Hierarchical task analysis (HTA)

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HP Activity Categories:
Task allocation between the human and machine [1]

Resource Type:
Technique

Abstract:
A structured, objective approach to describing users' performance of tasks, hierarchical task analysis originated in human factors. In its most basic form, a hierarchical task analysis provides an understanding of the tasks users need to perform to achieve certain goals. Originally developed in response to the need for greater understanding of cognitive tasks, HTA involves describing the activity under analysis in terms of hierarchy of goals, subgoals, operations, and plans. The end result is an exhaustive description of task activity.

References

Developer and source:

First paper written on specification for the method:


More information found on:


General Description

Purpose:
Hierarchical Task Analysis is an excellent technique for capturing how tasks are performed in a systematic and structured fashion. It is mainly a graphical technique that allows groups to work on the analysis together and is particularly useful when developing procedures, training plans and competency systems. In addition to the graphical notation, various table formats for describing the tasks in more detail are provided. In its most basic form, a hierarchical task analysis provides an understanding of the tasks users need to perform to achieve certain goals. Hierarchical task analysis can be used to describe the interactions between a user and a software system.

Type (e.g. observation, questionnaire, interview, checklist, measurement instrument, etc.):
Graphical notation and tabular templates

Technical description of method or tool etc

Description of the content/study:
HTA is based on a theory of human performance, and provides means for breaking down and studying individual elements of a task. It was originally developed in response to the need for greater understanding of cognitive tasks, and to focus on goals and plans rather than observable aspects of performance. HTA offers a means of describing a system in terms of goals and sub-goals with feedback loops in a nested hierarchy. According to Annett et al (1971), it is not the operations that are described in the hierarchical break-down, but sub-goals.

HTA may be used both to describe human tasks, system tasks and most often a combination of the two. While Annett, J. & Duncan, K.D. (1967) has collected 13 applications of HTA from ergonomics texts, three important problem domains to which HTA may be used are training design, user interface design and job design.

The original HTA notation provided a simple graphical notation with an integral numbering scheme. The notation used boxes for goals/tasks, and a combination of lines and layout to indicate hierarchical structures. The numbering scheme was used to code the hierarchical structure a well as for cross referencing purposes. It also included a simple table format for describing task details. There are numerous later propositions for enhancing the original tabular format. Also the numbering scheme usually used today (if any) is a development of the original one.

One way HTA has been enhanced is in formalizing type of plans, often expressed as operators between the sub-goals in a task model. This includes issues like sequence, choice, cycles, optionality and concurrency.

There are numerous propositions for extending HTA in different directions, like contextual constraints, categorization of tasks (task taxonomies), functional allocation, team processes, and work design.

Technical requirements for using the method, tool, etc:
not applicable

Measure/Response Type:

not applicable

Results obtained and interpretation:

A collection of graphical models with accompanying tables and possibly other textual descriptions.

**Evaluation**

Advantages:

Flexibility - HTA may be used to describe any system.

Versatility - HTA may be used to many ends

"HTA is perhaps the nearest thing to a universal task analysis technique" (Ainsworth & Marshall, 2000: p.83)

Disadvantages:

It may be difficult to know when to stop an analysis (Annett et al, 1971).

Lack representation of physical objects, propagation effects, causal understanding, and social-organizational knowledge (Miller & Vicente, 2001).

Alternative Methods:

GOMS, CTT

Stanton (2004) compares HTA with more than 20 task analysis representations.

**Usability (ease of use, efficiency, effectiveness)**

Ease of use:

high

Efficiency:

medium

Constraints concerning conditions of use:

none

Reliability:

not available

Validity:

not available

Required effort (to conduct & to analyse):
HTA may be applied in different levels of details, thus requiring different amounts of effort. Also, the efforts depend on the number of tasks that are to be analyzed. Generally, HTA is a fairly low effort technique.

**Level of HF expertise needed (required user qualification)**

Medium: limited level of expertise required, some training required
Other expertise needed (required user qualification):

n/a

**Cost Information**

Very low: (<100 €) low costs to purchase or free license, no special devices necessary
Experiences of use by SESAR partners (including references):

HTA is used occasionally by NATMIG partners in various application domains, but no known use in ATM. No experiences in other domains reported.

Reported and/or published experiences of use (including references):

Stanton (2006) refers to various published experiences, but there are a lot of papers also outside this.

Applicability to lifecycle phase (E-OCVM):

Applicable in V1, V2 and V3, but probably best suited for use in V3.

Application Area:

HTA is independent of application area, and has been applied in vast domains.

Keywords:

Task analysis, Goals, Sub-goals, Hierarchical break-down, Graphical notation

Short Description:

HTA is a structured, objective approach to describing users' performance of tasks. In its most basic form, a hierarchical task analysis provides an understanding of the tasks users need to perform to achieve certain goals. HTA involves describing the activity under analysis in terms of hierarchy of goals, subgoals, operations, and plans. The end result is an exhaustive description of task activity.