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ENHANCEMENT OF SYSTEM MISSION ASSURANCE REQUIREMENT TOOL (e-SMART)

Reproduction of the e-SMART TOOL NASA STD 1.0 Version 1.0

By Nathan Carlson, May 2013

THE SUMMARY REPORT OF COMPONENTS

FOR SPECIFICATIONS CONTAINED IN

THE FILE NAME FR-NFR.txt

3-22-2025

e-SMART REPORT for FR-NFR.txt on 3-22-2025, at 18:53, Page - 2

IMPERATIVES are those words and phrase that command that something
much be provided.

'SHALL' normally dictates the provision of a functional capability.

'MUST' or 'MUST NOT' normally establish performance requirements
or constraints.

'WILL' normally indicates that something will be provided from outside
the capability being specified.

An explicit specification will have most of its counts high in the IMPERATIVE list
(i.e. shall, must, required).

The counts of IMPERATIVE components found in the directory file
FR-NFR.txt are shown in the Table below.

IMPERATIVE	OCCURRENCE
ARE APPLICABLE	0
ARE TO	0
IS REQUIRED TO	0
MUST	0
RESPONSIBLE FOR	0
SHALL	31
SHOULD	0
WILL	0
TOTAL	31

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CONTINUANCES are phrases such as 'the following:' that follow an
imperative and precede the definition of lower level requirement
specifications. The extent that CONTINUANCES are used is an
indication that requirements have been organized and structured.
These characteristics contribute to the tractability and
maintenance of the subject requirement specification document.
However, extensive use of continuances indicate multiple, complex
requirements that may not be a dequately factored in to development
resource and schedule estimates.

The counts of CONTINUANCE components found in the directory file
FR-NFR.txt are shown in the Table below.

CONTINUANCE	OCCURRENCE
:	0
AND	11
AS FOLLOWS:	0
BELOW:	0

```
          FOLLOWING:                                  0
          IN PARTICULAR:                              0
          LISTED:                                     0
          SUPPORT:                                    0
                                                 ----------
                                       TOTAL          11
```

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DIRECTIVES are words or phrases that indicate that the document
contains examples or other illustrative information. DIRECTIVES
point to information that makes the specified requirements more
understandable. The implication is the higher the number of Total
DIRECTIVES the more precisely the requirements are defined.

The counts of DIRECTIVE components found in the directory file
FR-NFR.txt are shown in the Table below.

```
        DIRECTIVE                            OCCURRENCE
        ----------                           ----------
        E.G.                                      0
        FIGURE                                    0
        FOR EXAMPLE                               0
        I.E.                                      0
        NOTE:                                     0
        TABLE                                     0
                                             ----------
                                    TOTAL          0
```

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OPTIONS are those words that give the developer latitude in the
implementation of the specification that contains them. This type
of statement loosens the specification, reduces the acquirer's
control over the final product, and establishes a basis for
possible cost and schedule risks.

The counts of OPTION components found in the directory file
FR-NFR.txt are shown in the Table below.

```
        OPTION                               OCCURRENCE
        ----------                           ----------
        CAN                                       0
        MAY                                       0
        OPTIONALLY                                0
                                             ----------
                                    TOTAL          0
```

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WEAK PHRASES are clauses that are apt to cause uncertainty and leave
room for multiple interpretations. Use of phrases such as
'adequate' and 'as appropriate' indicate that what is required
is either defined elsewhere or worst, the requirement is open to
subjective interpretation. Phrases such as 'but not limited to' and
'as a minimum' provide the basis for expanding requirements that have been
identified or adding future requirements. WEAK PHRASE total is
indication of the extent that the specification is ambiguous and incomplete.

The counts of WEAK PHRASE components found in the directory file
FR-NFR.txt are shown in the Table below.

```
        WEAK PHRASE                          OCCURRENCE
        ----------                           ----------
        ADEQUATE                                  0
        AS APPROPRIATE                            0
        AS REQUIRED                               0
        BE ABLE TO                                0
        BE CAPABLE OF                             0
        CAPABILITY OF                             0
        CAPABILITY TO                             0
        EASY TO                                   0
        EFFECTIVE                                 0
        NORMAL                                    1
        PROVIDE FOR                               0
        TIMELY                                    0
                                             ----------
                                    TOTAL          1
```

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INCOMPLETE is the category of words and phrases that indicate that the
specification of requirements is not fully developed or provides a basis for
expansion or addition of new requirements at a later date.

       'TBD' indicates that necessary information has yet TO BE DETERMINED.
       'TBS' indicates that a required event has yet TO BE SCHEDULED.
       'TBE' indicates that a needed designation has yet TO BE ESTABLISHED
             or yet TO BE ESTIMATED.
       'TBC' indicates that a needed value has yet TO BE COMPUTED.
       'TBR' indicates that a question regarding a condition or value
             as yet TO BE RESOLVED.
       'not defined' and 'not determined' are phrases that explicitly
             declare that a specification statement is incomplete.
       'but not limited to' and 'as a minimum' are phrases that open the
             requirements specifications to future modifications or additions.

The counts of INCOMPLETES components found in the directory file
FR-NFR.txt are shown in the Table below.

INCOMPLETES	OCCURRENCE
AS A MINIMUM	0
BUT NOT LIMITED TO	0
NOT DEFINED	0
NOT DETERMINED	0
TBC	0
TBD	0
TBE	0
TBR	0
TBS	0
TOTAL	0

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   NUMBERING STRUCTURE DEPTH provides a count of the numbered statements
   at each level of the source document. These counts provide an indication
   of the document's organization and consistency and level of detail.
   High level specifications will usually not have numbered statements below
   a structural depth of four. Detailed documents may have numbered
   statements down to a depth of nine. A document that is well organized
   and maintains a consistent level of detail will have a pyramidal shape
   (few numbered statements at level 1 and each lower level having more
   numbered statements than the level above it). Documents that have
   an hour-glass shape (many numbered statements at high levels, few at
   mid levels and many at lower levels) are usually those that contain a
   large amount of introductory and administrative information. Diamond
   shaped documents (a pyramid followed by decreasing statement counts
   at levels below the pyramid) indicate that subjects introduced at the
   higher levels are probably addressed at different levels of detail.

   SPECIFICATION DEPTH is a count of the number of IMPERATIVE components
   at each level of the document. These numbers also include the count of
   lower level list items that are introduced at a higher level by an
   IMPERATIVE components. This structure has the same implications as the
   numbering structure. However, it is significant because it reflects the
   structure of the requirements as opposed to that of the document.
   Differences between the shape of the numbering and specification
   structure are an indication of the amount and location of background
   and/or introductory information that is included in the document.

   The NUMBERING and SPECIFICATION STRUCTURAL counts for FR-NFR.txt
   are provided by the following tables:

NUMBERING STRUCTURE		SPECIFICATION STRUCTURE	
DEPTH	OCCURRENCE	DEPTH	OCCURRENCE
-----	----------	-----	----------
1	0	1	0
2	0	2	0
3	2	3	2
4	38	4	27
5	0	5	0
6	0	6	0
7	0	7	0
8	0	8	0
9	0	9	0
Total	40	Total	29

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```
        TEXT STRINGS are the number of individual lines of text read by the
        e-SMART program from the source file.


        UNIQUE SUBJECTS is the count of unique combinations and permutations of
        words immediately preceding imperatives in the source file.  This count
        is an indication of the scope of subjects addressed by the specification.



        Total text strings :    40            Unique Subjects:  16



        The ratio of the total for SPECIFICATION STRUCTURE to total
        lines of source file is an indication of how concise the document
        is in specifying requirements.


        Total for SPECIFICATION STRUCTURE:    29
        Total text strings:     40


        RATIO =      0.725


        The ratio of unique subjects to the total for SPECIFICATION
        STRUCTURE is also an indicator of the specifications' detail.

        Unique Subjects:  16
        Total for SPECIFICATION STRUCTURE:  29


        RATIO =    0.551724137931034



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  ENHANCEMENT OF SYSTEM MISSION ASSURANCE REQUIREMENT TOOL (e-SMART)

              Reproduction of the e-SMART TOOL NASA STD 1.0 Version 1.0

              By Nathan Carlson, May 2013

               THE DETAIL REPORT OF IMPERATIVE COMPONENTS

                 FOR SPECIFICATIONS CONTAINED IN

                  THE FILE NAME FR-NFR.txt

                      3-22-2025


 e-SMART IMPERATIVE  REPORT for FR-NFR.txt on 3-22-2025, at 18:53, Page -  2


shall # 1: In Line No. 3, ParNo. 3.1.1.1, at Depth 4
3.1.1.1 The User Profile Management system SHALL allow a new Patient to register by providing full name, date of birth, email, and password.

shall # 2: In Line No. 4, ParNo. 3.1.1.2, at Depth 4
3.1.1.2 The User Profile Management system SHALL allow a new Doctor to register by providing full name, medical license number, email, and password.

shall # 3: In Line No. 5, ParNo. 3.1.1.3, at Depth 4
3.1.1.3 The User Profile Management system SHALL enforce role‚Äê'based access control (RBAC), differentiating patients and doctors.

shall # 4: In Line No. 6, ParNo. 3.1.1.4, at Depth 4
3.1.1.4 The User Profile Management system SHALL prevent duplicate registrations by checking email uniqueness.

shall # 5: In Line No. 7, ParNo. 3.1.1.5, at Depth 4
3.1.1.5 The User Profile Management system SHALL allow users to update their profile except for unique identifiers.

shall # 6: In Line No. 8, ParNo. 3.1.1.6, at Depth 4
3.1.1.6 The User Profile Management system SHALL secure credentials using salted password hashing and optional multiâ€'factor authentication (MFA).

shall # 7: In Line No. 10, ParNo. 3.1.2.1, at Depth 4
```

3.1.2.1 Only registered Patients SHALL submit consultation requests.

shall # 8: In Line No. 11, ParNo. 3.1.2.2, at Depth 4
3.1.2.2 Each consultation request SHALL receive a unique Requestâ€¯ID and timestamp upon submission.

shall # 9 and 10: In Line No. 12, ParNo. 3.1.2.3, at Depth 4
3.1.2.3 Patients SHALL view only their own requests; attempts to access othersâ€™ requests SHALL be denied.

shall # 11: In Line No. 13, ParNo. 3.1.2.4, at Depth 4
3.1.2.4 The system SHALL enforce input validation and sanitization for request data to prevent injection attacks.

shall # 12: In Line No. 14, ParNo. 3.1.2.5, at Depth 4
3.1.2.5 The system SHALL notify the assigned Doctor within 1 minute of request submission.

shall # 13: In Line No. 16, ParNo. 3.1.3.1, at Depth 4
3.1.3.1 Doctors SHALL see only unassigned Patient requests in their dashboard.

shall # 14: In Line No. 17, ParNo. 3.1.3.2, at Depth 4
3.1.3.2 Upon opening a request, the system SHALL assign it exclusively to that Doctor.

shall # 15: In Line No. 18, ParNo. 3.1.3.3, at Depth 4
3.1.3.3 Doctors SHALL update request status to Inâ€¯Progress or Closed, following the sequence Open â†' Inâ€¯Progress â†' Closed.

shall # 16: In Line No. 19, ParNo. 3.1.3.4, at Depth 4
3.1.3.4 The system SHALL log every status change with timestamp, Doctor ID, and notes.

shall # 17: In Line No. 21, ParNo. 3.1.4.1, at Depth 4
3.1.4.1 The system SHALL escalate requests remaining in Open state for over 24â€¯hours by sending a reminder to a supervisor.

shall # 18: In Line No. 22, ParNo. 3.1.4.2, at Depth 4
3.1.4.2 Closed requests SHALL be archived and locked against further edits.

shall # 19: In Line No. 23, ParNo. 3.1.4.3, at Depth 4
3.1.4.3 The system SHALL provide filtering of requests by status (Open, Inâ€¯Progress, Closed) in the Doctor dashboard.

shall # 20: In Line No. 26, ParNo. 3.2.1.1, at Depth 4
3.2.1.1 The web interface SHALL respond to user actions within 2â€¯seconds under normal load (<â€¯100 concurrent users).

shall # 21: In Line No. 27, ParNo. 3.2.1.2, at Depth 4
3.2.1.2 Notification delivery SHALL complete within 1â€¯minute of trigger.

shall # 22: In Line No. 29, ParNo. 3.2.2.1, at Depth 4
3.2.2.1 All data at rest and in transit SHALL be encrypted using AESâ€'256 and TLS.

shall # 23 and 24: In Line No. 30, ParNo. 3.2.2.2, at Depth 4
3.2.2.2 The system SHALL comply with HIPAA and ISO/IECâ€¯27001 standards.3.2.2.3 User sessions SHALL expire after 15â€¯minutes of inactivity.

shall # 25: In Line No. 31, ParNo. 3.2.2.4, at Depth 4
3.2.2.4 Access to API endpoints SHALL be restricted by user role.

shall # 26: In Line No. 33, ParNo. 3.2.3.1, at Depth 4
3.2.3.1 The system SHALL achieve 99.5% uptime monthly, excluding scheduled maintenance.

shall # 27: In Line No. 34, ParNo. 3.2.3.2, at Depth 4
3.2.3.2 Automatic backups of the database SHALL occur every 6â€¯hours.

shall # 28: In Line No. 36, ParNo. 3.2.4.1, at Depth 4
3.2.4.1 The architecture SHALL support horizontal scaling to add capacity for a 50% increase in users within 3â€¯months.

shall # 29: In Line No. 37, ParNo. 3.2.4.2, at Depth 4
3.2.4.2 All code modules SHALL include unit tests covering â‰¥â€¯80% of statements.

shall # 30: In Line No. 39, ParNo. 3.3.1, at Depth 3
3.3.1 The system SHALL integrate with external EHR systems via HL7 messaging.

shall # 31: In Line No. 40, ParNo. 3.3.2, at Depth 3
3.3.2 Audit logs SHALL be retained for a minimum of 7â€¯years.

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                By Nathan Carlson, May 2013

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                 THE DETAIL REPORT OF CONTINUANCE COMPONENTS

                     FOR SPECIFICATIONS CONTAINED IN

                        THE FILE NAME FR-NFR.txt

                              3-22-2025


e-SMART CONTINUANCE  REPORT for FR-NFR.txt on 3-22-2025, at 18:53, Page -  2
```

and # 1: In Line No. 3, ParNo. 3.1.1.1, at Depth 4
3.1.1.1 The User Profile Management system shall allow a new Patient to register by providing full name, date of birth, email, AND password.

and # 2: In Line No. 4, ParNo. 3.1.1.2, at Depth 4
3.1.1.2 The User Profile Management system shall allow a new Doctor to register by providing full name, medical license number, email, AND password.

and # 3: In Line No. 5, ParNo. 3.1.1.3, at Depth 4
3.1.1.3 The User Profile Management system shall enforce roleâ€'based access control (RBAC), differentiating patients AND doctors.

and # 4: In Line No. 8, ParNo. 3.1.1.6, at Depth 4
3.1.1.6 The User Profile Management system shall secure credentials using salted password hashing AND optional multiâ€'factor authentication (MFA).

and # 5: In Line No. 11, ParNo. 3.1.2.2, at Depth 4
3.1.2.2 Each consultation request shall receive a unique Requestâ€˜ID AND timestamp upon submission.

and # 6: In Line No. 13, ParNo. 3.1.2.4, at Depth 4
3.1.2.4 The system shall enforce input validation AND sanitization for request data to prevent injection attacks.

and # 7: In Line No. 19, ParNo. 3.1.3.4, at Depth 4
3.1.3.4 The system shall log every status change with timestamp, Doctor ID, AND notes.

and # 8: In Line No. 22, ParNo. 3.1.4.2, at Depth 4
3.1.4.2 Closed requests shall be archived AND locked against further edits.

and # 9 and 10: In Line No. 29, ParNo. 3.2.2.1, at Depth 4
3.2.2.1 All data at rest AND in transit shall be encrypted using AESâ€'256 AND TLS.

and # 11: In Line No. 30, ParNo. 3.2.2.2, at Depth 4
3.2.2.2 The system shall comply with HIPAA AND ISO/IECâ€˜27001 stANDards.3.2.2.3 User sessions shall expire after 15â€˜minutes of inactivity.

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               THE DETAIL REPORT OF DIRECTIVE COMPONENTS

                   FOR SPECIFICATIONS CONTAINED IN

                      THE FILE NAME FR-NFR.txt

                            3-22-2025


e-SMART DIRECTIVE  REPORT for FR-NFR.txt on 3-22-2025, at 18:53, Page -  2
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ENHANCEMENT OF SYSTEM MISSION ASSURANCE REQUIREMENT TOOL (e-SMART)

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THE DETAIL REPORT OF OPTION COMPONENTS

FOR SPECIFICATIONS CONTAINED IN

THE FILE NAME FR-NFR.txt

3-22-2025

e-SMART OPTION REPORT for FR-NFR.txt on 3-22-2025, at 18:53, Page - 2

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ENHANCEMENT OF SYSTEM MISSION ASSURANCE REQUIREMENT TOOL (e-SMART)

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THE DETAIL REPORT OF WEAK PHRASE COMPONENTS

FOR SPECIFICATIONS CONTAINED IN

THE FILE NAME FR-NFR.txt

3-22-2025

e-SMART WEAK PHRASE REPORT for FR-NFR.txt on 3-22-2025, at 18:53, Page - 2

normal # 1: In Line No. 26, ParNo. 3.2.1.1, at Depth 4
3.2.1.1 The web interface shall respond to user actions within 2â€˜seconds under NORMAL load (<â€˜100 concurrent users).

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THE DETAIL REPORT OF INCOMPLETE COMPONENTS

FOR SPECIFICATIONS CONTAINED IN

```
                    THE FILE NAME FR-NFR.txt

                        3-22-2025


  e-SMART INCOMPLETE  REPORT for FR-NFR.txt on 3-22-2025, at 18:53, Page -  2




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                 By Nathan Carlson, May 2013

                  THE DETAIL REPORT OF SUBJECTS

                    FOR SPECIFICATIONS CONTAINED IN

                    THE FILE NAME FR-NFR.txt

                        3-22-2025


  e-SMART SUBJECTS  REPORT for FR-NFR.txt on 3-22-2025, at 18:53, Page -  2


  Unique subject 1 :   only registered patients
  Unique subject 2 :   audit logs
  Unique subject 3 :   the web interface
  Unique subject 4 :   patients
  Unique subject 5 :   the user profile management system
  Unique subject 6 :   the system
  Unique subject 7 :   each consultation request
  Unique subject 8 :   closed requests
  Unique subject 9 :   all data at rest and in transit
  Unique subject 10 :  the architecture
  Unique subject 11 :  access to api endpoints
  Unique subject 12 :  automatic backups of the database
  Unique subject 13 :  notification delivery
  Unique subject 14 :  upon opening a request, the system
  Unique subject 15 :  all code modules
  Unique subject 16 :  doctors
```