Using FPS and VE to understand user needs and develop a building prototype

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Agenda

- What is a Functional Performance Spec?
- How to build one
- Results on the CVIF
- Conclusion
FPS - Project objectives

- Project Quality: Everybody focuses on customer requirements
- Project Precision: The degree to which a project is delivered in accordance with the specifications
- Project Efficiency: Effective Use of Resources, Midcourse Spec Changes Minimized, Use of Disciplined Methodologies, Tradeoffs Between Cost / Features / Performance

Design strategy

- Advised Client
- Market Research
- Need
- Function Analysis
- Functional Performance Specification
- Conceptual Design
- Design to Cost
- FMEA
- Production
- Detail Engineering
- Value Engineering
What is a FPS?

AFNOR NFX 50-150

- Document by which a client expresses his needs with functions and constraints. For each function there are appreciation criteria with their level. Each level has a flexibility.

What are needs?

- Needs are what a client want to see accomplished when using the product
- Needs are independant of solutions
- Needs should be the only thing driving the design of your product
- They are expressed through FUNCTIONS
What are Functions?

- Functions are independent of solutions
- Functions express services to be rendered when using the product (through its life)
- There may be many functions to an object and they are independent.

Function analysis

- Identify the functions to accomplish
- Organize the functions: diagram
- Characterize: performance, level and flexibility
- Set a hierarchy of functions
- Distribute cost
Finding the functions

1. Intuitive research
2. Environmental analysis
3. Sequential analysis
4. Movements and efforts analysis
5. Reference product analysis
6. Rules and regulation analysis

Organizing functions

- Group functions into functional groups
- Identify categories: basic, support and constraints
- Validate the functions through their links
- Functional diagram
Characterizing functions

State what in the function will be measured, in terms of performance:
Criteria: How a function is accomplished, measured
Level: acceptable result for each criteria
Flexibility: indication on how much a level can be negotiated

Hierarchizing functions

• Rank functions according to their relative importance
• Hierarchy:
  1-vital, critical
  2-very important
  3-important
  4-desirable
  5-nice to have
Evaluation

• Distribute the cost objective on the set of functions
• Compare the cost of functions
• Validate the interest of the client in paying these costs for these functions
• Identify the most expensive functions
• Identify mismatches between cost and value

The content of a FPS

- The subject: the product, the market, the context, assumptions and the goals;
- The methodology and how to read the information
- The needs described by the characterized functions in order of the functional tree
- Appendices

Ref: EN 12973:2000
Range of FPS

Each market has its segments:

- Bottom of the line
- Middle of the line
- Top of the line

To each segment is a specific performance.

Why a FPS?

- Describe the needs in a set format
- Indicate the grey areas
- Specify the constraints
- Give a standard format for response
Why a FPS?

- Let the designer choose the best solution
- Make the designer responsible for his choices
- Favour the client-supplier dialogue
- Optimize the value of the product
- Favour innovation

FPS/VE and the Commercial Vehicle Inspection Facility (CVIF) Building

Overview
- Objectives
- Process
- Outcome
FPS/VE and the CVIF Building

Objectives:

- Address the shift of focus from weight based enforcement to driver and vehicle fitness;
- Develop functional concepts for the CVIF Buildings responsive to the government’s need for flexibility, value and sensitivity; and
- Form the basis for of a concept to be incorporated into the CVIF Building Guidelines.

In February of 2005 the FPS/VE, participants included:

- Ministry representatives from:
  - CORPORATE SERVICES
  - POLICY, PLANNING & STANDARDS
  - ROAD USER SAFETY
  - OPERATIONS
- Consultant Team from Marshall Macklin and Monaghan (MMM); and
- Facilitator - Lucie Parrot
Application of FPS/VE to the CVIF Building

The study was completed over two sessions, during the first session the project team:

1. Defined the functions to be accomplished by the Building;
2. Organized the functions into a logical structure; and
3. Characterized the functions

Functional Diagram - CVIF Building

- Support operations
  - Ensure health & safety
  - Be flexible
  - Be a good corporate citizen
- Promote road safety
- Support inspection and enforcement operations with a safe, flexible, efficient and comfortable environment
<table>
<thead>
<tr>
<th>Number</th>
<th>Functions</th>
<th>Criteria</th>
<th>Level</th>
<th>Score</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>support inspection and enforcement operations with a safe, flexible, efficient and comfortable work environment</td>
<td>life expectancy</td>
<td>20 years</td>
<td>F2</td>
<td></td>
</tr>
<tr>
<td>0-1</td>
<td>promote road safety</td>
<td>truck volume</td>
<td>may double in 10-15 years</td>
<td>F2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>support operations</td>
<td>1-1</td>
<td>operate all day round</td>
<td>number of hours</td>
<td>24 hours 7 days</td>
</tr>
<tr>
<td>1-2</td>
<td>manage shift changes</td>
<td>number of officers</td>
<td>10</td>
<td>F1</td>
<td>5 per platoon</td>
</tr>
<tr>
<td>1-3</td>
<td>manage peak volumes of people</td>
<td>number of persons</td>
<td>20</td>
<td>F3</td>
<td>officers and clients</td>
</tr>
<tr>
<td>1-4</td>
<td>operate under all conditions</td>
<td>temperature</td>
<td>standard office</td>
<td>F2</td>
<td>work with uniforms and kevlar vests</td>
</tr>
<tr>
<td>1-5</td>
<td>be self sufficient</td>
<td>location</td>
<td>remote</td>
<td>F3</td>
<td>may be far from all utilities</td>
</tr>
<tr>
<td>1-1</td>
<td>support enforcement duties</td>
<td>platoon size</td>
<td>number of platoons</td>
<td>6 persons from 1 to 5</td>
<td>F2</td>
</tr>
<tr>
<td>1.1.1</td>
<td>secure all storage</td>
<td>see branch 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.1.1</td>
<td>support office work</td>
<td>number of stations</td>
<td>number of computers</td>
<td>7, 60&quot; x 36&quot; half the number of officers</td>
<td>F2</td>
</tr>
<tr>
<td>1.1.1.1.1</td>
<td>store office supplies, files and reference material</td>
<td>linear feet of files</td>
<td>reference material</td>
<td>see inventory</td>
<td></td>
</tr>
<tr>
<td>1.1.1.2</td>
<td>provide space to fill in forms</td>
<td>location</td>
<td>sitting down</td>
<td>F0</td>
<td></td>
</tr>
<tr>
<td>1.1.1.3</td>
<td>centralize some control operations</td>
<td>type of equip</td>
<td>PA, system controls</td>
<td>F1</td>
<td>procedure kiosk-building to be discussed</td>
</tr>
<tr>
<td>1.1.1.4</td>
<td>accommodate shift leader privacy</td>
<td>number of closed office</td>
<td>1</td>
<td>F6</td>
<td>shared by shift leaders, separate files for each</td>
</tr>
</tbody>
</table>

**Total Cost distribution**

- **Support operations**: 50%
- **Ensure H&S and security**: 23%
- **Be a good corporate citizen**: 15%
- **Flexible**: 12%
Between the first and second sessions, MMM developed design concepts for small medium and large future CVIF Buildings.

At the second session, the FPS/VE team reviewed the design concepts presented and completed a function analysis of the concepts item by item.

Through this session, the team developed plans for the CVIF Buildings', building room specifications and preliminary cost estimates.

Small Building

locations where staffing of the CVIF is on irregular basis and expansion is unlikely
FPS/VE and the CVIF Building

Medium Building
- Facilities regular weekly use.
- Expansion to a Large Building is possible.
- Construction of this building will be initiated on Highway 402 in 2007.

FPS/VE and the CVIF Building

Large Building
- 24/7 Operations
**FPS/VE and the CVIF Building**

In conclusion, the FPS/VE process:
- Identifies the client’s needs;
- Aids in developing a product according to those needs; and
- Can assist in selection of a solution among a choice of existing ones

**QUESTIONS??????**