User Manual

SmartHMA

“Mobile platform for deployment of HMA standardised services into different types of non PC system environments in frame of RSS architecture”
## Project Details

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<th>ESA Contract No.</th>
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<td><strong>Security Classification</strong></td>
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<td><strong>Delivery Date</strong></td>
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</tr>
<tr>
<td><strong>Version</strong></td>
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<td><strong>Issue</strong></td>
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### Deliverable Responsible

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# Document Change Log

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1. Introduction

The main objective of the SmartHMA project is to develop and validate an open source operational platform architecture which implements a set of HMA standards in native client for access to Ground Segment data and services.

The aim of the project is the development of a mobile platform for discovery and distribution of existing EO data and services and those that will be introduced in the near future, in the form that will be acceptable by mobile devices (mainly tablets) and entirely based on OGC and HMA specifications. Implementation will be focused on accessing the ESA Fedeo environment according to changing user needs associated with new user behaviours and growing market of mobile devices. SmartHMA in form of open source software allows complementing the RSS system environment and Fedeo platform.
2. Applicable and reference documents

2.1. **Applicable documents**

SmartHMA User Manual document contents refers to:

- SmartHMA project proposal
- SmartHMA contract
- SmartHMA SDP document
- SmartHMA SRS document
- SmartHMA SDD document

2.2. **Applicable documents**

The following documents are applicable to the project. In the current document, these documents are referenced as listed below.

- [AD01] ESA Contract No. 4000110269/14/I-LG SmartHMA – Mobile Platform for Deployment of HMA Standardised Services into different types of non PC system environments in frame of RSS architecture
- [AD02] SmartHMA Software Development Plan, Issue 1, Revision 1, 25/04/2014.
- [AD03] HMASE-SPB-D3200.4, FEDEO Client Partner Guide, Issue 1, Revision 0, 05/02/2014.
3. Terms, definitions and abbreviated terms

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<td>European Cooperation for Space Standardization</td>
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<td>EO</td>
<td>Earth Observation</td>
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<td>EO-DAIL</td>
<td>Earth Observation Data Access &amp; Integration Layer Implementation</td>
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<td>ESA</td>
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<td>Fedeo</td>
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<td>XML</td>
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4. Software overview

4.1. Function and purpose

The main purpose of the SmartHMA which will be developed as an open source operational mobile application is providing an access to searching, discovery of distribution set of Heterogeneous Missions in native thin clients for access to Ground Segment services from the GMES Contributing Missions (GCM) and the ESA missions distributed by different existing and planned services. The aim of SmartHMA is providing a new platform for distribution of existing EO data and those that will be available in the near future, in the form that will be acceptable by mobile devices (mainly tablets). Application will focus on adaptation of existing environment to changing user needs associated with mobile user behaviours and growing market of mobile devices. SmartHMA in form of open source software allows complementing the RSS system environment and EO data discovering platform.

4.2. Environmental considerations

SmartHMA as an application designed to the tablet devices will operate in typical for tablet based application environment (indoor and outdoor). For this purposes design process of UI will focus on handy and user friendly EO data discovering and searching with use of tablet touch screen. Application will be designated to all types of tablet devices with all screen size and resolution (mainly 7 inch and 10 inch). Target operational system for SmartHMA will be Android in version 3.0 and higher.

4.3. Relation to other systems

Fedeo [AD03] is a prototype system providing a brokered discovery (and access) capability to European (and Canadian) EO missions’ data based on HMA interfaces. The SmartHMA mobile application acts as a client to the discovery interfaces provided by Fedeo. Also other discovery interfaces and services will be added to SmartHMA if it will be possible. Architecture of application and interfaces are not closed and in future implementation is possible to add modules to extend application functionality (i.e. add new entry points).

SmartHMA implements Fedeo two stage search engine in each of the available modules: “Search EO Data”, “Browse EO Data”, “ESA Missions” and partially as an option in “ESA Online” news reader. “Search EO Data” utilise parameters provided by OSDD to perform all search on each stage of search EO products. Parameters in OSDD are the base to build all Fedeo requests. Fedeo Explain Document is used in “Browse EO Data” module of SmartHMA application where user can start browsing collections from Explain Document. SmartHMA also includes most of information from ESA EO Missions website (https://earth.esa.int/web/guest/missions) and user can browse ESA related EO mission and start searching EO data from “ESA Missions” part of application.
In terms of Fedeo, SmartHMA application utilises all of the parameters described in Fedeo User Guide document [AD3], OSDD parameters implemented by Fedeo interfaces, and Explain Document which is part of Fedeo entry point.
5. Main Functions of SmartHMA Application

SmartHMA is an Android tablet based application. It allows a user to search EO data in a two stage approach. It means that the user in the first stage defines parameters for searching EO collections, and then searches EO products inside the specified collection. In the SmartHMA application, the “discovery” of EO data is defined in two ways:

1. as a “Search EO Data” function, which allows users to set a query phrase in the search box (web browser engine approach);
2. as a “Browse EO Data” function, which allows users to browse folder by folder EO collections and products.

5.1. SmartHMA Main Screen

After starting the application, the SmartHMA main screen with 4 buttons is displayed (Figure 1). The buttons on the main screen permit to move across different successive screens, each one providing different functionalities:

1. “Search EO Data” screen, providing “Fedeo Search Engine” in the form of a google-like view, for searching EO collections and – successively – EO products;
2. “Browse EO Data” screen, providing “Fedeo Explain Document” entries, to start browsing EO data and displaying content of each catalogue;
3. “ESA Missions” screen, providing information of ESA and Third Party EO missions. This screen could be an alternative starting point to search EO data related to individual missions;
4. “ESA Online” screen, which permits to use the “ESA EO RSS Reader” function and show latest ESA EO information.
Figure 1. Screens with the main functions of the SmartHMA application.

A movie on the SmartHMA Main Screen presents the entry point of the SmartHMA application and is available at:

https://youtu.be/NhN2JQaHTU4
5.2. **Search EO Data - Basic Parameters Configuration**

The Search EO Data screen permits the user to perform catalogue searches of EO data through available collections. A number of basic parameters can be configured:

1. The **Catalogue** to be used to perform the search;
2. The **Search Area**, to restrict the search to a specified geographic area;
3. The **Time Period**, to restrict the search to a specified time interval.

The steps presented below (see also Figure 2) explain how the basic parameters can be configured:

1. To change the default Fedeo catalogue used in the search, tap the active **Catalogue** area (pt.1), which permit to select the catalogue to be used for searching EO data; clicking the **Catalogue** area, a dialog box appears with list of available EO Data catalogues (pt.2). By default, the following catalogues are available:
   - EOP:ESA:FEDEO - Top-level dataset series catalogue comprising all individual dataset series catalogues with heterogeneous content;
   - EOP:ESA:FEDEO:COLLECTIONS - EO-DAIL and M2CS dataset series with ISO metadata records;
   - EOP:ESA:GPOD:EO - ESA GPOD connector with RDF metadata records;
   - EOP:ESA:EO-VIRTUAL-ARCHIVE4 - ESA Virtual Archive with RDF metadata records;
2. The active **Time Period From** area starts the widget to change start date and time of the search (pt.3), whilst the “**Time Period To**” area permits to specify the end date and time of the search (pt.4);
3. Taping **Start Time / End Time** element, a dialog with calendar or time picker widget appears, where user can set up date and time of the search (pt.5);
4. The active **Search Area** provides information about bounding box used for the search (pt.6); to change the values of the bounding box, the user should tap **Search Area** field, which automatically displays a map view (pt.7). Map is centred and zoomed to user current position (if it is available). Visible map area defines the bounding box parameters. By map zooming and panning, user can change these parameters (as visible in left panel of the application);
5. It is also possible to define a non-regular shape for the search area (pt.8): the user can draw vertex of a polygon object on the map by “long press map” gesture. It closes the object automatically and stores bounding box parameters;
6. By taping back button on the bottom of the screen (pt.9), the user closes map view and saves bounding box parameters for searching EO data.

Once the parameters have been configured, the main search screen with a search box permits the user to provide a search term. Accepting and starting of searching process with all defined parameters is possible by clicking the arrow on right hands side of search edit box or by using a “Go” button on the screen keyboard (pt.10).
A movie on the configuration of basic parameters is available at: https://youtu.be/F8_zA96gITI

Figure 2. Basic parameters setup.
5.3. **Search EO Data - Advanced Parameters Configuration**

Advanced search parameters configuration allows users to set up initial search parameters for collections search in the **Search EO Data** screen. It is an extended search screen, with additional panels for parameters configuration. The configurable parameters are the following:

1. **Fedeo endpoint**: represents address of remote Fedeo server which will provide an Fedeo responses. User can choose between fedeo.esa.int (which is default), geo.spacebel.be and smaad.spacebel.be

2. **Title**: corresponds to Fedeo dc:title parameter and allows to define collections title i.e. “ESA TPM SPOT” or “Spot multispectral”

3. **Organisation**: corresponds to Fedeo eo:organisationName parameter and defines organisation name of searched collection i.e. “ESA/ESRIN” or “Airbus Defense And Space”

4. **Platform**: corresponds to Fedeo eo:platformShortName and defines unique name of platform defined in metadata as gmi:platform i.e. “SPOT5”

The steps presented below (see also Figure 3) explain how the advanced parameters can be configured:

1. From the Search EO Data screen, press the “Advanced Settings” button;

2. This action displays an area with edit boxes and picker below default parameter boxes. It allows to choose additional parameter for the collections searching process;

3. Taping “Endpoint” area, a list with available Fedeo endpoints is displayed. The default endpoint is fedeo.esa.int which can be changed by choosing one from the displayed list;

4. To specify Title, Organisation or Platform for the collection to be searched, user can put these parameters in edit boxes (if it is needed).

5. After this operation user can start searching process by clicking a “Go” button from search box field.
Figure 3. Advanced parameters setup.
5.4. **Search EO Data – Collections and Products**

Searching collections and products is the main function of the SmartHMA application, and is used to discover EO data. This process is actually performed through a two-step approach: first a collection of EO products is searched and selected, and an EO product is searched within the selected collection. The following steps (see also Figure 4) summarize the entire search process:

1. After setting basic or advanced parameters – or using default values of search parameters – the user can start the searching process pressing the arrow on the right side of search entry field (or by pressing “Go” on keyboard screen);
2. Searching process can take several seconds and the summary of search is displayed on the left hand side panel. The result of the searching process is a list of collections (dataset series). Bottom active text boxes allow to navigate through all searched group items;
3. The right hand side list displays first group of searched items – EO collections list. By clicking a list item, the user can chose one collection and display the details;
4. On the details screen, the user can look at metadata by clicking on “Metadata” button at the bottom of screen;
5. On the Metadata screen, all the information about a chosen collection is displayed in form of ISO Metadata (in most cases);
6. On the details screen, the user can also redefine or precise basic search parameters – e.g. time and area of search;
7. Clicking one of the parameters on these area, a dialog box with time or map picker are displayed for parameters adjustments.
8. For setting up other parameters, the user can open the right hand side slider, which loads list of OSDD parameters for current collection (displayed on the screen);
9. Clicking “Search Products” user can start searching an EO product within the previously selected collection, using the parameters defined for the search;
10. When the searching process is successfully completed (can take few seconds), a product search screen appears. By pressing navigation text buttons, the user can change page with results and load other part of resulting products list. In the left panel, list of products are displayed. User by clicking an item on the list can see details (in right panel) of selected EO product.
11. Finally a details of EO product with short information about selected product and function buttons are displayed in left panel of SmartHMA application.

A movie on the EO Data search process is available at:
https://youtu.be/F8_zA96gITI
Figure 4. Process of searching EO data in two stages
5.5. **EO Product Details and Share Functionality**

Product details are the final step available after the EO product discovery process, and it is the entry point for the distribution of EO data in next steps. The following four functions are available at the bottom of the page (see also Figure 5):

1. **“QuickLook”** button, which displays the image quicklook of a selected EO product;
2. **“Metadata”** button, which provides the complete metadata of the product;
3. **“Show Map”** button, which permits to overlay the geo-referenced quicklook onto a map. Through the slider, the user can change the opacity/transparency of the image (or look at footprint only);
4. **“Share”** button, which is used to share information about selected EO product in social media. On this stage only Facebook interfaces is implemented. Clicking the **“Share”** icon on right top corner user can share EO product information using native android function of built-in application (like mail, Gmail, Bluetooth etc.) (pt. 5).
Figure 5. Product details and share screens
5.6. **EO Product data download and save in cloud**

From the “Product details” view user can download raw EO product data (if it is available from SmartHMA system) or send it direct on the cloud service storage. If access to EO data is restricted or system send only link to EO data and metadata file with all product information. To start download or save the following steps should be performed (see also Figure 6):

1. Click **“Download”** button, to start EO data downloading. Progress of this process will be indicated in notification area (on top of the screen);
2. After downloading process complete, an information will be shown on the screen;
3. In navigation drawer a details of downloading process will be displayed with exceptions (if any) occurred during the downloading;
4. **“Save to Cloud”** button, is used to transfer raw EO data directly to cloud services.
5. After click this button a dialog with available cloud services will be displayed.
6. After choose one of the cloud storage service an information about validation of user credentials or registration info will be provided to user. Acceptation start transfer process what will be indicated on the top of the screen in navigation area with details in navigation drawer.

![Figure 6. Product details and share screens](image-url)
5.7. **Browse EO Data (with Explain Document)**

From the SmartHMA Main Screen, the user can press the “Browse EO Data” button, which permits to use the browse functionality to discover EO data through the Fedeo Explain Document at first stage, choosing a specific collection and then searching products in this collection (with defined searching parameters). The following steps (see also Figure 7) summarize the entire browse process:

1. Press the **“Browse EO data”** button on SmartHMA Main Screen;
2. After several seconds, an **“Explain Document”** is loaded and Fedeo groups of collections are displayed in right hand side list. Left panel contains map with basic parameters settings, which user can change in the same manner as in described in chapter 5.2 points 1-7;
3. Clicking item on the list, a specific list of collections provided in **“Explain Document”** is displayed;
4. User also can specify a non-regular area of interest by long click on the map (as it is also described in chapter 5.2 point 5). Choosing an entry on collections list, the user starts the browsing process. After several seconds, a summary of Fedeo server responses are displayed;
5. Collections search summary screen provide the same information as in searching process. The user can also open the slider with available OSDD parameters for chosen entry point, catalogue or collection;
6. If in the OSDD it is defined a type of EO data to search (dataset series or dataset), the user can search a collection or product in next stage of browsing (searching) process by clicking **“Search Collection”** or **“Search Products”** button. Name of button and type of searching depends on type of parameter chosen form OSDD slider;
7. After few seconds, a screen with result of search are displayed. From this point browsing information about products run in the same form as is described in chapter 5.4 point 2-8.

Following searching steps are published as a movie under SmartHMA EO Data Browse (https://youtu.be/hQmp-f4ft_l) link.
Figure 7. Workflow describing browsing collection with use of Fedeo Explain Document
5.8. *Discovery ESA EO Missions’ Collections and Products*

Last form of EO data discovery is using ESA EO Mission website content, linked with Fedeo searching engine.

*Figure 8. Screens with ESA EO Missions content integration*
1. To use this type of EO data search, the user should tap “ESA Missions” button on the SmartHMA Main Screen;

2. After loading an ESA EO Mission website content, a list of available groups of EO missions are loaded into the left panel, and introduction information about ESA EO Missions is displayed on right panel. Clicking on an item in right panel expands the list with specific mission entries;

3. Clicking on expanded list entry (mission name), information about chosen mission is displayed in right panel. Information are grabbed directly from ESA websites.

4. In right panel is also “Search EO Data” button which allow to start searching EO data with use of Fedeo engine. Searching process start after clicking this button and is based on default searching parameters;

5. After several second a collection summary screen is displayed. Collections search summary screen provides the same information as in searching process. From this point searching process run in the same form as is described in chapter 5.4 point 2-8.

Movie showing all steps is presented under this link: SmartHMA ESA EO MISSIONS (https://youtu.be/_1c-PwMX86E)

5.9. **ESA Online – ESA EO News Reader**

Additional function of SmartHMA application is an ESA EO News Reader. It provides a latest information and news grabbed directly from ESA website.

1. To start News Reader user should tap “ESA Online” button on the SmartHMA Main Screen;

2. After several second, an ESA RSS/Atom news channel are retrieved and latest information are displayed in form of news list on left panel. Clicking on list item an short information (short version of selected news) is displayed in right panel;

3. To get complete article user should click on active text “More >>” below the article;

4. In new view an internet browser are opened and user is redirected to the full article.

Movie with ESA News Reader implemented in SmartHMA application is available under this link SmartHMA ESA News Reader (https://youtu.be/Ey4pTM0yUbl).
Figure 9. ESA RSS News Reader and online content.