iCARDEA

Information Society Technologies

iCARDEA

"An Intelligent Platform for Personalized Remote Monitoring of the Cardiac Patients with Electronic Implant Devices"

User Manual for CIED Information System" and „Patient Parameter Monitor PPM"

Table of Contents

CIED Information System Description

CIED follow-up through telemonitoring offered today by many main CIED vendors, is gradually being adopted in the practice of cardiovascular treatment. The sharing of updated reports and parameter assessment as offered by the data servers and networks connections implemented by many vendors, is helpful for healthcare providers to gain a better understanding of the progress in rehabilitation and the overall effects of medical treatment. Furthermore, emergency alarms and potential problems can be reported and addressed immediately.

In the iCARDEA project, CIED Information Integration System employs standards specifications from ISO/IEEE 11073 (Health Informatics, Point-of-care Medical Device Communication) and HL7v2.x in the context of Integrating the Healthcare Enterprise (IHE) profiles to deliver telemonitoring CIED report data from two different CIED vendors (Medtronic and St. Jude Medical) to the adaptive care planner that implements guideline-driven care plans. And this software component will be practically implemented in the SALK with other interacted software components. This paper shows the basic implementation and operation procedure as well as some notices for the direct user and administer.

For further detailed descriptions refer to „D6.1.1. Exposing CIED Data through Standard Interfaces“ available through the iCARDEA website or to the End-User Manual.

Patient Parameter Monitor (PPM) Description

The aim is to provide assistant software for healthcare professionals to help in determining the critical patient parameters to be monitored and analyzed for better personalization of the automated follow-up. This is achieved by analyzing patient data from CIEDs, Electronic Healthcare Records and Personal Health Records, such as history of illness, surgeries, medications, and then graphically presenting these data in an intelligent way by correlating the fields from separate sources.

How to start and use

CIED Information System

The CIED Information System is started by a single batch file called `startCIEDInformationSystem.cmd`. This batch should be stored on your desktop or at your Windows autostart folder. If not, it is available at the Folder `icardea\icardea-cied-dataprocessing\` where „icardea“ refers to your iCARDEA installation.

To use the CIED system store the CIED Reports, downloaded from Medtronic or SJM webportals, to the vendor specific folders. These are defined at the configuration file AppConfig.properties, which can be found at `icardea\icardea-cied-dataprocessing\config\` . For Medtronic the parameter is stored at ***`DIRECTORY_MEDTRONIC_ORIGINAL_PDF_REPORT`*** and for SJM at ***`DIRECTORY_SJM_ORIGINAL_TXT_REPORT.`*** The full list is given at „Trouble shooting by start.“

You can see that the system is running properly, if a CIED-Report was stored to the directory and after some minutes the report was removed from the directory and moved to the processed folder.

For an End User step by step usage of CIED Information System have a look at the separate Manual.

Patient Parameter Monitor

The PPM Receiver system is started by a single batch file called `startPPMReceiver.cmd`. This batch should be stored on your desktop or at your Windows autostart folder. If not, it is available at the Folder `icardea\icardea-ppm\` where „icardea“ refers to your iCARDEA installation.

The PPM Servlet is automatically started with the tomcat installation of iCARDEA. You have only to copy the ppm_v2.war file to the deployment directory of the tomcat installation.

PPM Servlet is a visualization tool which runs in web browser. Therefore you need the correct URL of PPM or use the link provided by the central iCARDEA website:

e.g https://icardea-server.lksdom21.lks.local:8443/ppm_v2/view?startup=de.offis.health.icardea.ppm.viewapp

Compiling / Deploy

using *mvn packaging* you will find in `icardea-ppm\target` and `icardea\icardea-cied-dataprocessing\target` zip files, which can be used for the local installation. These zips include the startXX.bat files and the needed jars. Furthermore there can be the war files found for deployment.

Trouble shoting by start.

CIED Information System

Some of the technical problems can be

1. How to configure CIED Data Integration Module?
2. How to configure the Language of Medtronic Portal for CIED Information System use?

Configuration for CIED Data Integration Module

All parameters are being defined in a configuration file: Appconfig.property. All parameters in CIED data integration module could be reconfigured for conforming to user own practical implementation.

Configuration by Appconfig.properity stored under `icardea\icardea-cied-dataprocessing\config\`

1) Configuration HL7 Sending for Adaptive Care Planner

```
SEND_TO_CARE_PLANNER=Yes
```

-Sending to Adaptive Care Planner (Yes/No)

```
ENCAPSULATED_BASE64_EGM_PDF=NO
```

-Whether integrate Base64 coded EGM PDF files into HL7 message OBX-Segment (Currently 'No')

```
# LOCAL PARSING defines the format of the file based HL7 Messages

LOCAL_HL7_FILEFORMAT_inXML=No
```

-Store HL7v2.5 (received from Merlin.Net and parsed by PDF from CareLink) in *.xml or *.hl7 format

```
ADAPTIVE_CARE_PLANNER_HL7_SERVER=localhost
```

-The IP address for Adaptive Care Planner

```
ADAPTIVE_CARE_PLANNER_HL7_PORT=21012
```

-The port number for Adaptive Care Planner

```
# definition of the accepted format of the MLLP Server

ADAPTIVE_CARE_PLANNER_HL7_isXML=Yes
```

-Sending HL7v2.5 to Adaptive Care Planner in *.xml or *.hl7 format.

2) Configuration for directory

```
# The directory for the original CIED PDF files from Medtronic
CareLink

DIRECTORY_MEDTRONIC_ORIGINAL_PDF_REPORT=C:\\Test\\Medtronic\\u
nprocessed\\
```

-Store the CIED PDF files from CareLink in this directory, and these PDF will be parsed to HL7v2.5 ORU message.

```
# The directory for the CIED PDF files which has been parsed
to HL7 file successfully

DIRECTORY_MEDTRONIC_PROCESSED_PDF_REPORT=C:\\Test\\Medtronic\\
processed\\
```

-After parsing, successfully processed Medtronic CIED PDF files will be moved into this directory.

```
# The directory for the CIED PDF files which could not be
parsed

DIRECTORY_MEDTRONIC_UNKNOWN_PDF_REPORT=C:\\Test\\Medtronic\\un
known\\
```

-After parsing, unrecognized PDF files (wrong format, broken file or lacing obligated contents) will be moved into this directory.

```
# The directory for the EGM PDF files which will be integrated
in HL7 OBX-Segment with Base64 Code

DIRECTORY_MEDTRONIC_EXPORTED_EGM=C:\\Test\\Medtronic\\tmp_expo
rted_EGM\\
```

-During parsing process, required EGM figures will be abstracted and reconverted into a new PDF files and stored in this directory for Base64 coded integration.

```
# The input directory for HL7 Message which will be processed
by the PIX Module

# Currently the Medtronic PDF file parsed and transformed to
HL7 message

# and the received St. Jude Medical HL7 message will be stored
here

DIRECTORY_ORIGINAL_HL7_MESSAGE=C:\\Test\\hl72pix\\
```

-HL7 parsed by CareLink PDF files and Merlin.Net TXT/PDF files reports will be stored in this directory for PIX integration processing.

```
# The output directory for HL7 message after PIX integration
processing

# Currently the HL7 Sender module uses this as input dir. for
the outgoing transmission

DIRECTORY_PIX_HL7_MESSAGE=C:\\Test\\hl7withpix\\
```

-After PIX integration processing, new HL7 with Patient Identify will be stored in this directory for transmission to Adaptive Care Planner.

```
# The directory for HL7 messages which have been successfully
transmitted through MLLP and TCP

DIRECTORY_HL7_TRANSMITTED=C:\\Test\\hl7_transmitted\\
```

-Successful transmitted HL7 message wil be stored in this directory.

```
# The directory for the original CIED TXT&PDF files from
Merlin.Net

DIRECTORY_SJM_ORIGINAL_TXT_REPORT=C:\\Test\\SJM\\unprocessed\\
```

-Store the CIED TXT&PDF files from Merlin.Net in this directory, and these files will be parsed to HL7v2.5 ORU message.

```
# The directory for the HL7 messages parsed by CIED TXT&PDF
files from Merlin.Net

DIRECTORY_SJM_HL7_MESSAGE=C:\\Test\\hl72pix\\
```

-HL7 parsed by CareLink PDF files and Merlin.Net TXT/PDF files reports will be stored in this directory for PIX integration processing.

```
# The directory for the processed CIED TXT&PDF files from
Merlin.Net

DIRECTORY_SJM_PROCESSED_TXT_REPORT=C:\\Test\\SJM\\processed\\
```

-After parsing, successfully processed SJM CIED TXT&PDF files will be moved into this directory.

3) Configuration for the PIX

PIX_HOST=localhost

PIX_PORT=2575

-IP address and Port number for the PIX manager

OWN_NAMESPACE=CIED

OWN_UNIVERSAL_ID=bbe3a050-079a-11e0-81e0-0800200c9a66

OWN_UNIVERSAL_TYPE=UUID

OWN_IDENTIFIERTYPECODE=

-PIX QUERY QBP^Q23 QPB-3 Person Identifier

QUERY_NAMESPACE=icardea

QUERY_UNIVERSAL_ID=www.srdc.com.tr

QUERY_UNIVERSAL_TYPE=DNS

QUERY_IDENTIFIERTYPECODE=SS

- PIX QUERY QBP^Q23 QPB-4 Domain Returned

4) Configuration for the language

PDFPARSER_LANGUAGE_SETTING=en

Language of Medtronic portal:

Because Medtronic CareLink supports Multilanguage, users need to reconfigure language settings according to requirements.

Step 1: Choose the right clinic in “Choose Clinic” Drop-down List as shown in Figure 1.

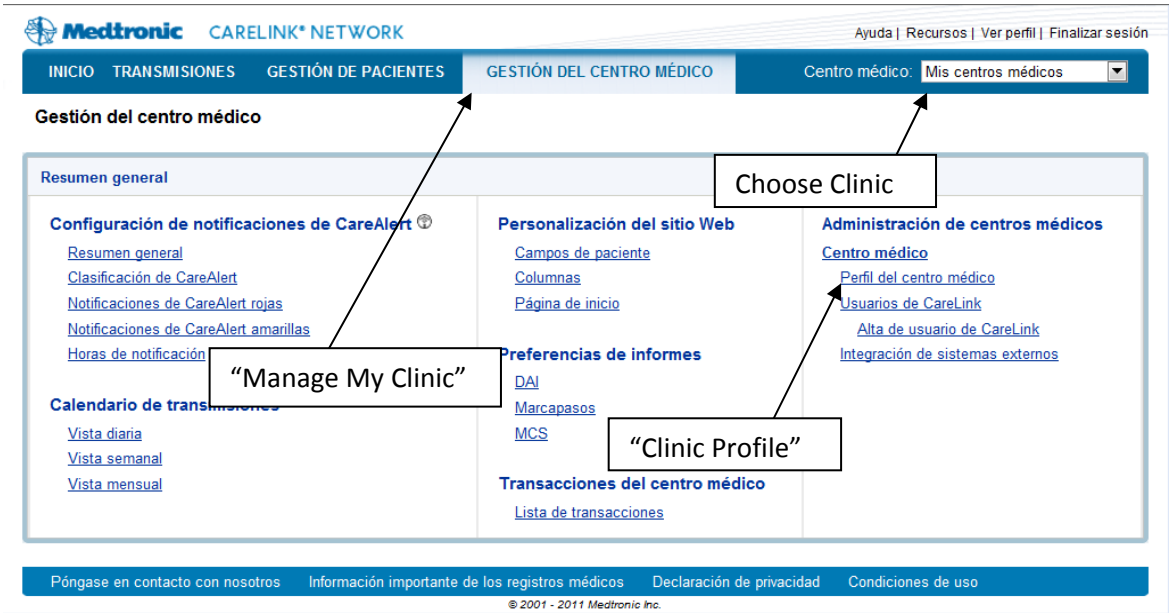

Figure 1 CareLink-Main Page

In "Manage My Clinic" domain as shown in Figure 2, CareLink could be configured according to user requirements. In "Regional Setting" drop-down list, users could choose the right language and time format. In iCARDEA, it is set to "English, dd-mmm-yyyy, 2400" as Figure 3. After click "Save" button, the language in the CareLink webpage including exposure CIED PDF reports have been changed into English version as Figure 4.

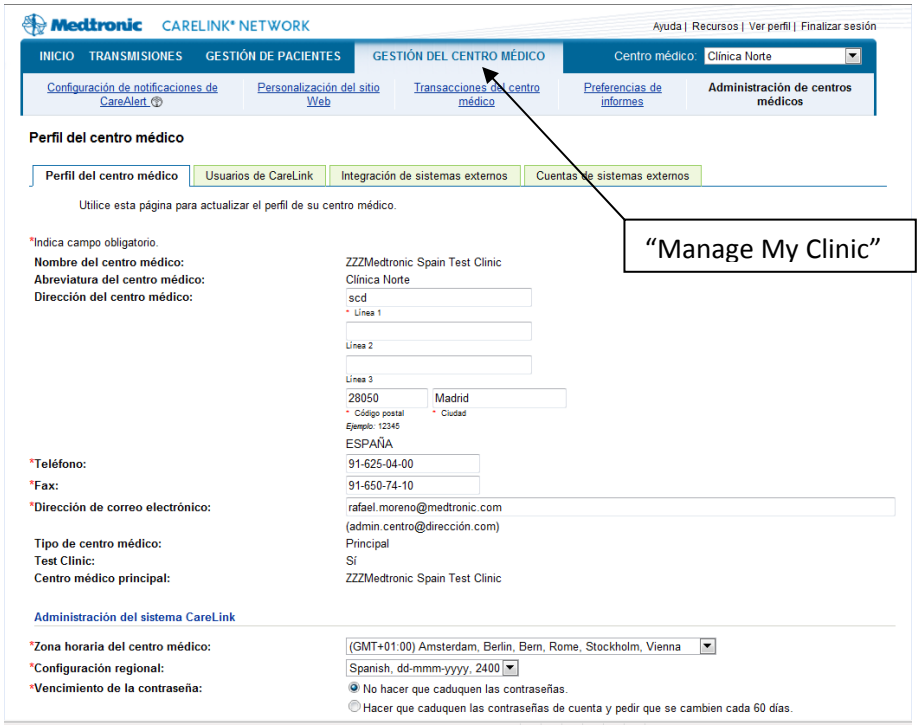

Figure 2 CareLink Webpage-Manage My Clinic

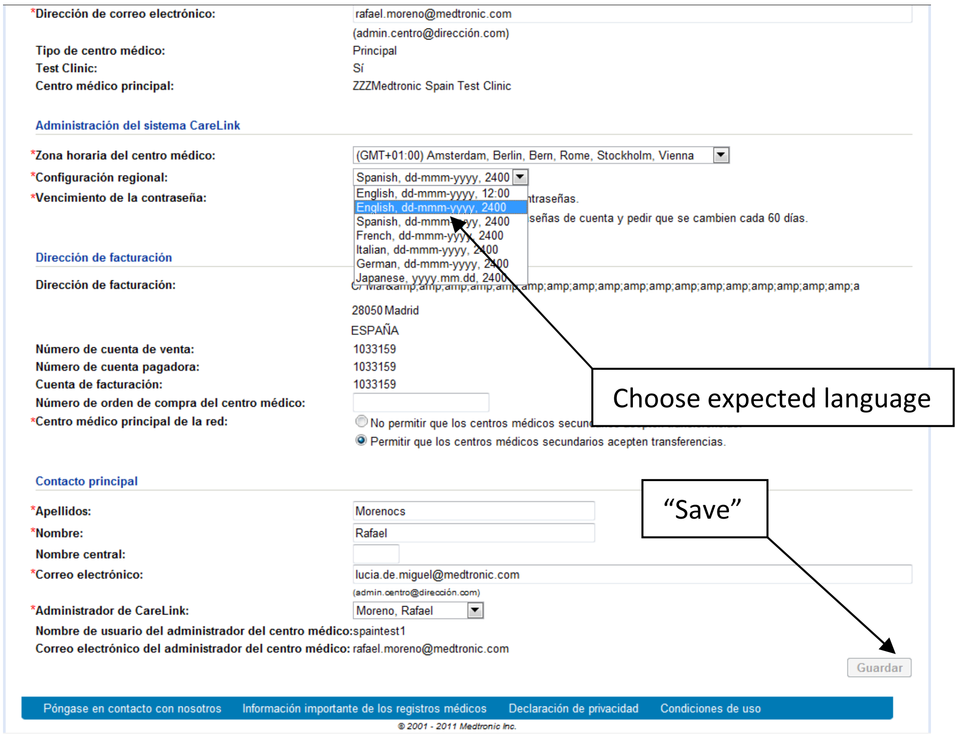

Figure 3 CareLink Webpage-Manage My Clinic-Choose expected language

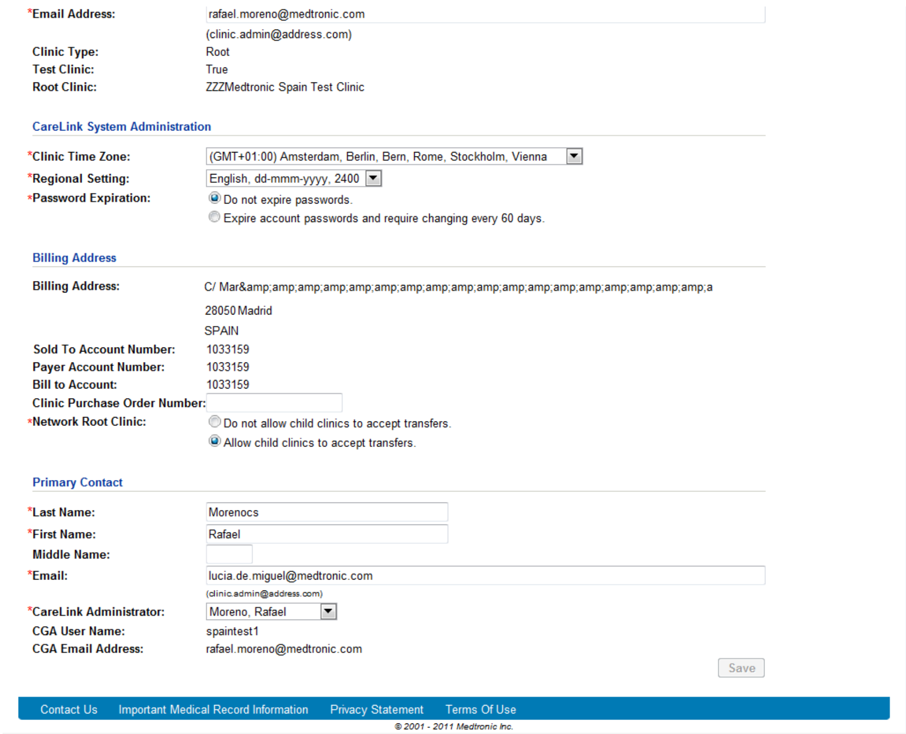

Figure 4 CareLink Webpage-Manage My Clinic-in Englisch

Patient Parameter Monitor

Since PPM is a Web application for evaluation purposes it can sometimes show unexpected behavior. Some general solutions

Login says “Unknown User / OpenID Error”:

- Just try a second time.
- If that doesn’t work, please call the OpenID page itself and try, if your user ID is still valid
- Otherwise: Ask iCARDEA-IT-Support and mention, that maybe OPENID isn’t running

PPM doesn’t start:

- If an error message appears fast, that the side could not be found:
    - Check, if you have the correct URL.
- Otherwise: Ask iCARDEA-IT-Support and mention, that maybe TOMCAR isn’t running

PPM shows a message: Can’t create initial views

- Directly call iCARDEA-IT Support and mention, that MYSQL isn’t running

PPM doesn’t show the Top View so you can’t logout

- Double Click on PPM Main or on the top line above PPM Main.
- Try to click and move the top line above PPM Main down to see the Logout Screen Sometimes the “General Information “ is hidden automatically to provide more space for patient data.

In general: You can always close the PPM Webpage without damaging data or the application. You should always use the Logout to prevent the re usage of your account.

How to install from scratch

CIED Information System

Since CIED Information System is a service for the iCARDEA System, first you have to download the iCARDEA system and install it. After that please do following steps:

Step 1. Language setting

Make sure that the language setting in CareLink and software configuration are the same. For example if the language in CareLink is set to English, the corresponding in AppConfig.properities

PDFPARSER_LANGUAGE_SETTING=en

Step 2. Configure the software

Before the first running of the software or if any changes is required, the corresponding parameters in AppConfig.properities should be defined or modified.

Step 3. Run software

Double click batch file to run software, software will monitor the update status of CIED reports automatically.

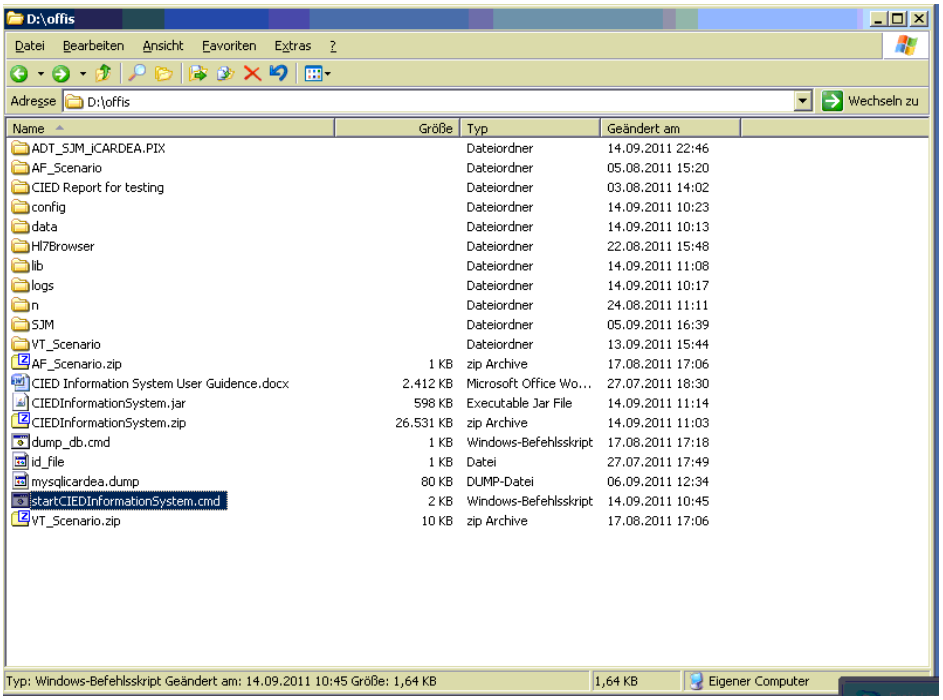

Figure 5 Batch File in Software

Step 4. Download the CIED Report

As the procedure described in Section 5.1 “Exporting CIED Report from CIED Vendor Server”, CIED report from vendor servers are retrieved and stored in server.

Because the limitation of the clinical firewall and the complexity of CSG configuration. PDF files from CareLink are retrieved from CareLink webpage as described in Section 5.1.1. PDF files should be stored under the directory which is freely configurable in AppConfig.properities as shown in Figure 6.

Because the HL7 exposure function is still not supported by currently Merlin.Net, CIED report from Merlin.Net is retrieved as described in Section 5.1.4. FollowupSummaryData.txt with attached PDF files from Merlin.Net are stored under the directory which is freely configurable in AppConfig.properities as shown in Figure 7.

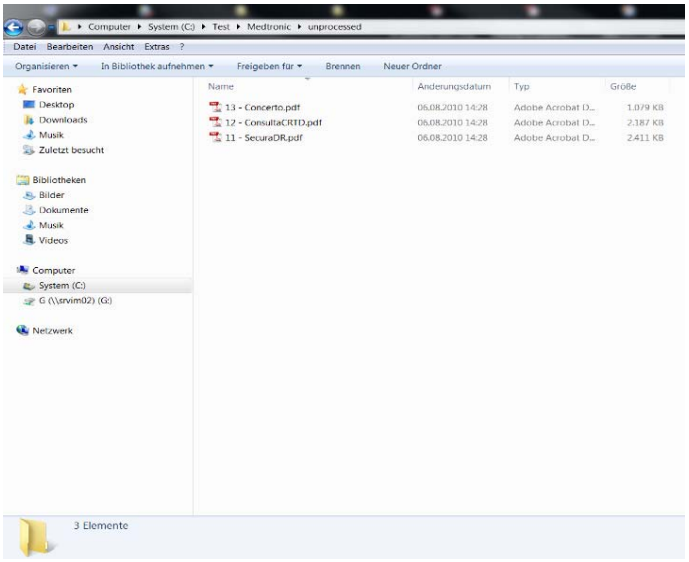

Figure 6 Downloaded CareLink PDF File in Server

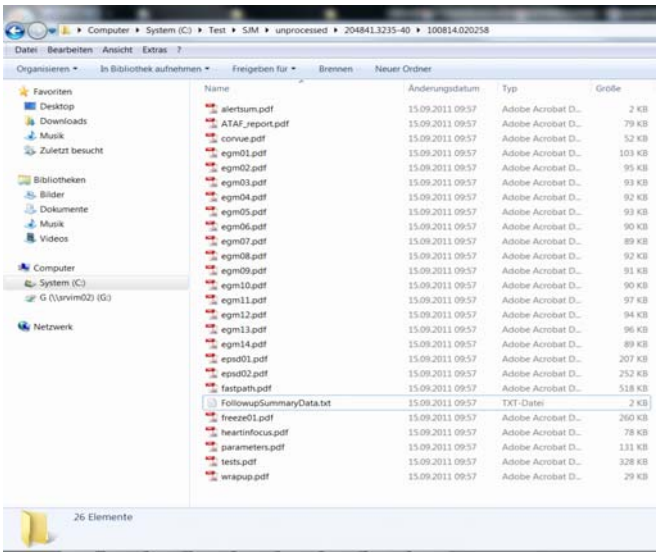

Figure 7 Downloaded Merlin.Net TXT&PDF Files in Server

Step 5. CIED message sending

Whenever CIED reports are added to the pre-configured directory, they are parsed, and the CIED data are sent to the iCARDEA adaptive care planner using the PCD-09 transaction specified in the IHE IDCO integration profile.

Step 6. Possible error during the software running

1) Could not connect to PIX manager

Solution: Check the status of PIX manger and connection

2) Could not connect to Adaptive Care Planner

Solution: Check the status of Adaptive Care Planner and connection

3) False location for the original CIED reports

Solution: check the location of CIED reports

Technical Requirements

The CIED System was implemented and tested under Windows XP and 7 using Java 1.6. Therefore this environment is highly recommended.

For sending the processed CIED data to the iCARDEA environment, the iCARDEA PIX Manager has to be available and probably configured.

The Patient Parameter Monitor was implemented and tested under Windows XP and 7 using Java 1.6. Therefore this environment is highly recommended. It has to be run under Tomcat and requires a running and configured iCARDEA environment including especially a MySQL Database with the iCARDEA CaremanagementDB, a local identity provider and a ConsentManager.