



## HoliDes

Holistic Human Factors **Design** of  
Adaptive Cooperative Human-  
Machine Systems

# HoliDes

### HoliDes Platform Builder Validation Report

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## HoliDes

Holistic Human Factors **Design** of  
Adaptive Cooperative Human-  
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### RECORD OF REVISION

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05.06.2015	Create Functional and no Functional Validations and scope of the Validation Report	Jordi Fonoll (ATOS)
10.06.2015	Version 1.0	Jordi Fonoll (ATOS)
09.11.2015	PB new design	Jordi Fonoll (ATOS)
09.11.2015	PB app version 1.1	Jordi Fonoll (ATOS)
16.12.2015	Added tool chain for my projects. PBB app version 2.0	Jordi Fonoll (ATOS)
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**HoliDes**  
**H**olistic Human Factors **D**esign of  
Adaptive Cooperative Human-  
Machine Systems



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# 1 Introduction

## 1.1 Purpose



The purpose of this document is to report the validation activities of the HoliDes Platform Builder application. Such validation task was defined based on the requirements included in the document "HoliDes Platform Builder requirements". This document is located in the Ajaxplorer and also is available from the menu bar in the PB app.

## 1.2 Scope

The scope of this document is to check all the validations in order to demonstrate that all the requirements are working fine and the PB application is running correctly.

## 1.3 Definitions, acronyms and abbreviations

<b>Acronym</b>	<b>Meaning</b>
HoliDes	Holistic Human Factors Design of Adaptive Cooperative Human-Machine Systems
Requirement	Requirements proposed in the document "HoliDes Platform Builder requirements.doc"
PB app	Platform Builder Application
HF Partners	Partners involved in the HoliDes Project with knowledge in Human Factor issues
HF User	User with access to the PB. Has received an identification including user and password
CSS	Stylesheet language that describes the presentation of an HTML (or XML) document.

	<p><b>HoliDes</b></p> <p>Holistic Human Factors <b>Design</b> of Adaptive Cooperative Human- Machine Systems</p>	
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## 2 Validations

A validation is done for each requirement proposed in the “HoliDes Platform Builder requirements” document; it should demonstrate and check a right execution. For each requirement a screenshot of the PB app, demonstrating the requirement, is included.

Each validation test contains the follow information:

**Validation ID:** number of validation, unique identify for each validation.

**Type:** functional or non-functional validation, it depends on the requirement (functional or not).

**Name:** a word describing the validation.

**Description:** explains the validation to check.

The validation tests are divided in 2 groups: functional and non-functional.

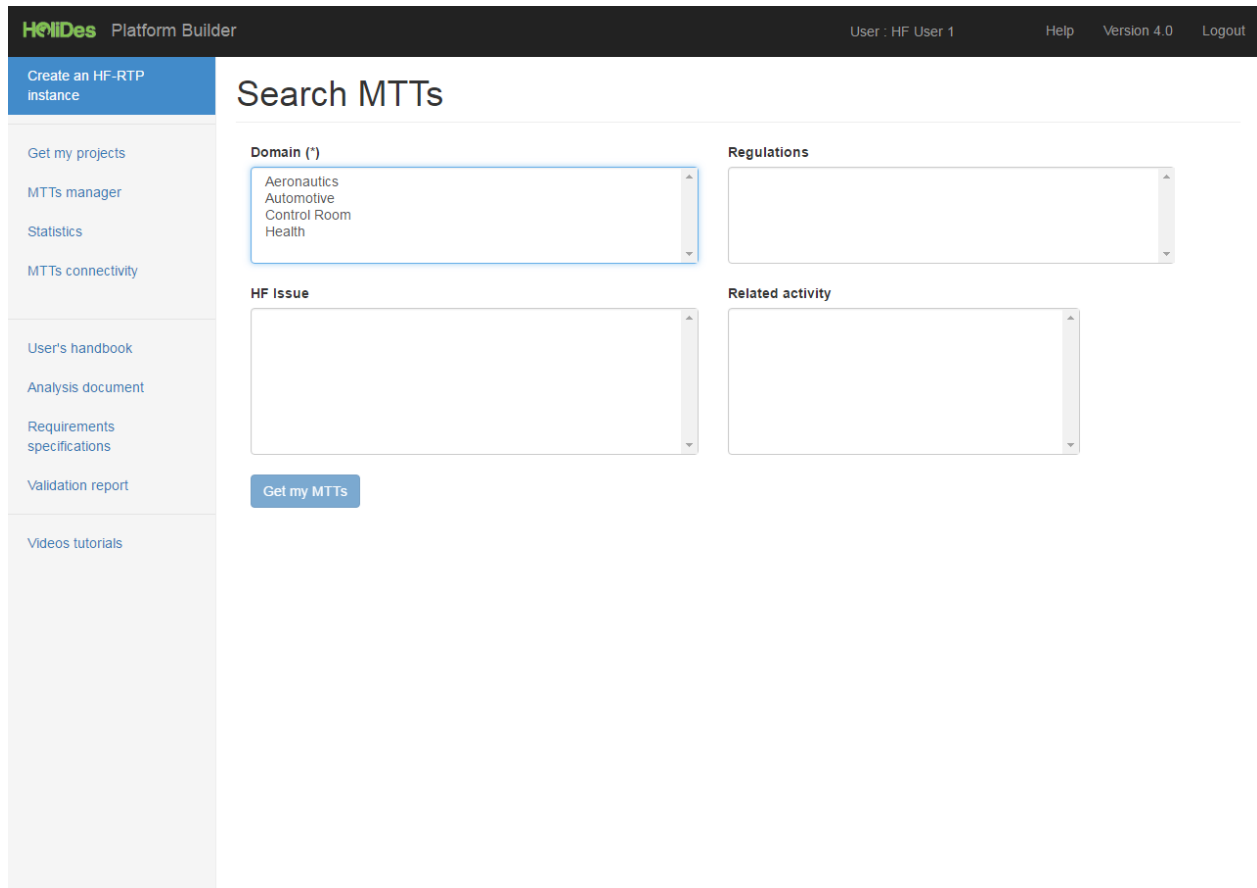
Functional validation: validations related to the functional requirements and should be specific for PB or HoliDes project.

Non-functional validation: generic validations related to non-functional requirements.

## 2.1 Functional validations

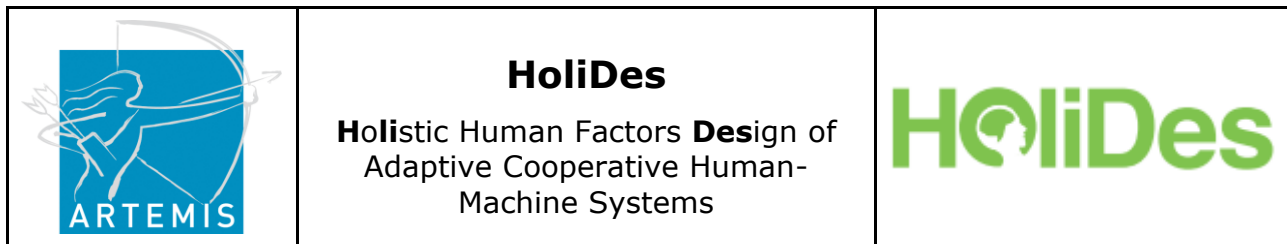
<b>Validation ID</b>	VAL-F1	<b>Type</b>	Functional
<b>Name</b>	Filtering.		
<b>Description</b>	Check the preconditions used to show the MTT's tools. Using: filters proposed by HF experts. HF issues, domains, regulations and related activities.		

Preconditions proposed by HF experts: domain, regulations, HF issues and related activities.



**Figure 1 Input screen domains**

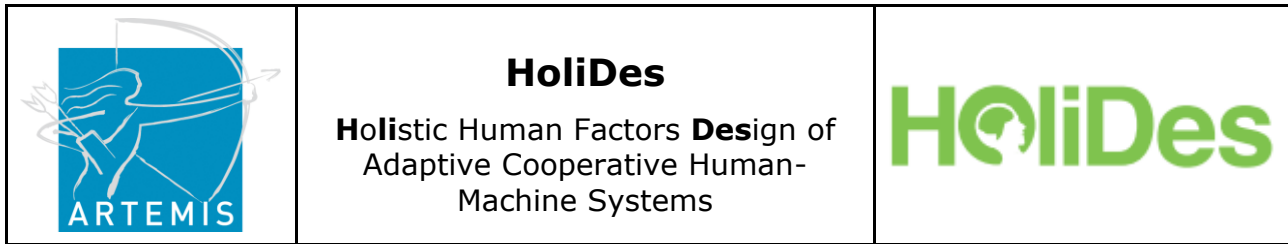




Filtering by domain when a specific domain is selected:

- The content appearing in the regulations list:
  - “System for adoptive cruise control”
- The content appearing in the HF issue list:
  - “Attention”.
  - “Behaviour”.
  - “Distraction”.
  - “Safety”
  - “Situational Awareness”.
  - “Task Performance”.
  - “Usability”.
  - “Workload”

The HF issues listed above are exclusively for “Automotive” domain as you can see in the screen shown below:



**HoliDes Platform Builder** User : HF User 1    Help    Version 4.0    Logout

**Create an HF-RTP instance**

**Search MTTs**

- Get my projects
- MTTs manager
- Statistics
- MTTs connectivity

---

- User's handbook
- Analysis document
- Requirements specifications
- Validation report

---

- Videos tutorials

**Domain (\*)**

- Aeronautics
- Automotive**
- Control Room
- Health

**Regulations**

- Code of Practice (CoP) for the Design and Evaluation of Advanced Detectability Concept applied by TWT
- Distraction Detection and Mitigation Through Driver Feedback; (Nal
- Human Machine Interaction and the Safety of Traffic in Europe (HA
- ISO 15005: Road vehicles - Ergonomic aspects of transport inform
- ISO 45003: Road vehicles - Assessment of driver workload



**HF Issue**

- Attention
- Behavior
- Distraction
- Safety
- Situational Awareness
- Task Performance
- Usability
- Workload

**Related activity**

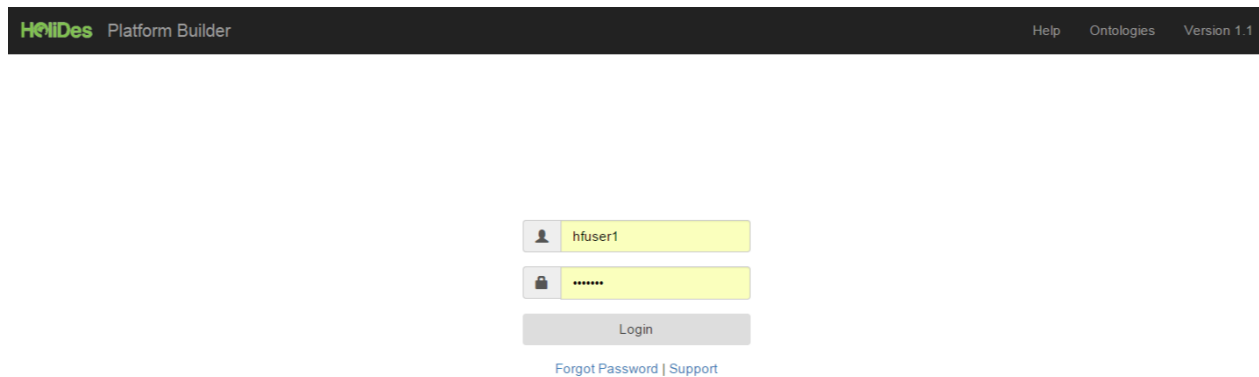
- Analysis
- Certification
- Conceptualisation
- Deployment
- Design
- Evaluation
- Requirements engineering
- System implementation

**Figure 2 Input screen filters**

	<p><b>HoliDes</b></p> <p>Holistic Human Factors <b>Design</b> of Adaptive Cooperative Human- Machine Systems</p>	
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<b>Validation ID</b>	VAL-F2	<b>Type</b>	Functional
<b>Name</b>	Rights.		
<b>Description</b>	Checking that the users can access to the PB app including the user/password. Different user rights are provided for each user.		

The access to the PB app is allowed by HF experts only with a user credentials provided, as the below image shows:





**Figure 3 Login required**

Once introduced the user/password the PB app shows the full name in the right and top part of the screen in the navigator bar, "HF User 1" in this case.

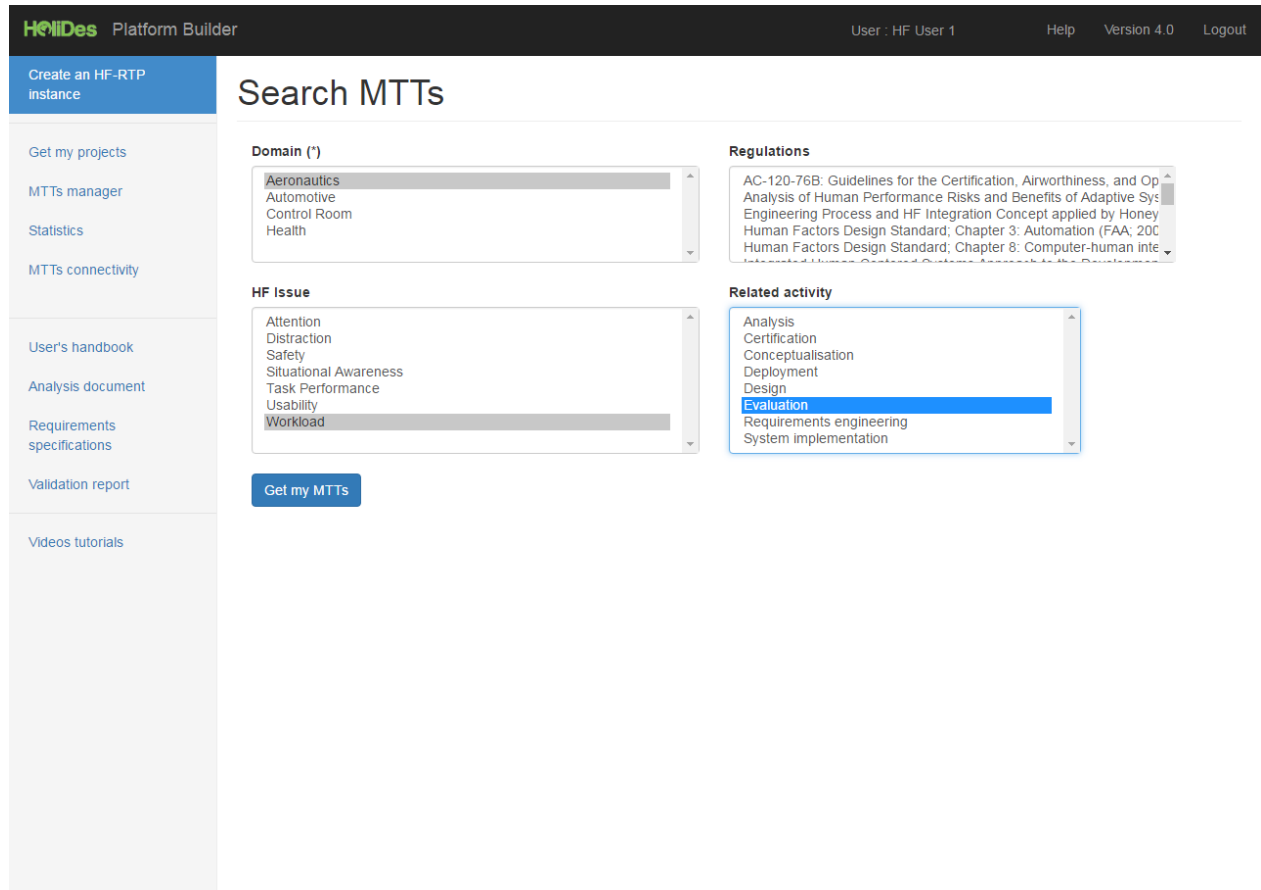


**Figure 4 Navigator bar shows the "HF User 1" as a user logged**

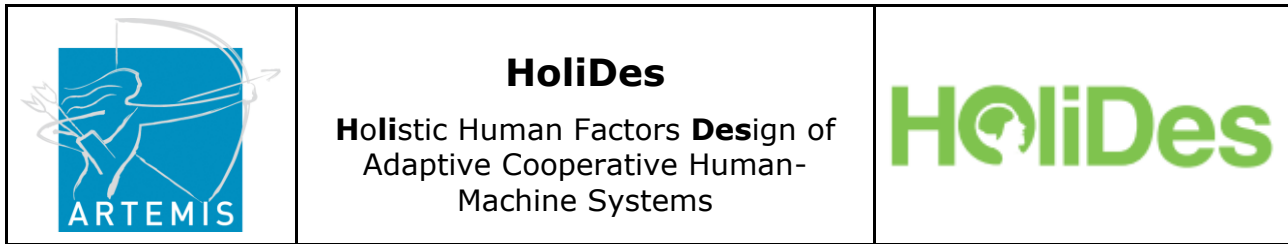
	<h2>HoliDes</h2> <p>Holistic Human Factors <b>Design</b> of Adaptive Cooperative Human-Machine Systems</p>	
--	--	---

<b>Validation ID</b>	VAL-F3	<b>Type</b>	Functional
<b>Name</b>	Result.		
<b>Description</b>	Checking that PB app proposes a list of MTTs tools when the preconditions selected have some MTT to show, searching by filters selected.		

Selecting the “Aeronautics” domain, the HF issue: “Workload”, giving in blank the regulations list and clicking on “Evaluation” in the related activity list:



**Figure 5 Selecting the criteria conditions**



Clicking on "Get my HF-RTP" button, a list of MTTs appears in the Preliminary MTTs Screen:

**HoliDes Platform Builder** User : HF User 1    Help    Version 1.1    Logout

**Platform Builder Input**



- Get My Projects
- Mtts Manager
- Statistics
- User's handbook
- Analysis document
- Requirements specifications
- Validation report

## Preliminary MTTs List

Search:

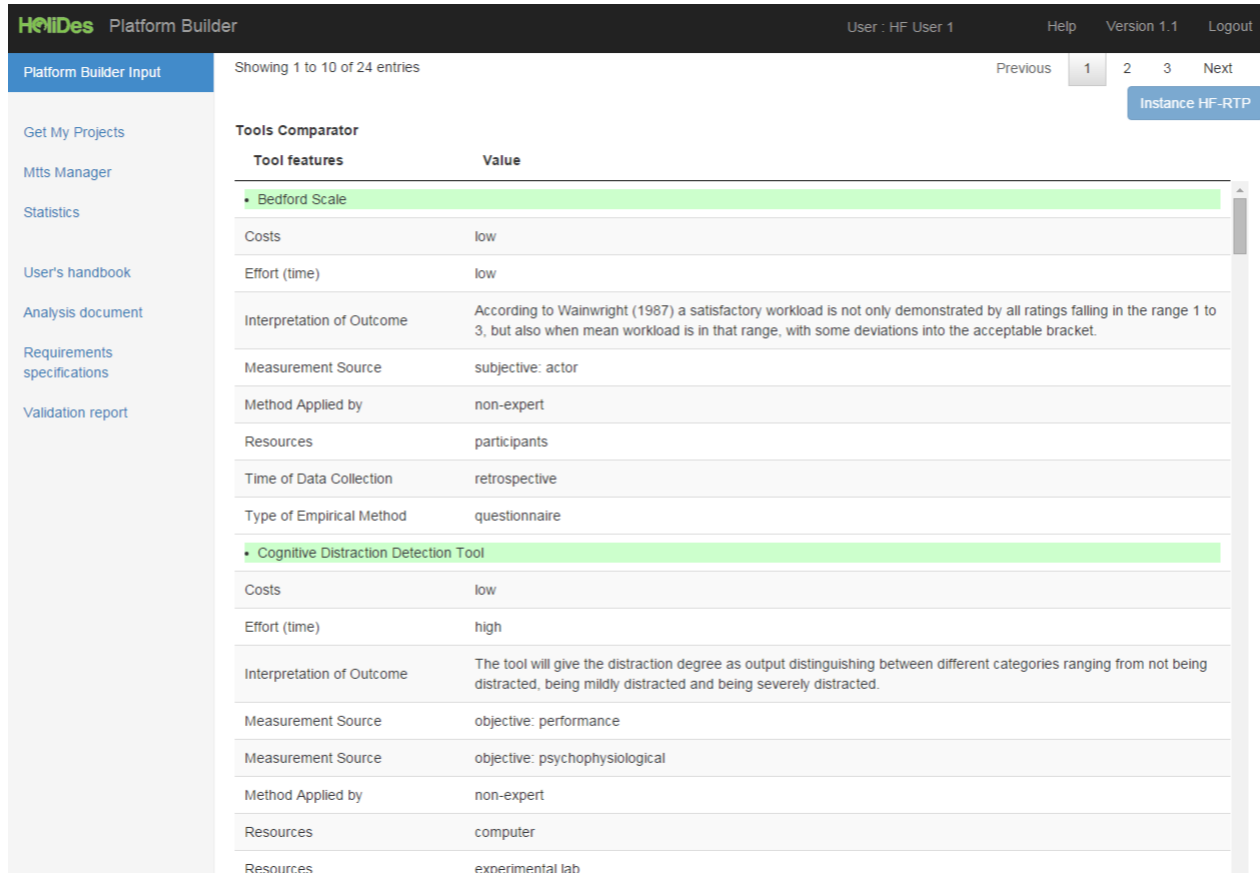
MTT	Description	OSLC
Nasa-TLX	NASA-TLX allows users to perform subjective workload assessments on operator(s) working with various human-machine systems. NASA-TLX is a multi dimensional rating procedure that derives an overall workload score based on a weighted average of ratings on six subscales.	<a href="http://open-services.net/">http://open-services.net/</a>
HF-Guideline	The HF-Guideline will provide a detailed orientation for the development process of the AdCos in HoliDes. The guideline considers human factors before, during and after the implementation of adaptive systems and adaptive automation into a cooperative multi agent system (humans and machines). Besides definitions from the literature the guideline will provide step-by-step introductions on how to consider human factors in an appropriate way.	<a href="http://open-services.net/">http://open-services.net/</a>
HEE	Tool to predict operator workload, task performance and attention already in early design phase based on design sketches.	<a href="http://open-services.net/">http://open-services.net/</a>
Cognitive Distraction Detection Tool	The cognitive distraction detection tool allows users to evaluate whether a driver is distracted from his primary task e.g. when developing new HMI displays. This evaluation is based on audio-signals, video recordings of the driver's face and behavioural driving data.	<a href="http://open-services.net/">http://open-services.net/</a>
Human Performance Prediction	By applying the Human Operator Model CASCaS (cognitive model) during a simulation of a certain scenario, performance of the human can be predicted for this scenario. Mainly applied for comparison of different versions of an assistance system. Predicted can be: Task Execution Times, Effort for Eye and Head Movements, Gaze Distribution, Reaction Times, Effects of Routine Learning, Situation Awareness Distribution, Forgetting, Missed events (e.g. flashing warnings, flight annunciation changes).	<a href="http://open-services.net/">http://open-services.net/</a>
Primary Task Measures	Changes in the way a person performs a behavioural task can reflect the person's internal state (workload). Assumption: Only limited cognitive resources are available for processing cognitive information. Mandatory experimental set-up: Multi-Task.	<a href="http://open-services.net/">http://open-services.net/</a>
Secondary Task Measures	Changes in the way a person performs a behavioural task can reflect the person's internal state (workload). Assumption: Only limited cognitive resources are available for processing cognitive information. Mandatory experimental set-up: Multi-Task.	<a href="http://open-services.net/">http://open-services.net/</a>
Pupil Diameter Variation	Assumption: Pupil dilates with increasing cognitive workload	<a href="http://open-services.net/">http://open-services.net/</a>

**Figure 6 Preliminary MTTs list comply the criteria conditions**

	<h2>HoliDes</h2> <p><b>H</b>olistic Human Factors <b>D</b>esign of Adaptive Cooperative Human-Machine Systems</p>	
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<b>Validation ID</b>	REQ-F4	<b>Type</b>	Functional
<b>Name</b>	Compare.		
<b>Description</b>	Checking the frame "Tools comparator". Is a frame appearing in the preliminary screen that allows the HF Users to compare the different features for each MTT. Helping the users to choose a MTT.		

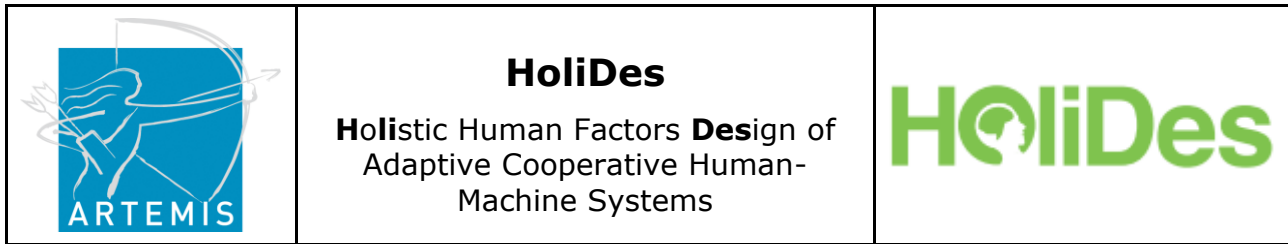
In the frame "Tools Comparator" the user can see the capabilities for each MTT proposed, including the advantages and disadvantages for each MTT:



The screenshot shows the 'Tools Comparator' section of the HoliDes Platform Builder. It displays a table with two columns: 'Tool features' and 'Value'. The table lists various features for two MTTs: Bedford Scale and Cognitive Distraction Detection Tool.

Tool features	Value
<b>Bedford Scale</b>	
Costs	low
Effort (time)	low
Interpretation of Outcome	According to Wainwright (1987) a satisfactory workload is not only demonstrated by all ratings falling in the range 1 to 3, but also when mean workload is in that range, with some deviations into the acceptable bracket.
Measurement Source	subjective: actor
Method Applied by	non-expert
Resources	participants
Time of Data Collection	retrospective
Type of Empirical Method	questionnaire
<b>Cognitive Distraction Detection Tool</b>	
Costs	low
Effort (time)	high
Interpretation of Outcome	The tool will give the distraction degree as output distinguishing between different categories ranging from not being distracted, being mildly distracted and being severely distracted.
Measurement Source	objective: performance
Measurement Source	objective: psychophysiological
Method Applied by	non-expert
Resources	computer
Resources	experimental lab

**Figure 7 Tools comparator**



<b>Validation ID</b>	VAL-F5	<b>Type</b>	Functional
<b>Name</b>	Select.		
<b>Description</b>	Checking the possibility to select different tools proposed by the PB, in order to make an HF-RTP instantiation.		

In this case is selected the MTT: "Human Performance Prediction".



The screenshot shows the HoliDes Platform Builder interface. The main content area displays a 'Preliminary MTTs List' table with columns for MTT, Description, and OSLC. The 'Human Performance Prediction' MTT is highlighted. Below the list is a 'Tools Comparator' section showing details for 'CASCaS Driver Model (WP9)' and 'Cognitive Distraction Detection Tool'.

MTT	Description	OSLC
CASCaS Driver Model (WP9)	The driver model is specialized on highway driving but in general can be extended to work in other road scenarios (e.g. rural roads). For the highway scenarios it provides driving within moderate traffic flow, simulating vehicle control, gaze behavior (3D view) and the typical driving maneuvers free-flow, car following plus lane changes left right. It allows additional tasks to be integrated (use of IVIS or integration of additional ADAS). It can be parameterized to simulate different driving styles.	http://open-services.net/
CASCaS	A domain independent cognitive architecture which can be used to simulate human behavior on a procedure-based task level. The domain dependent knowledge base has to be created by domain expert and a simulation method has to be selected (either realtime connection to a simulator, or alternatively an event-script step simulator is offered for simple testing)	http://open-services.net/
HF-Guideline	The HF-Guideline will provide a detailed orientation for the development process of the AdCos in HoliDes. The guideline considers human factors before, during and after the implementation of adaptive systems and adaptive automation into a cooperative multi agent system (humans and machines). Besides definitions from the literature the guideline will provide step-by-step introductions on how to consider human factors in an appropriate way.	http://open-services.net/
Surrogate Reference Task (SuRT)	Tool to simulate visual distraction as caused by executing a secondary task during operating	http://open-services.net/
Cognitive Distraction Detection Tool	The cognitive distraction detection tool allows users to evaluate whether a driver is distracted from his primary task e.g. when developing new HMI displays. This evaluation is based on audio-signals, video recordings of the driver's face and behavioural driving data.	http://open-services.net/
Empirical analysis and validation methods of cognitive processes in automotive domain (SNV)	SNV purpose is to address, through the use of psychological and psycho-physiological techniques, the need of investigating human performance to assess distraction processes.	http://open-services.net/
Human Performance Prediction	By applying the Human Operator Model CASCaS (cognitive model) during a simulation of a certain scenario, performance of the human can be predicted for this scenario. Mainly applied for comparison of different versions of an assistance system. Predicted can be: Task Execution Times, Effort for Eye and Head Movements, Gaze Distribution, Reaction Times, Effects of Routine Learning, Situation Awareness Distribution, Forgetting, Missed events (e.g. flashing warnings, flight announcement changes).	http://open-services.net/
ELAN	ELAN is a professional software tool for the creation of complex annotations on video and audio resources (https://ita.mpi.nl/tools/ita-tools/elan)	http://open-services.net/
Performance Related Measures	When the difficulty of a task is increased (e.g. via distracting tasks), more resources are required by default to maintain the same level of performance.	http://open-services.net/
Eye Gaze Recordings	Eye-movement recordings can provide a dynamic trace of where a person's attention is being directed in relation to a visual display. The visibility, meaningfulness, and placement of specific interface elements can be evaluated objectively.	http://open-services.net/

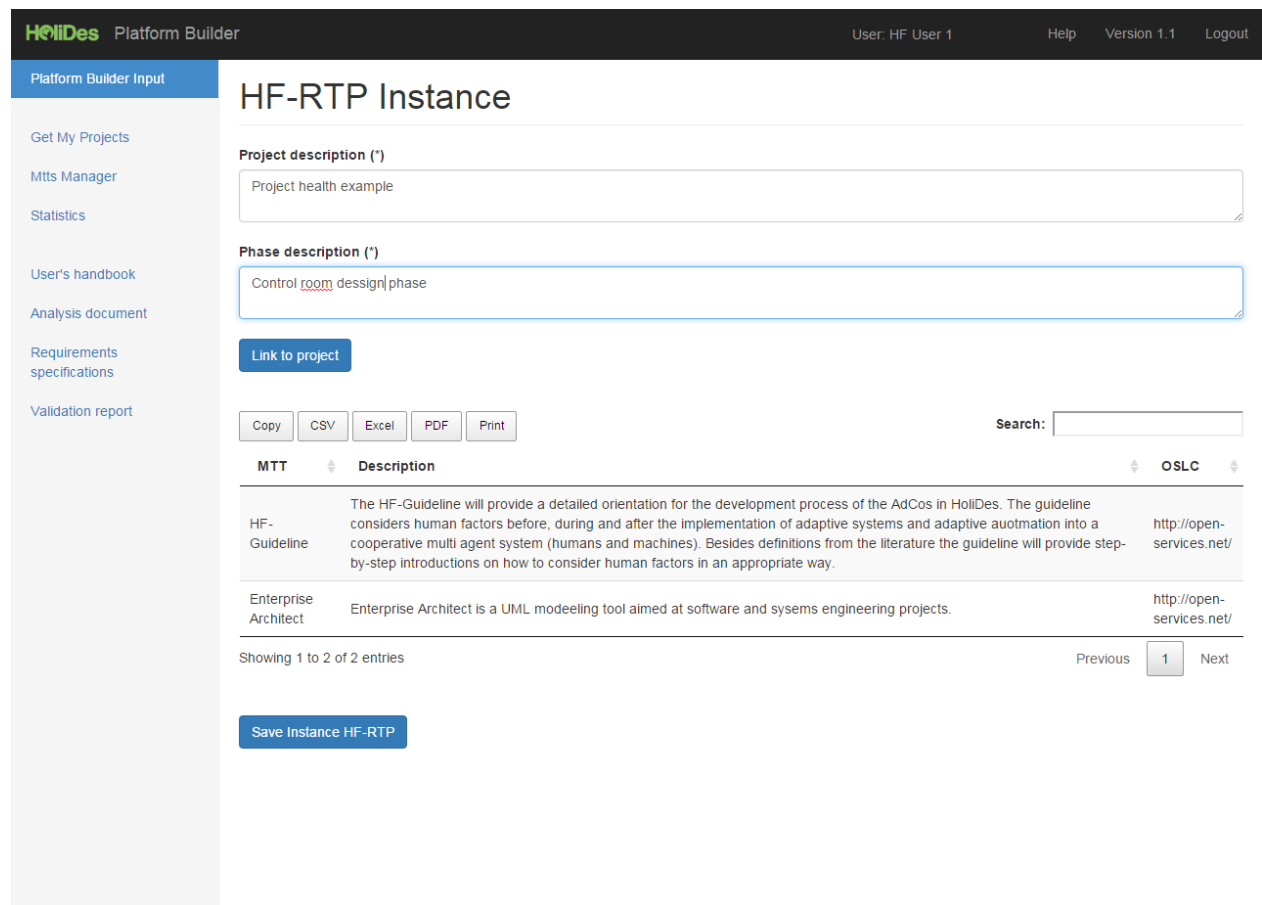
Tool features	Value
Interpretation of Outcome	The model records his own actions (gaze, actions, goals, selected action plan) in a separate trace file. The interpretation of the outcome is highly dependent on the integration into the simulation platform, the task and the test scenarios.
Measurement Source	objective: performance
Method Applied by	domain experts
Method Applied by	HF-expert
Resources	computer
Resources	simulation environment
Time of Data Collection	real-time
Effort (time)	high
Interpretation of Outcome	Intention of the driver model is to systematically simulate test scenarios in a full driving simulator environment with a model of the assistance system. The outcome is highly dependent on how the system is integrated into the simulation platform and what kind of question should be answered. In general, real-time data of the simulation is recorded. Besides the typical simulator data the model records his own actions (gaze, actions, goals, selected action plan) in a separate trace file.
Measurement Source	objective: performance
Method Applied by	domain experts
Method Applied by	HF-expert
Resources	computer
Resources	simulation environment
Time of Data Collection	real-time
Costs	low

Figure 8 Selecting some MTTs

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<b>Validation ID</b>	VAL-F6	<b>Type</b>	Functional
<b>Name</b>	Export.		
<b>Description</b>	Possibility to export all the results in some format files in order to export all the information to other platforms.		

Clicking on the buttons appearing in the top left side is possible to export to the follow formats: csv, Excel, pdf, also print the MTT and copy the MTT information to clipboard.



**HF-RTP Instance**

Project description (\*)  
Project health example

Phase description (\*)  
Control room design phase

Link to project

Copy CSV Excel PDF Print

Search:

MTT	Description	OSLC
HF-Guideline	The HF-Guideline will provide a detailed orientation for the development process of the AdCos in HoliDes. The guideline considers human factors before, during and after the implementation of adaptive systems and adaptive automation into a cooperative multi agent system (humans and machines). Besides definitions from the literature the guideline will provide step-by-step introductions on how to consider human factors in an appropriate way.	http://open-services.net/
Enterprise Architect	Enterprise Architect is a UML modeling tool aimed at software and systems engineering projects.	http://open-services.net/

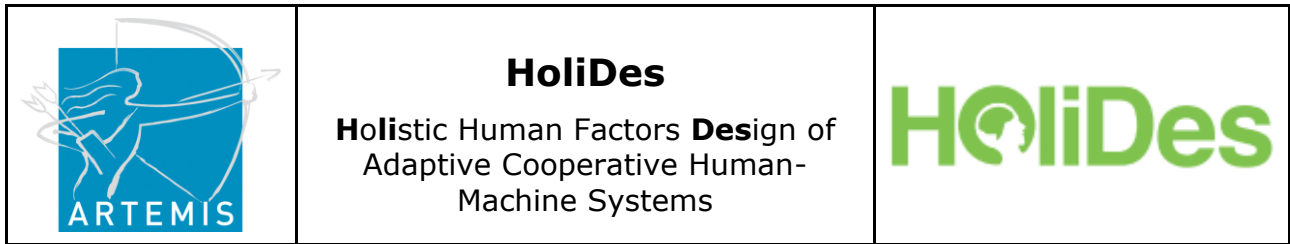
Showing 1 to 2 of 2 entries

Previous **1** Next

Save Instance HF-RTP

**Figure 9 Exporting the MTTs information**



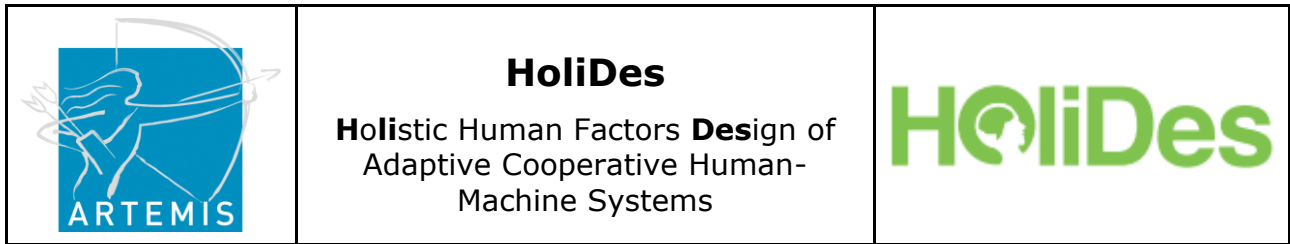


Exporting in a pdf document appears:

**Platform BuilderPlatform Builder**

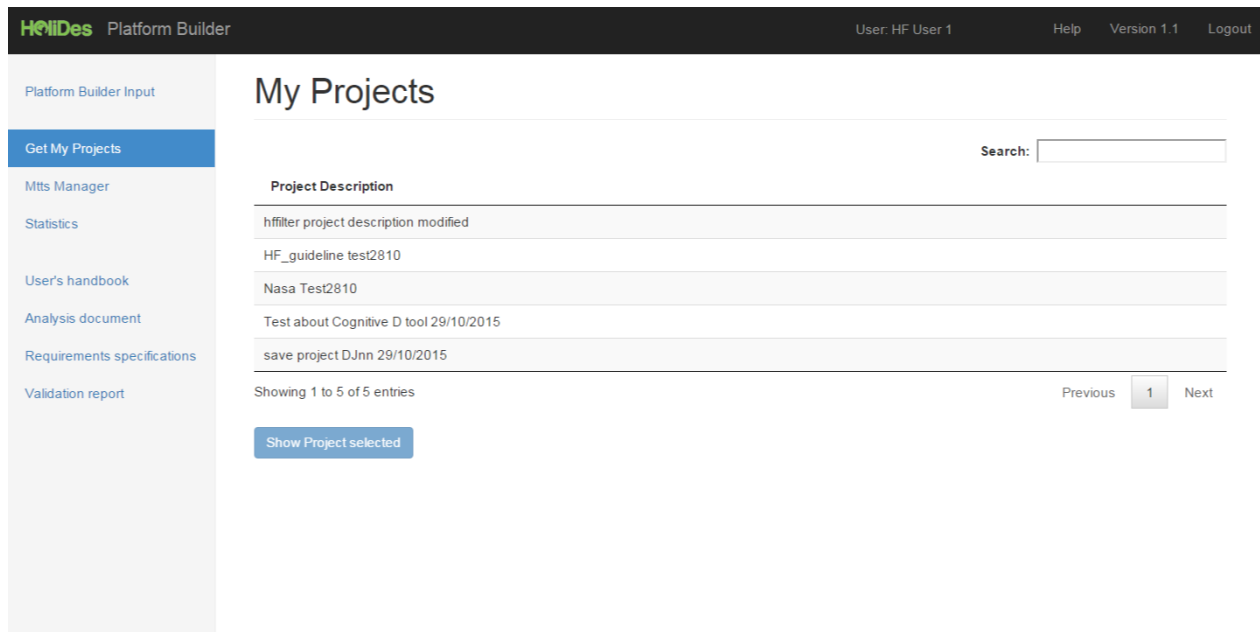
idRtp	idMtt	MTT	Description	OSLC
1	8	HF-Guideline	The HF-Guideline will provide a detailed orientation for the development process of the AdCos in HoliDes. The guideline considers human factors before, during and after the implementation of adaptive systems and adaptive automation into a cooperative multi agent system (humans and machines). Besides definitions from the literature the guideline will provide step-by-step introductions on how to consider human factors in an appropriate way.	<a href="http://open-services.net/">http://open-services.net/</a>
1	28	Enterprise Architect	Enterprise Architect is a UML modeling tool aimed at software and systems engineering projects.	<a href="http://open-services.net/">http://open-services.net/</a>

**Figure 10 Export to PDF document**



<b>Validation ID</b>	VAL-F7	<b>Type</b>	Functional
<b>Name</b>	Storing.		
<b>Description</b>	Checking and testing to store the user projects in the database and get these when you the user want to.		

A list of projects saved by users is shown in the projects screen in the PB. The user can manage his/her projects and selects one.



**HoliDes Platform Builder** User: HF User 1 Help Version 1.1 Logout

Platform Builder Input

**Get My Projects**

Mts Manager

Statistics

User's handbook

Analysis document

Requirements specifications

Validation report

## My Projects

Search:

**Project Description**



- hfilter project description modified
- HF\_guideline test2810
- Nasa Test2810
- Test about Cognitive D tool 29/10/2015
- save project DJnn 29/10/2015

Showing 1 to 5 of 5 entries

Previous **1** Next

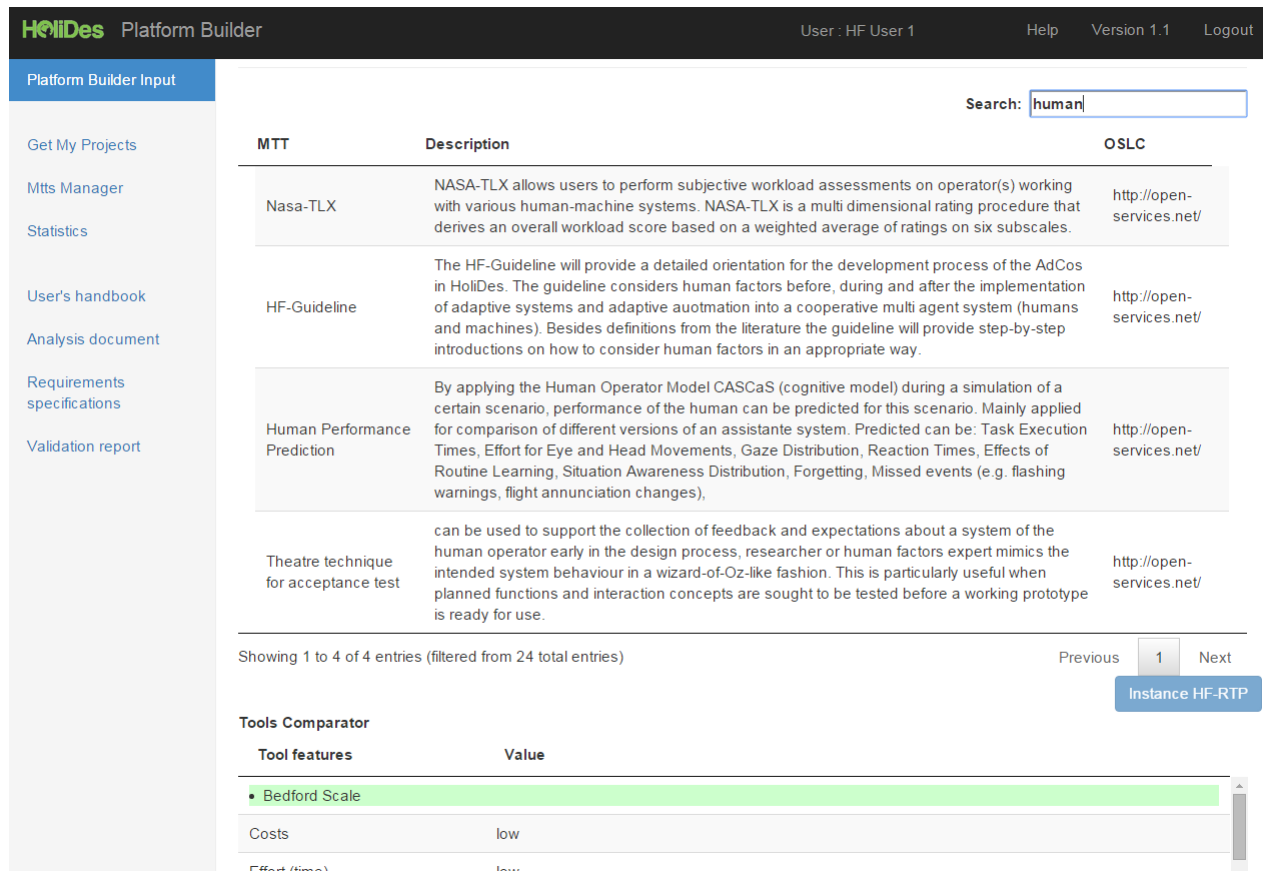
Show Project selected

**Figure 11 List of projects saved for the HF User 1**

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<b>Validation ID</b>	VAL-F8	<b>Type</b>	Functional
<b>Name</b>	Search Engine.		
<b>Description</b>	Help to users to find MTTs in the list of the MTTs proposed.		

This functionality can help the user to find some tools searching by word, the PB app provides a textbox in the top right side of the list of MTTs. For example in the figure below the search is done using the word "human", and appears all the MTTs comply it in their description or tool name:

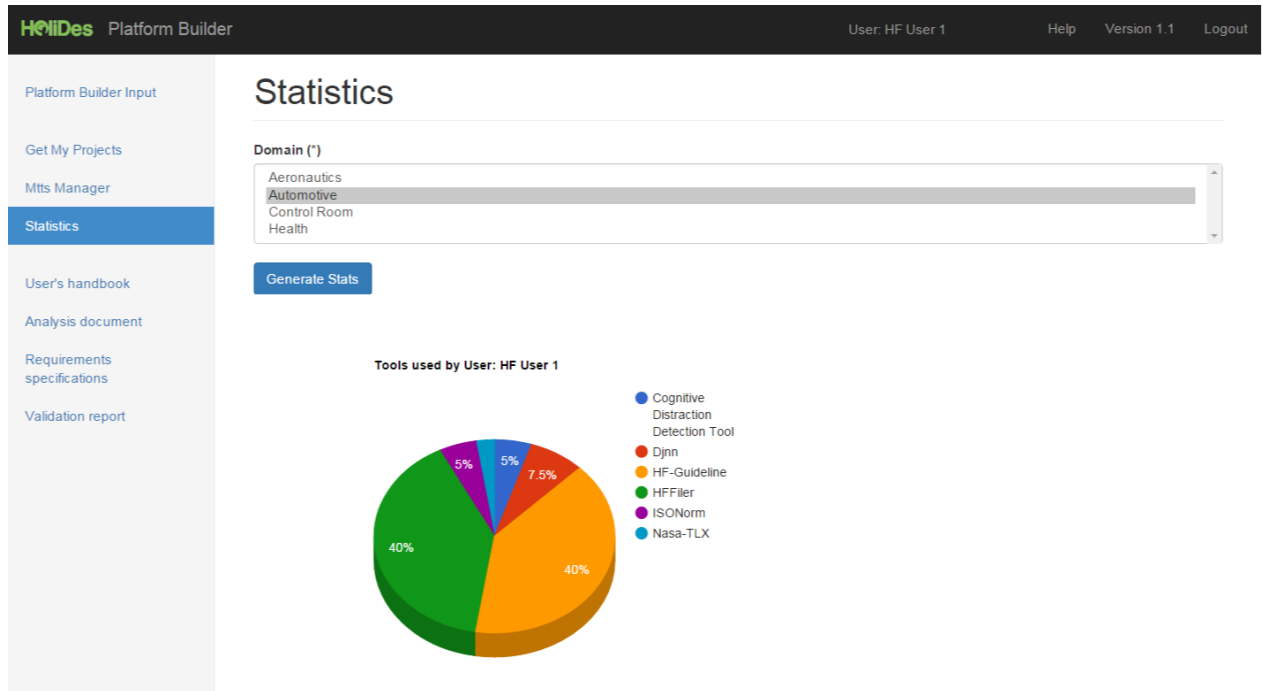


The screenshot shows the HoliDes Platform Builder interface. At the top, there is a navigation bar with the HoliDes logo, 'Platform Builder', and user information: 'User: HF User 1', 'Help', 'Version 1.1', and 'Logout'. On the left, there is a sidebar menu with options like 'Get My Projects', 'Mts Manager', 'Statistics', 'User's handbook', 'Analysis document', 'Requirements specifications', and 'Validation report'. The main content area features a search bar with the text 'human' entered. Below the search bar is a table of MTTs (Methodical Task Tools) with columns for 'MTT', 'Description', and 'OSLC'. The table lists four MTTs: 'Nasa-TLX', 'HF-Guideline', 'Human Performance Prediction', and 'Theatre technique for acceptance test'. Each MTT entry includes a brief description and a URL. Below the table, there is a pagination control showing 'Showing 1 to 4 of 4 entries (filtered from 24 total entries)' and buttons for 'Previous', '1', and 'Next'. A blue button labeled 'Instance HF-RTP' is also visible. At the bottom, there is a 'Tools Comparator' section with a table showing 'Tool features' and 'Value' for 'Bedford Scale', 'Costs', and 'Effort (time)'. The 'Bedford Scale' row is highlighted in green.



**Figure 12 Search by word**

	<h2>HoliDes</h2> <p>Holistic Human Factors <b>Design</b> of Adaptive Cooperative Human- Machine Systems</p>	
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<b>Validation ID</b>	VAL-F9	<b>Type</b>	Functional
<b>Name</b>	Statistics.		
<b>Description</b>	Statistics for PB shows how many tools are instantiate by each user, filtering by domains, and showing the information in a graphical environment.		



**Figure 13 Statistics**

	<p><b>HoliDes</b></p> <p><b>H</b>olistic Human Factors <b>D</b>esign of Adaptive Cooperative Human- Machine Systems</p>	
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<b>Validation ID</b>	VAL-F10	<b>Type</b>	functional
<b>Name</b>	Connectivity.		
<b>Description</b>	Provide a graphical environment to see the connection between tools.		

This functionality provides a graphical environment where MTTs can be selected by criteria: domain, related activities and HF issues, and these MTTs will be presented within a V-model picture, including each MTT in one or more related activities.

The MTTs can be located in some categories: analysis, conceptualization, certification, design, evaluation, deployment and system implementation.

Selecting for example the conceptualization and deployment items in the “related activity” combo list, a list of MTTs appears in the right size with the MTTs accomplishing the conditions.

Selecting some MTTs, these ones will appear in the V-model picture as the picture below shows:



# HoliDes

## Holistic Human Factors Design of Adaptive Cooperative Human-Machine Systems



**HoliDes** Platform Builder - MTTs connectivity User : HF User 1 Help Version 3.0 Logout

Create an HF-RTP instance

Get my projects

MTTs manager

Statistics

**MTTs connectivity**

User's handbook

Analysis document

Requirements specifications

Validation report

Videos tutorials

Domains	Extra requirements	HF Issues	Related activity
<input type="checkbox"/> Aeronautics	<input type="checkbox"/> Modelling with Architectural Frameworks	<input type="checkbox"/> Attention	<input type="checkbox"/> Analysis
<input type="checkbox"/> Automotive	<input type="checkbox"/> Not Selected	<input type="checkbox"/> Behavior	<input type="checkbox"/> Certification
<input type="checkbox"/> Control Room	<input type="checkbox"/> Regulation xy	<input type="checkbox"/> Distraction	<input checked="" type="checkbox"/> Conceptualisation
<input type="checkbox"/> Health		<input type="checkbox"/> Safety	<input checked="" type="checkbox"/> Deployment

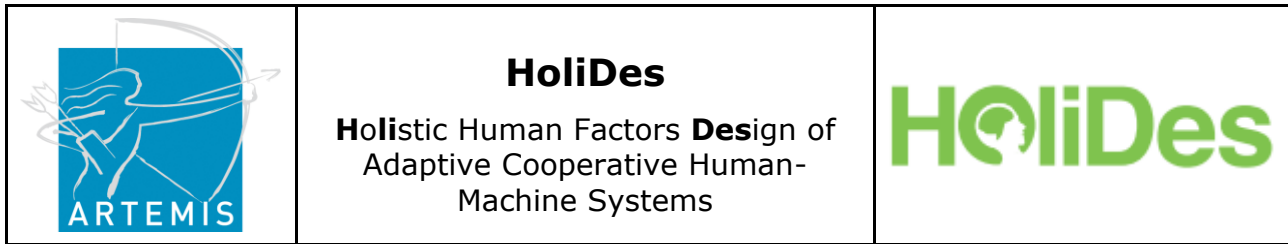
  
  

Select all MTT's

List of MTTs

- validation methods of cognitive and communicative processes Control Room
- Empirical analysis and validation methods of cognitive processes in automotive domain (SNV)
- Enterprise Architect
- Enterprise Architect
- Focus Groups
- HF-Guideline
- HFFiler
- Means-end analysis
- RTMaps
- Search Bestie
- Subject Matter Expert Interviews
- Theatre technique for acceptance test
- U-DAT
- Workshops

**Figure 14 MTTs Connectivity GUI**



<b>Requirement ID</b>	REQ-F11	<b>Type</b>	functional
<b>Name</b>	AdCoS Integration		
<b>Description</b>	Possibility to connect the Platform Builder with some AdCoS.		

The integration between the PB and the HoliDes AdCoS has been done in the "Adaptation framework" tool, inside PB app.

**HoliDes** Platform Builder - Adaptation framework

Create an HF-RTP instance

My projects

MTTs database

MTTs Statistics

MTTs connectivity

**Adaptation framework**

Built your AdCoS Requirement kernel by using our Adaptation Framework

Set-up your AdCoS by using Cognitive Loop primitives.  
Cognitive Loop primitives are single simplified entities that allow an **agent** (human or machine) to interact on an **object** (a user interface, a task, a task distribution or a process) that are involved in the original **process**.  
You can choose Cognitive loop primitives in the followings:

**M** means **Machine**, **H** means **Human**, **UI** means **User Interface**, **T** means **Task**, **TD** means **Task Distribution**, **P** means **Process**

For example, the loop means that a **machine** control a **user interface** to manage a process

**Examples**

- Patient Positioning
- DVA
- Workload Balancing
- Lane Change

**Buttons:** Add Loop, Remove Loop, Reset All

Loop	Agent	Object	Process
M-UI	display advisor	gantry display	patient positioning
H-P	practitioner	patient positioning	patient positioning

**Generate**

Cognitive Loop used in your AdCoS:

**AdCoS Requirements...**

**Requirements for MACHINE display advisor**

- workload : display advisor may need to inspect its states (introspection)

**Requirements for USER INTERFACE gantry display on PROCESS patient positioning**

- situationAwareness : display advisor must be able to perceive and evaluate gantry display state(s)
- situationAwareness : display advisor must be able to perceive and evaluate the patient positioning environment (in which the gantry display is used)
- decisionMaking : information presented on the gantry display and about the patient positioning environment must allow the display advisor to decide if the gantry display needs to be changed
- usability : display advisor must be able to access the controls that allow changing the gantry display
- situationAwareness : display advisor must get a feedback from the changes made on the gantry display

**Requirements for HUMAN practitioner**

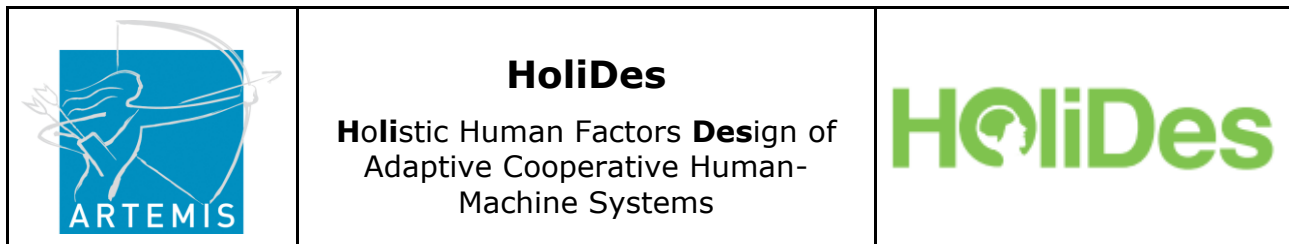
- workload : practitioner workload must stay in acceptable bounds
- fatigue : practitioner fatigue must stay in acceptable bounds for the operation perform in the loop
- cognitiveCapacityLimit : The operations requested from practitioner must stay below its cognitive capacity limits
- visualDistraction : practitioner must not be visually distracted in operations where visual perception and evaluation are involved
- satisfaction : The operations in which practitioner are involved must provide satisfaction
- situationAwareness : practitioner may need to inspect its states (introspection)

**Requirements for PROCESS patient positioning on PROCESS patient positioning**

- situationAwareness : practitioner must be able to perceive and evaluate the state of the patient positioning
- situationAwareness : practitioner must be able to perceive and evaluate the patient positioning environment in which patient positioning is controlled
- decisionMaking : information on patient positioning about the patient positioning environment must allow the practitioner to decide if patient positioning needs to be changed
- decisionMaking : information on patient positioning about the patient positioning environment must allow the practitioner to decide how patient positioning needs to be changed
- decisionMaking : practitioner must be able to change patient positioning
- decisionMaking : practitioner must get a feedback from the changes made on patient positioning

**Figure 15 PB Adaptation framework**

It provides an interface that allows an agent (human or machine) to interact on an object (a user interface, a task, a user distribution or a process) that are involved in the original process.



For instance in the picture above Figure 15, selecting the “Patient Positioning” example, gives as a result a list of AdCoS requirements, shown in the inferior part of the Figure 15.

## 2.2 Non-functional validations

Non-functional validations are related to non-functional requirements described in the “HoliDes Platform Builder requirements” document.

<b>Validation ID</b>	VAL-NF01	<b>Type</b>	Non-functional
<b>Name</b>	Accessibility.		
<b>Description</b>	Checking that the PB can be used by people with disabilities. More specifically, people with disabilities can perceive, understand, navigate and interact with the PB.		

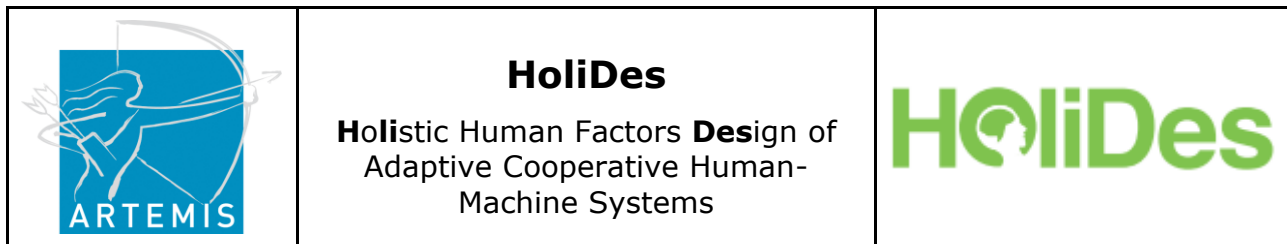
The design used in the version 1.1 of the PB app covers this condition. It’s been designed using Bootstrap CSS, this framework provides a compatibility with the most relevant navigators.

For example using Chrome Navigator:

Chrome OS includes built-in accessibility features like ChromeVox, high contrast, and magnifier.

The Chrome browser supports screen readers and magnifiers, and offers people with low vision full-page zoom, high-contrast colour and extensions.





<b>Requirement ID</b>	VAL-NF02	<b>Type</b>	Non-functional
<b>Name</b>	Capacity, current and forecast.		
<b>Description</b>	Checking the capacity of the solution should be planned for an unexpected increase of resources needed.		

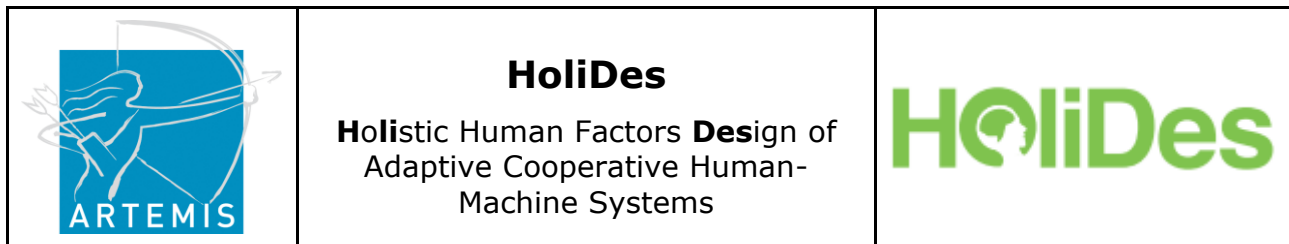
The application is uploaded to a server as a .war file. The database is created in a server with an automatically expandable size in case of a big amount data.

<b>Requirement ID</b>	VAL-NF03	<b>Type</b>	Non-functional
<b>Name</b>	Compliance		
<b>Description</b>	The PB may be developed in compliance with specifications created by reference industry bodies, such as the IETF.		

PB app is developed using standards languages: java, using CSS and HTML5 in order to give a unique design easily updatable.

<b>Requirement ID</b>	VAL-NF04	<b>Type</b>	Non-functional
<b>Name</b>	Documentation		
<b>Description</b>	All the software engineering process of the PB should be documented.		

There are 4 documents explaining the architecture of PB and how it's possible to access it, these documents are: analysis, a handbook for users, requirements and the validation Report. It's been uploaded in the Ajaxplorer repository.



<b>Requirement ID</b>	VAL-NF05	<b>Type</b>	Non-functional
<b>Name</b>	Disaster recovery		
<b>Description</b>	Security measures aimed to prevent the lack of access due to different kinds of disaster or unexpected contingencies.		



The application includes a user/password security for HF users only. Database is only accessible for user administrator, and all the selects and modifications are available only for the users logged in the PB app.

<b>Requirement ID</b>	VAL-NF06	<b>Type</b>	Non-functional
<b>Name</b>	Efficiency		
<b>Description</b>	The PB should accomplish its mission in an efficient and optimal way.		

The solution proposed is working on server and is easy to access it via navigator, in order to simplify some extra work for the users.

<b>Requirement ID</b>	VAL-NF07	<b>Type</b>	Non-functional
<b>Name</b>	Effectiveness.		
<b>Description</b>	The PB should be able to achieve its objectives and the extent to which targeted problems are solved.		

The PB app has developed for the HoliDes project in order to achieve the objectives proposed in WP1. It's a technical solution done specifically for this project.

	<h2>HoliDes</h2> <p>Holistic Human Factors <b>Design</b> of Adaptive Cooperative Human- Machine Systems</p>	
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<b>Requirement ID</b>	VAL -NF08	<b>Type</b>	Non-functional
<b>Name</b>	Extensibility.		
<b>Description</b>	If is needed the application developed can be extended and is possible to include in the app more features in the future.		

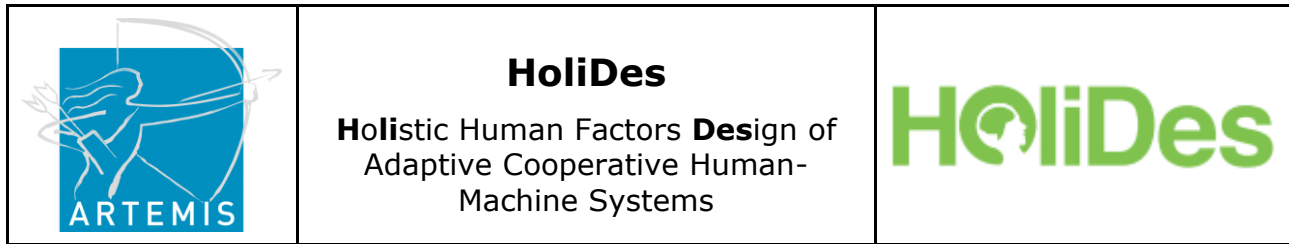
There is a control of the versions in the PB app.  
The PB app has been created to accept the inclusion of new functionalities.  
The architecture, software engineering and the database are created to simplify future modifications.

<b>Requirement ID</b>	VAL-NF09	<b>Type</b>	Non-functional
<b>Name</b>	Fault tolerance.		
<b>Description</b>	Errors should be considered and managed in an optimal way.		

A control of errors has been included in the software application in order to manage and keep a stable control of the application.

<b>Requirement ID</b>	VAL-NF10	<b>Type</b>	Non-functional
<b>Name</b>	Interoperability.		
<b>Description</b>	Components developed in different technologies should be able to communicate their selves.		

The PB app is developed in a standard HTML format, it's accessibly from different devices (laptops, mobile devices, smartphones and others devices using navigator). At the same time the architecture used is divided in 3 parts MVC: Model, View and Control detailed in the analysis document.



<b>Requirement ID</b>	VAL-NF11	<b>Type</b>	Non-functional
<b>Name</b>	Maintainability.		
<b>Description</b>	The maintenance of the PB should be a continuous process and easy to achieve.		



There is a control of versions in the documents related to the PB app. This control provides to the developers team to know in real time the state of the functionalities included in the version.

<b>Requirement ID</b>	VAL-NF12	<b>Type</b>	Non-functional
<b>Name</b>	Privacy		
<b>Description</b>	The personal data of the users should be protected with privacy mechanisms.		

Each user only can access their own data, and the application does not have the ability to view the saved projects or private data used for other users.

<b>Requirement ID</b>	VAL-NF13	<b>Type</b>	Non-functional
<b>Name</b>	Portability		
<b>Description</b>	The functionalities of the PB should works in the same way for different computing platforms.		

The PB has developed using languages, technics and software to give the maximum possibilities to access it by the users.  
For example: responsive design to adapt automatically for different devices, using Bootstrap CSS and HTML5.

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<b>Requirement ID</b>	VAL-NF14	<b>Type</b>	Non-functional
<b>Name</b>	Quality.		
<b>Description</b>	The PB app should comply to a given design based in the functional requirements described in the requirements document.		



The design of the PB has been proposed to help and simplify the work for HF experts. It's been included help panels and handbook documents to help the users.

<b>Requirement ID</b>	VAL-NF15	<b>Type</b>	Non-functional
<b>Name</b>	Reliability.		
<b>Description</b>	The PB app should be able to be tested as failure-free for a specified period of time in a specified environment.		

There are two different environments: one for the execution (production environment) and another one to test the PB app (localhost environment), in order to know and check all the possible errors found.

<b>Requirement ID</b>	VAL-NF16	<b>Type</b>	Non-functional
<b>Name</b>	Resilience.		
<b>Description</b>	The PB should be a resilient system. This means that it can be hot in a critical component and recover and come back for more in a known, bounded, and generally acceptable period of time.		

The composition of the PB is based in components and the links between them: database, view (javascript, jquery, html), control (servlets, bean java), this architecture provide an independence between all these components allowing a simple and non-critical situation if one component needs to be replace by a new version.

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<b>Requirement ID</b>	VAL-NF17	<b>Type</b>	Non-functional
<b>Name</b>	Response time.		
<b>Description</b>	The PB should use an acceptable time for responding the request of a final user.		



The business and the preconditions involved for each tool and the connectivity between them are located in the database, and the PB app proposes an effectively solution as soon as possible.

<b>Requirement ID</b>	VAL-NF18	<b>Type</b>	Non-functional
<b>Name</b>	Robustness.		
<b>Description</b>	The PB should be able to cope with errors during execution time.		

A control error exists for each function or procedure in the software, controlling the different kind of errors: warning, critical or information.

<b>Requirement ID</b>	VAL-NF19	<b>Type</b>	Non-functional
<b>Name</b>	Scalability.		
<b>Description</b>	The PB should be able to handle a growing amount of work in a capable manner or to be enlarged to accommodate that growth.		

It's hosted in expandable servers, the database server and web server are located in different places and there is a system team working and managing these servers.

	<p><b>HoliDes</b></p> <p>Holistic Human Factors <b>Design</b> of Adaptive Cooperative Human- Machine Systems</p>	
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<b>Requirement ID</b>	VAL-NF20	<b>Type</b>	Non-functional
<b>Name</b>	Security.		
<b>Description</b>	Security constraints should be covered in all the software engineering process of the PB.		

Constraints have defined in the database tables, applied too in the PB app for the users, accessing only their own information, without the possibility to see other information of other users.

<b>Requirement ID</b>	VAL-NF21	<b>Type</b>	Non-functional
<b>Name</b>	Testability.		
<b>Description</b>	The developed PB should be able to be tested in a set of different environments and technical constraints.		

The tests have done in different navigators and using different devices in order to cover the maximum test possibilities.

To test different devices is used the google Chrome extension: Responsive web design tester.