers, command and control operational environment awareness assets, observe and collect information, orient and assess operational awareness assets, and the ability to track friendly forces. Complements the Joint Warfighting Force with the ability to find, identify, track targets of interest, survey broad areas simultaneously, defeat and deny the enemies ability to camouflage, conceal, and deceive. In an offensive mode,

Singularized Requirement

ability to track friendly forces.

Allocate to Primary Function



Decompose to the next lower level

Decompose to the next lower levels

L1 - Situational Awareness



L2 - Track friendly Enemy.



L2 - Track friendly Non-combatants.



L2 - Track friendly forces.



L3 – Locate



L4 - Sense



L3 – Find Position

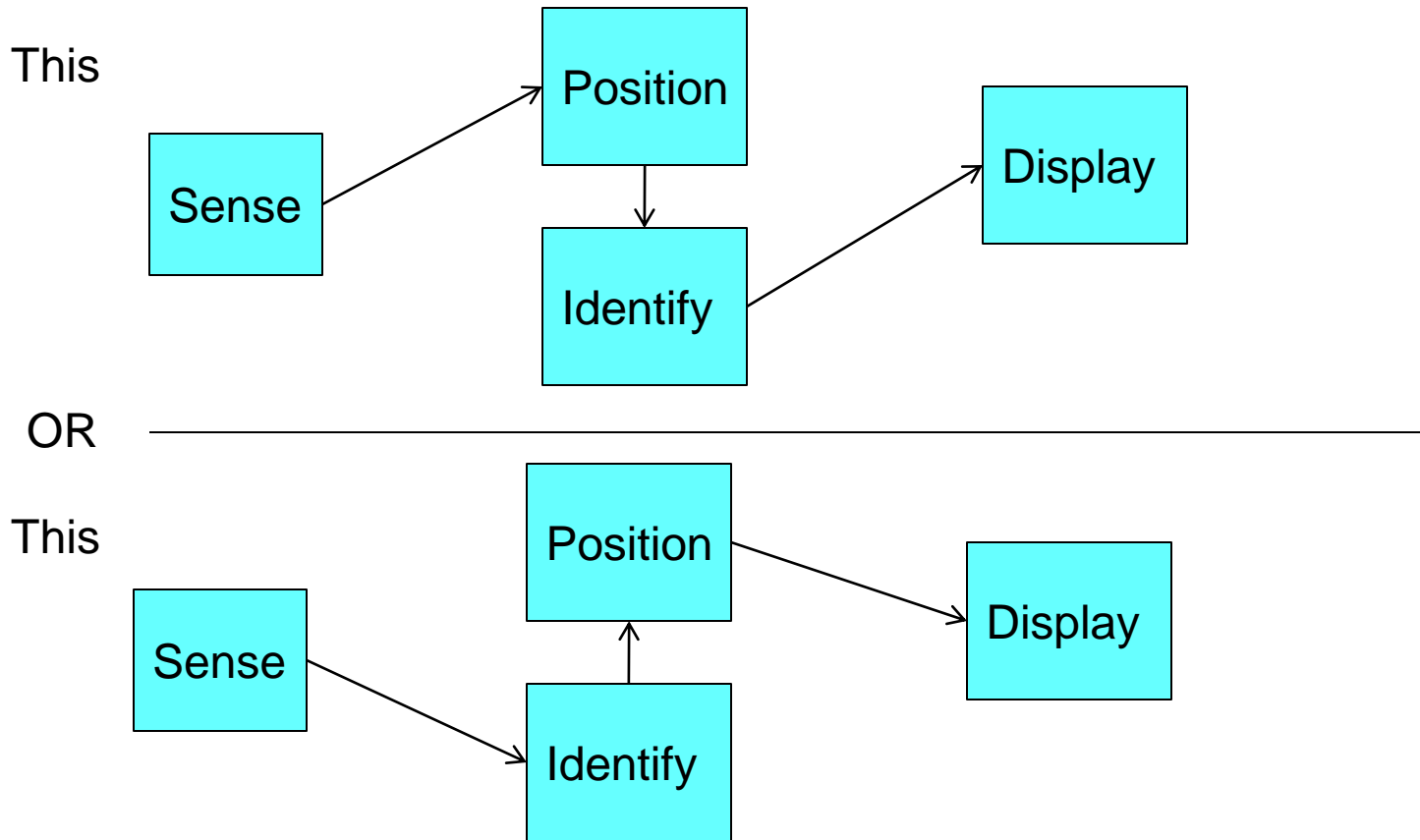


L3 – Identify



L3 – Display

Functional Architecture Decisions need to be made at this point.



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QUESTIONS?