VistA Data Extraction Framework (VDEF)

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Developers – Greg Woodhouse, Patrick Hua
VDEF Overall Diagram

Domain Application

Send Trigger request

VDEF Application

Generate HL7 message

Deploy HL7 message

HL7 Message

Deliver HL7 message

Receiving Facility

VIE Application

Deliver HL7 message

HL7 Application
**VDEF** domain applications & Trigger request

- **Domain applications:**
  - Allergies
  - Outpatient Pharmacy
  - Vitals

- **Trigger**
  - adds entry to VDEF Request Queue (FIFO)
  - then VDEF task processes the trigger event
VDEF Activities within Messaging

- **VistA Data Extraction Framework (VDEF)**
  - Extract LIVE data from VistA database
  - Generate HL7 message (using HL7 v2.4 standard)
  - Hand off HL7 message to HL7 application

- **HL7 Engine (v1.6)**
  - Deliver HL7 message to VIE

- **VistA Interface Engine (VIE)**
  - Deliver HL7 message to Receiving Facility

- **Receiving Facility - Health Data Repository system (HDR / HDR II)**
  - Parse HL7 message and store data on target systems
VDEF’s Events & Message Types

**Vitals Package:** GEN. MED. REC. – VITALS
ORU-R01-VTLS PATIENT VITALS

**Allergy Package:** ADVERSE REACTION TRACKING
ORU-R01-ALGY ALLERGY UPDATE/INSERT
ORU-R01-ADAS ALLERGY ASSESSMENT
ORU-R01-ADRA ADVERSE REACTION REPORT

**Outpatient Pharmacy Package:** OUTPATIENT PHARMACY
RDE-O11-PRES OP PHARM PRESCRIPTION
RDS-O13-PPAR OP PHARM PRESCRIPTION PARTIAL
RDS-O13-PREF OP PHARM PRESCRIPTION REFILL
VDEF Export VistA data

Convert VistA data into HL7 Message
Select Systems Manager Menu Option: VDEF  VDEF Configuration and Status

Site   Site-Wide Parameters
Req    Request Queue Parameters
ActR   Activate/Inactivate Requestor
SusR   Suspend/Run Request Queue
Cust   VDEF Custodial Package Activate/Inactivate
API    VDEF Event API Activate/Inactivate
Stat   Status of VDEF components
Sch    Request Processor Schedule
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<th>Site-Wide Parameters</th>
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Select VDEF Configuration and Status Option: SITE  Site-Wide Parameters

VDEF SYSTEM: TEST.CHEYENNE.MED.VA.GOV//
VDEF MONITOR DELAY: 30S//
Select VDEF Configuration and Status Option: Request Queue Parameters

Select Request Queue: ??
MAINTENANCE

Select Request Queue: MAINTENANCE
ARCHIVAL PARAMETER: 30D 23H 59M 59S/
CHECKED OUT TIME LIMIT: 10M/
REQUEST QUEUE WAKEUP PERIOD: 10S/
VDEF – Activate/Inactivate Requestor

Select VDEF Configuration and Status Option: ActR
Activate/Inactivate Requestor

Select Requestor: MAINTENANCE

Inactivating a requestor has a significant effect on the synchronization of VistA and remote system(s). All VDEF requests made while the requestor is inactive will be PERMANENTLY lost. Make sure you really want to turn it off.

REQUESTOR ACTIVATION FLAG: ACTIVE//
Select VDEF Configuration and Status Option: SusR Suspend/Run Request Queue

Select Request Queue: MAINTENANCE
SUSPENDED FLAG: RUNNING//
Select VDEF Configuration and Status Option: Cust VDEF Custodial Package Activate/Inactivate

Select Custodial Package: ??

Choose from:
OUTPATIENT PHARMACY
GEN. MED. REC. - VITALS
ADVERSE REACTION TRACKING

Select Custodial Package: OUTPATIENT PHARMACY PSO

Inactivating a custodial package has a significant effect on the synchronization of VistA and remote system(s). All VDEF requests for HL7 messages associated with this custodial package made while the package is inactivated will be PERMANENTLY lost. Make sure you really want to turn this custodial package off.

ACTIVATION STATUS: ACTIVE// ?
Sending messages for this package is "A"ctive or "I"nactive
Choose from:
A  ACTIVE
I  INACTIVE
ACTIVATION STATUS: ACTIVE//
Select VDEF Configuration and Status Option: API  VDEF Event API Activate/Inactivate

Select VDEF API Event: 5

Choose from:

1. ORU-R01-VTLS  PATIENT VITALS  Status: ACTIVE
   Pkg: GEN. MED. REC. - VITALS  HL7 Engine: HL7 1.6

2. ORU-R01-ALGY  ALLERGY UPDATE/INSERT  Status: ACTIVE
   Pkg: ADVERSE REACTION TRACKING  HL7 Engine: HL7 1.6

3. ORU-R01-ADAS  ALLERGY ASSESSMENT  Status: ACTIVE
   Pkg: ADVERSE REACTION TRACKING  HL7 Engine: HL7 1.6

4. ORU-R01-ADRA  ADVERSE REACTION REPORT  Status: ACTIVE
   Pkg: ADVERSE REACTION TRACKING  HL7 Engine: HL7 1.6

5. RDE-O11-PRES  OP PHARM PRESCRIPTION  Status: ACTIVE
   Pkg: OUTPATIENT PHARMACY  HL7 Engine: HL7 1.6

6. RDS-O13-PPAR  OP PHARM PRESCRIPTION PARTIAL  Status: ACTIVE
   Pkg: OUTPATIENT PHARMACY  HL7 Engine: HL7 1.6

7. RDS-O13-PREF  OP PHARM PRESCRIPTION REFILL  Status: ACTIVE
   Pkg: OUTPATIENT PHARMACY  HL7 Engine: HL7 1.6

Select VDEF API Event: 5

Inactivating a VDEF API event will cause all requests for that API to be PERMANENTLY lost. Make sure you really want to turn this API event off.

API EVENT ACTIVE FLAG: ACTIVE//
Select VDEF Configuration and Status Option: Stat  Status of VDEF components

VDEF Status - JUN 03, 2009@19:26:52

Logical Link Status
  VDEFVIE1: stopped or caught up
  VDEFVIE2: stopped or caught up
  VDEFVIE3: stopped or caught up

Requestor Status
  MAINTENANCE: Activated        Dest.: VISTA HL7    Req. Queue: MAINTENANCE

Request Processor Status
  MAINTENANCE: Running
  Current Task # [Proc]: 1440227 [20C008F5]  Task status: Active-Running
  Requests waiting for purge: 1271405        last request#: 2934699
  Checked Out(98)  Queued Up(>1000)  Errored Out(0)
Select VDEF Configuration and Status Option: Sch Request Processor Schedule

Select Request Queue: MAINTENANCE
No Scheduling Rules currently defined for this queue
Select Entry:
SYSTEM LINK MONITOR for CHEYENNE VAMC (T System)

<table>
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<tr>
<th>NODE</th>
<th>MESSAGES RECEIVED</th>
<th>MESSAGES PROCESSED</th>
<th>MESSAGES TO SEND</th>
<th>MESSAGES SENT</th>
<th>MESSAGES TYPE</th>
<th>DEVICE STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDEFVIE1</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>NC</td>
<td>Enabled</td>
</tr>
<tr>
<td>VDEFVIE2</td>
<td>437</td>
<td>437</td>
<td>764</td>
<td>437</td>
<td>NC</td>
<td>Enabled</td>
</tr>
<tr>
<td>VDEFVIE3</td>
<td>620</td>
<td>620</td>
<td>620</td>
<td>620</td>
<td>NC</td>
<td>Enabled</td>
</tr>
</tbody>
</table>

Incoming filers running => 1  
Outgoing filers running => 1  
TaskMan running  
Link Manager running  
Monitor current [next job 0.1 hr]

Select a Command:  
(N)EXT (B)ACKUP (A)LL LINKS (S)CREENED (V)IEWS (Q)UIT (?) HELP:
VDEF Request Queue before HL7 message is generated:

^VDEFHL7(579.3,1,1,3307,0)=3307^Q^RDE^O11^^1^1^3080827.173717^5
^VDEFHL7(579.3,1,1,3307,.05,0)=^579.311^2^2
^VDEFHL7(579.3,1,1,3307,.05,1,0)=1^SUBTYPE=PRES
^VDEFHL7(579.3,1,1,3307,.05,2,0)=2^IEN=1614645
^VDEFHL7(579.3,1,1,3307,1,"B",1,1)=
^VDEFHL7(579.3,1,1,3307,1,"B",2,2)=

VDEF Request Queue after HL7 message is generated:

^VDEFHL7(579.3,1,1,3307,0)=3307^P^RDE^O11^^1^1^3080827.173717^3080827.17392^827.17392^44233620030^3080827.17392^5
^VDEFHL7(579.3,1,1,3307,.05,0)=^579.311^2^2
^VDEFHL7(579.3,1,1,3307,.05,1,0)=1^SUBTYPE=PRES
^VDEFHL7(579.3,1,1,3307,.05,2,0)=2^IEN=1614645
^VDEFHL7(579.3,1,1,3307,1,"B",1,1)=
^VDEFHL7(579.3,1,1,3307,1,"B",2,2)=
VDEF – HL7 Message Header File (File-773)

File-773 : HL7 Message Administration

^HLMA(33620030,0)=35387771^44233620030^O^D^^33620030^210^6776^^
133^132^1^^^^210
^HLMA(33620030,"MSH",0)=^773.01^1^1
^HLMA(33620030,"MSH",1,0)=MSH~\&^HDRPRES^442~TEST.CHEYENNE.
MED.VA.GOV~DNS^PSO VDEF IE
SIDE^200HD~HDR.MED.VA.GOV~DNS^20080827173920-
0500^^RDE~O11^44233620030^T^2.4^^^AL^NE^USA
^HLMA(33620030,"P")=1
HL7 MESSAGE ADMINISTRATION:

NUMBER: 33620030  DATE/TIME ENTERED: AUG 27, 2008@17:39:20
MESSAGE ID: 44233620030  TRANSMISSION TYPE: OUTGOING
PRIORITY: DEFERRED  INITIAL MESSAGE: AUG 27, 2008@17:39:20
LOGICAL LINK: VDEFVIE3  LOGICAL LINK - IN QUEUE: VDEFVIE3
SUBSCRIBER PROTOCOL: PSO VDEF RDE 011 OP PHARM PRES HR
SENDING APPLICATION: HDRPRES  RECEIVING APPLICATION: PSO VDEF IE SIDE
MESSAGE TYPE: ACK  MESSAGE SIZE (c): 1705
File-772 : HL7 Message Text

^HL(772,35387771,0)=3080827.17392^133~~~44235387771~~~35387771^D^6777^^^M
^HL(772,35387771,"IN",0)=^15"^15"3080827^1
^HL(772,35387771,"IN",1,0)=PID^16661234567V666123^16661234567V666123~~~USVHAA&0363-NI-VA FACILITY
ID&20OML|666123456~~~USVHAA&0363-SS-VA FACILITY ID&442&L|666123~~~USVHAA&0363-PI-VA FACILITY
ID&442&L|666123456~~~USVHAA&0363-PD-VA FACILITY ID&442&L^^OPPATIENT-ONE-------L^OPMOTHER
^HL(772,35387771,"IN",2,0)=-------M^19500509"M^1111-3-SLF~2222-1111-3~~CDC^666 ADDRESS
~"^CITY-ST-66666^"-"P^"~021|--CITY-ST----N^021^7777-7777-PRN-PH|(111)111-1111-ORN-CP^"^^W^29^666123456~~~3333-3-
SLF~4444-5555-5--CDC^AAABBB MA^^^^^*
^HL(772,35387771,"IN",3,0)=
^HL(772,35387771,"IN",4,0)=ORC^RE^3389378-442_52_39.3^1614645-442_52_.001^^CM~~~20070305-20070404
~~FILL/EXPIRATION|~~~20070305--ISSUED|~~~20070305-20070305~~DISPENSED/LAST DISPENSED^^20070305165017-
0500~2229-OPENTER-ONE-------VistaA200~2453-OPORDER-ONE-D~~~MD-RE~~
^HL(772,35387771,"IN",5,0)=^442-CHEYENNE VAMC~TWROC-442_52_20~5203651-CHEYENNE VAMC~TWROC~NCPDP~~~~CHEYENNE
VAM~~~~~4500699-ACTIVE~99VA_52_100
^HL(772,35387771,"IN",6,0)=
^HL(772,35387771,"IN",7,0)=RXE^&ONE TABLET~~~20070305-20070404~~FILL/EXPIRATION^4003067-OXYCODONE HCL 5MG /ACETAMINOPHEN 325MG
TAB-99VA_52_6-00406-0512-01~~NDC"0"0~~-442_52_6^63~TAB-442_50.7_.02~TAKE~442_52.0113_8~TID~442_52.0113_7|F CHRONIC
PAIN~442_52_114~FOR CHRONIC
^HL(772,35387771,"IN",8,0)=PAIN~442_52_115~~~WINDOW~~21~~0^666111111-OPPARM-ONE-M~~~~PHARMACIST^856897 ^~~20070305165648-
0500~~TAKE ONE TABLET BY MOUTH THREE TIMES A DAY FOR CHRONIC PAIN~~442_52_10.2 ^D7~~~~~~~~~344-OXYCODONE 5MG WTW
ACETAMINOPHEN 325MG TAB-442_50.01
^HL(772,35387771,"IN",9,0)=
^HL(772,35387771,"IN",10,0)=RXR^1-ORAL (BY MOUTH)~442_52.0113_6
^HL(772,35387771,"IN",11,0)=
^HL(772,35387771,"IN",12,0)=FT1^1^20070305^CG^893-OXYCODONE/ACETAMINOPHEN~442_52_39.2~~~0.0338~~~~OPT
SC~~6666-OPPROVIDER-ONE~~~~~442_52_38
^HL(772,35387771,"IN",13,0)=
^HL(772,35387771,"IN",14,0)=OBX^1^CE^WAS THE PATIENT COUNSELED^^4500630-NO~99VA_52_41~~~F
^HL(772,35387771,"IN",15,0)=
^HL(772,35387771,"P")=3^3080827.17392
^S")=1548^1
HL7 MESSAGE TEXT

NUMBER: 35387771
DATE/TIME ENTERED: AUG 27, 2008@17:39:20
SERVER APPLICATION: HDRPRES
TRANSMISSION TYPE: OUTGOING
MESSAGE ID: 44235387771
PARENT MESSAGE: AUG 27, 2008@17:39:20
PRIORITY: DEFERRED
RELATED EVENT PROTOCOL: PSO VDEF RDE O11 OP PHARM PRES VS
MESSAGE TYPE: SINGLE MESSAGE
MESSAGE TEXT:

PID^1^6661234567V666123^6661234567V666123~USVHA&0363-NI~VA FACILITY ID&200M&L|6661234566~USSSA&0363-SS~VA FACILITY ID&442L|666123~USVHA&0363-PI~VA FACILITY ID&442L|66612345~USVBA&0363-PN~VA FACILITY ID&442L~OPPATIENT~ONE~~~~~L~OPMOTHER
~~~~~~~M19500509M^1111-3-SLF~2222-1111-3~CDC^666 ADDRESS ~"~CITY~ST~66666~"~P~"~021|~CITY~ST~~N~021^(777)777~7777~PRN-PH~7|11111-1111-0RN-CP"~W^29^6661234566~3333-3-SLF~4444-5555-5~CDC^AAAABBBB MA~~~~~~~~~
ORC#3389378~442_52_39.3~1614645~442_52_001~~CM~~~~20070305~20070404~FILL/EXPIRATION|~~~~20070305~ISSUED|~~20070305-20070305
305~~DISPENSED/LAST DISPENSED~~20070305165017~
0500^2229-OPENTER~ONE~~~~~Vista200~~2453-OPORDER~ONE~D~~~MD~RE~~~~~~~~~442-CHEYENNE VAMTWROC~442_52_20~5203651~CHEYENNE
VAMTWROC~NCPPDD~CHEYENNE VAMC~~~~4500659-ACTIVE~99VA_52_100
RXE^ONE TABLET~~20070305-20070404~FILL/EXPIRATION~4003067-OXYCODONE HCL 5MG /ACETAMINOPHEN 325MG TAB~99VA_52_6-00406-0512-01~~NDC:0~442_52_6~63~TAB~442_50.7_.02~TAKE~442_52.0113_8|~TID~442_52.0113_7|F CHRONIC PAIN~442_52_114|~FOR CHRONIC
PAIN~442_52_115~WINDOW~21^O^666111111~OPPARM~ONE-M~~PHARMACIST~856897 ~^^20070305165648-0500^^^TAKE ONE TABLET BY
MOUTH THREE TIMES A DAY FOR CHRONIC PAIN~~442_52_10.2 ^D7~~~~~~~~~~~~344~OXYCODONE 5MG WT ACETAMINOPHEN 325MG TAB~442_50.01
RXR^1~ORAL (BY MOUTH)^442_52.0113_6
FT1^1^^20070305^^CG^93-OXYCODONE/ACETAMINOPHEN~442_52_39.2~0.0338~OPT SC^6666-OPPROVIDER~ONE~~~~~442_52_38
OBX^1^CE~WAS THE PATIENT COUNSELED~~4500630~NO~99VA_52_41~~~~~F

STATUS: SUCCESSFULLY COMPLETED
DATE/TIME PROCESSED: AUG 27, 2008@17:39:20
NO. OF CHARACTERS IN MESSAGE: 1548 NO. OF EVENTS IN MESSAGE: 1
VDEF – Error Messages

- Error Message in VDEF File-579.3:

```
^VDEFHL7(579.3,1,1,2190679,0)=2190679^E^ORU^R01^^1^1^3080605.114245^3080610.114852
^VDEFHL7(579.3,1,1,2190679,.05,0)=^579.311^2^2
^VDEFHL7(579.3,1,1,2190679,.05,1,0)=1^SUBTYPE=VTLS
^VDEFHL7(579.3,1,1,2190679,.05,2,0)=2^IEN=10515224
^VDEFHL7(579.3,1,1,2190679,1,"B",1,1)=
^VDEFHL7(579.3,1,1,2190679,1,"B",2,2)=
^VDEFHL7(579.3,1,1,2190679,"ERRMSG")=Invalid data in file GMR(120.5) for IEN 10515224
```

- Examples of VDEF Alerts in FORUM:

  - RECORD <IEN> IN QUEUE <QUEUE NAME> HUNG IN CHECKED OUT STATUS.
    *Reason: IEN in VDEF REQUEST QUEUE has been in the Checked Out status longer than the allowed time period.*

  - VDEF HAS REQUEUED CHECKED OUT RECORDS. NO ACTION NEEDED.
    *Reason: VDEF queue process has re-queued one or more requests that were hung in the Checked Out status*

  - VDEF HAS REQUEUED ERRORED OUT RECORDS. NO ACTION NEEDED.
    *Reason: VDEF queue process has re-queued one or more requests that were in the Error Out status*
VDEF - Advantages

- Standardize HL7 Messages
- Reuse code and API calls
- Reuse Message Segments and Fields
- Simplify regeneration of HL7 message if needed
- Verify data before HL7 message is generated
- Generate HL7 message from LIVE data that will not duplicate or overwrite previous HL7 message
- Monitor HL7 message generation process
- Document individual HL7 field in Messaging Work Bench
- Provide VDEF Alerts
- And much more . . .
VDEF – Job Requirement:
Decode VistA data into HL7 message
Questions ??