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Value Engineering

Making good Projects Great

WSDOT

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Why use Function Analysis System Technique (FAST) ?

To Understand a problem is 50% of the solution, by separating a problem from its symptoms and effects by analyzing its function is essential to this process.
Function Analysis may be the most important phase of Value Methodology,
FAST provides a powerful technique to analyze the relationship of functions by:

- Showing the specific relationship of all functions with respect to one another.
- Testing the validity of functions.
- Assisting in identifying missing functions.
- Broadening knowledge and understanding of a project for the team members.

FAST creates the conditions to present ideas in a common language that crosses disciplines. It allows the multi-disciplined team members to contribute equally and to communicate with each other while addressing the problem objectively without bias or preconceived conclusions.

How a problem is Stated affects How it is Solved

Types of FAST Diagramming

There are three forms of FAST diagramming that are recognized internationally, These are:

- Classic
- Technical or Technically –Oriented
- Customer – Oriented

These techniques evolved from a logical thinking approach to function analysis in a paper titled Basic Function Determination Technique, introduced by Charles Bytheway in 1965.

Projects that usually provide the highest potential for value improvements are:

- Major reconstruction of existing highways.
- Projects with major traffic control.
- Projects with multiple stages.
- New alignment or bypass sections.
- Widening of existing highways for capacity improvements.
- Major structures. & Interchanges of multilane facilities.
- Projects with expensive environmental or geotech. requirements.
- Projects with difficult materials requirements/sources
- Projects with alternative solutions that vary the scope and cost

Classic FAST Diagram

Classic and Technical FAST diagrams are similar, however the Classic FAST diagrams focus on the HOW →← WHY of the major logic path as a way to organize logical thinking.

As originally developed, the Classic FAST Diagram stems from a set of nine "thought Provoking" questions That required a Verb-Noun answer that disclosed the action or function required without dictating a method. To demonstrate how to analyze functions and show their relationships, Mr. Bytheway created a logic diagram (figure 1) which tied several functions together logically along a Primary path that perform the Basic function, by following this logic path and asking **HOW** ? this function will be performed , the function immediately to the left should provide an answer and likewise in the reverse direction, the function immediately to the right of any other function on the primary path should answer **WHY?** the function is being performed. In this way the Basic Function can be identified.

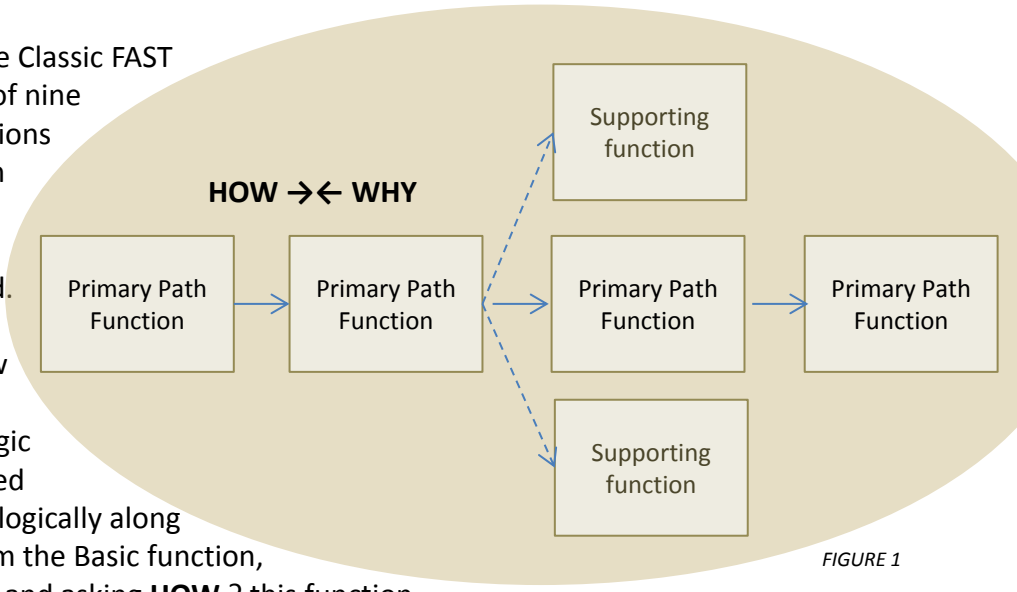


FIGURE 1

Functions in the Classic FAST that support any of the primary path functions are identified by asking the question: "If or When a Primary Function is performed, what other functions have to be performed?" These are placed above and below the Primary path.

Further refinements by Value Practitioners developed the Classic Fast into the form we see today. Further sophistications led directly to the evolution of the Technical FAST diagram.

Technical FAST Diagram

The Technical FAST is the prevailing method that is used by Value Practitioners today.
This method allows for greater flexibility In precisely describing and in communicating the specific purpose of the project being studied.
The Technical Fast (figure 2) provides a Scope boundary that includes the Basic Purpose that the project addresses and all the supporting functions in describing **HOW** that need will be met and **WHY** it is being done. The **WHEN** dimension displays secondary functions that are "caused by" functions in the Logic path. They will occur "when" the function they are connected to occurs and may be desired or undesired articles. Outside the Scope boundaries are the Higher Order and the Lower Order functions These represent the Need and the Input that initiated the study.
Above the diagram are placed the Design Objectives, these are inclusive and may be applied to all the functions. They influence the concept selected to best achieve the Basic Function.

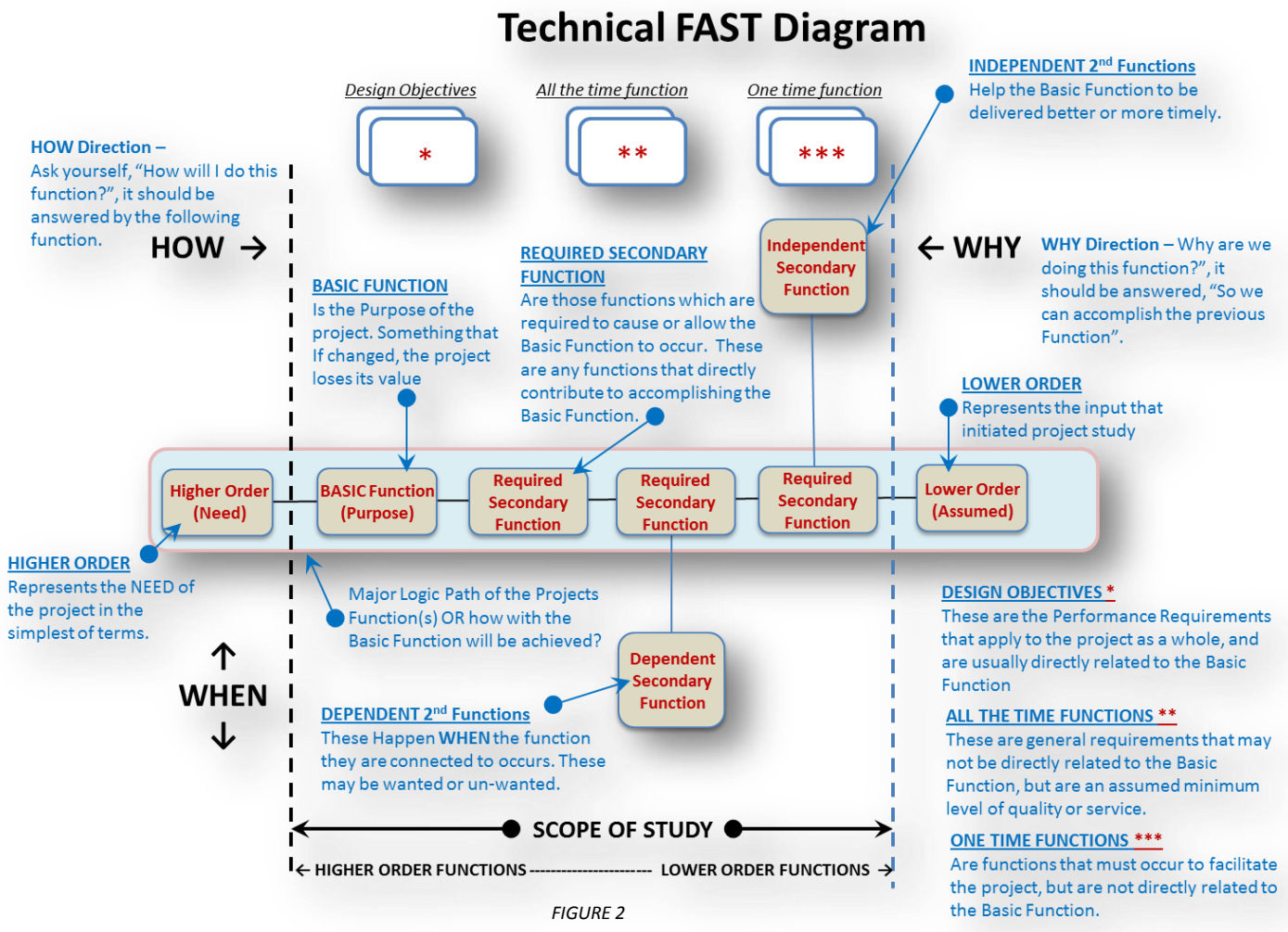


FIGURE 2

For additional information and examples of Technical fast diagramming, use this link to view the presentation from the 2013 AASHTO VE Peer exchange titled: **Fast Diagramming Made Easy: Straightforward Techniques for Your Highway Project**

The Customer Based FAST Diagram

The Customer Based or Task-Oriented FAST Diagram (figure 3) was developed by Fowler & Snodgrass in 1972 for use with the manufacturing of products. They developed this method of FAST to address what they felt were deficiencies in the Technical Fast when trying to determine the value of the customers needs for a process, product or service.

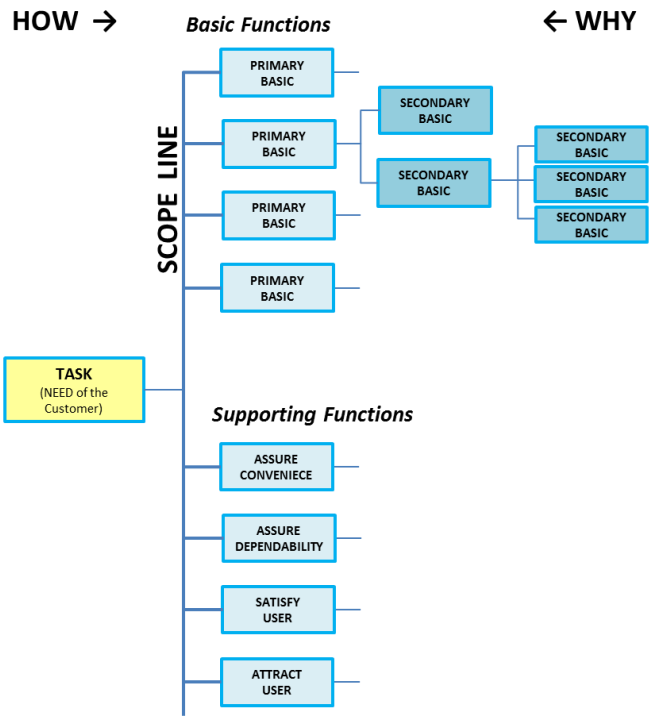
While the Technical FAST is excellent establishing and communicating the Need and Purpose of a product or process, The Customer FAST includes the customers role in establishing value and whose needs must be recognized, understood and fulfilled to achieve success in developing the complete value picture.

The customer FAST is comprised of two main areas:

- BASIC FUNCTIONS
- SUPPORTING FUNCTIONS

Basic Functions are mapped in much the same manner as in the Classic & Technical methods. Each listed Basic Function being those that are absolutely essential to the performance of the task and who without, the process or product will not work. Primary Basic Functions branch directly from the Task or (need) of the project, Secondary Basic Functions enable the Primary Basic Function to occur.

Supporting Functions may not be crucial to establishing the "Technical" need of the product or service, but are essential to create customer buy-in or "Sell" the Product or service.



Customer-Based FAST Diagram (Task-Oriented Diagram)

FIGURE 3

There are four Primary Supporting Functions:

- **Assure Convenience** – functions that create or enhance visual attraction, make it understandable or easy to use and those that facilitate ease of Maintence.

- **Assure Dependability** – functions that enhance product longevity, create durability, ensure reliability and make it safe to use.

- **Satisfy User** – functions that may modify the basic function and are perceived as enhancing the product. i.e. bigger, faster, stronger; functions that enhance the users environment, make the product easy to use or those that may be simply desired by the user.

- **Attract User** – functions that enhance visual appeal, create perceived "status' for the user, create a user perception of a "better" product, or whose manufacturing process appeals to the users values.

Secondary functions associated with both the Basic function area and the Supporting function area need to answer the question of how the Basic function will occur and there should be at least two secondary functions before branching from the Basic. This rule holds true for further branching. The HOW→←Why branching stops when the answer to the HOW is a noun the specifies a tangible Object. i.e. Place **Asphalt**.

When FAST techniques are applied to determine the Functions of a project and their relationships a powerful tool is created. With this, teams may carefully and un-objectively analyze the project and effectively speculate and evaluate creative solutions that recognize the essential functions, eliminate unnecessary ones and provide cost savings and project improvement opportunities.