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IDC Reengineering Phase 2

Elaboration Iteration E2 Deliverables Status

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Executive Summary (1 of 2)

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- Completed all E2 deliverables identified in the Statement of Work
- New deliverables:
  - 21 Use Cases
  - 17 User Interface Storyboards
  - 4 Use Case Realizations
  - Draft Component Interface Specification
  - Draft Component Interface Specification: Signal Detection Control
  - Executable Architecture Reports – Prototyping Overview

Executive Summary (2 of 2)

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- Updated deliverables:
  - System Specification Document
  - Use Case Model Survey
  - Glossary
  - Architecture Document
  - Data Model
  - Cost Estimate

Iteration E2 Deliverables

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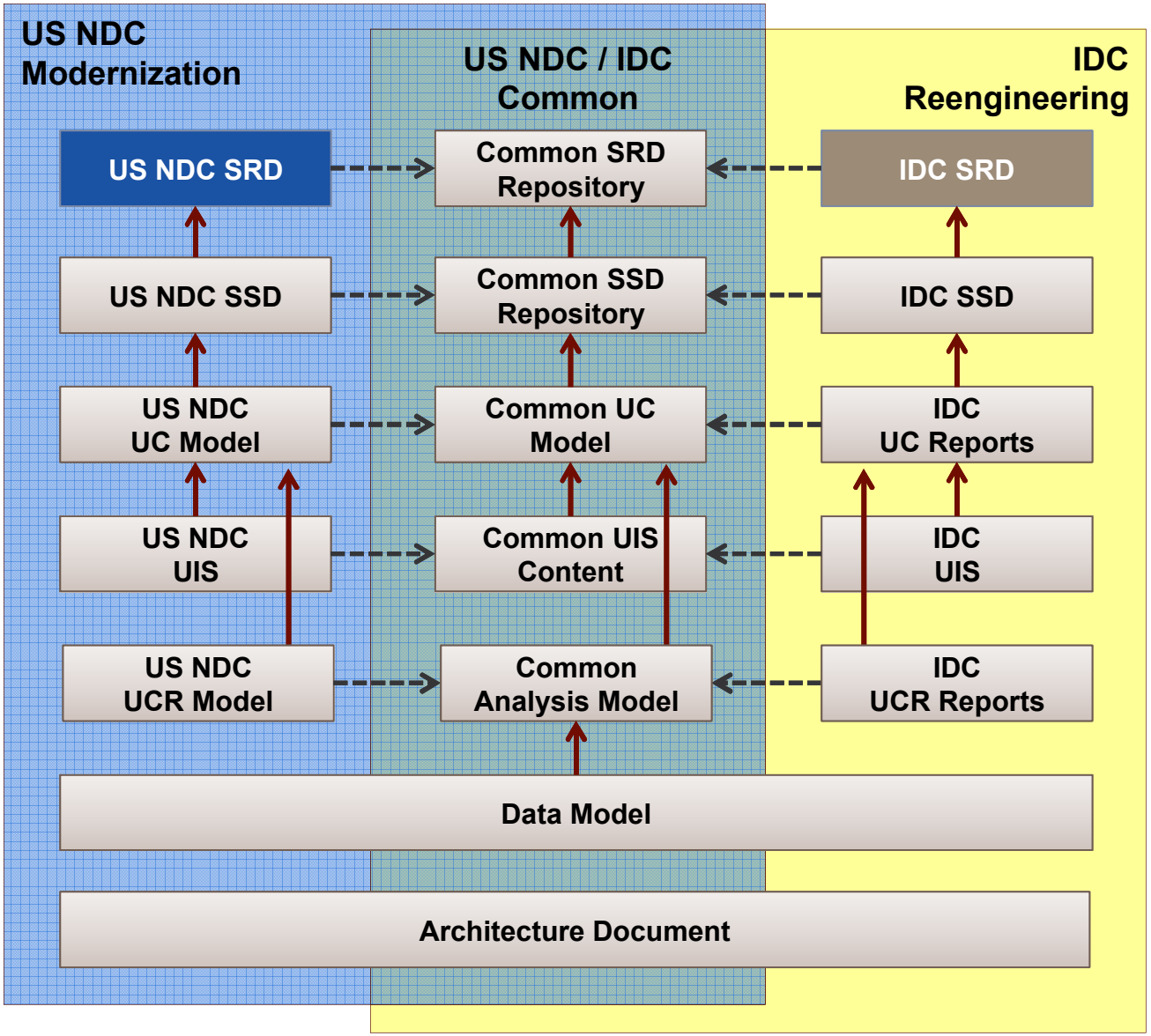
Artifact	E1 Delivery
System Requirements Document (SRD): Baseline system requirements developed by the IDC with support from SNL	N/A*
System Specification Document (SSD): Detailed specification statements, with traceability to the IDC System Requirements Document	Updated
Use Case Descriptions: Reports for each use case with traceability to the IDC System Specifications (21)	Initial Delivery
Use Case Model Survey: Brief descriptions of the Use Cases defined for the IDC system	Updated
User Interface Storyboards: Reports of user interface requirements defined for interactive use cases (17)	Initial Delivery
Use Case Realizations: Reports of analysis-level architecture defined for architecturally significant use cases [portion of total (4)	Initial Delivery
Architecture Document: Documents architecture methodology, decisions, patterns, and guidance	Updated
Executable Architecture Reports: Documents studies and prototypes demonstrating performance of technology decisions and architecture frameworks	Initial Delivery
Data Model Report: Defines the primary data elements used within the System, specifying element content and relationships	Updated
Data Model to IDC Schema Mapping: Provides a mapping between the Data Model content & the IDC schema	N/A*
Component Interface Specification: Software interface definition for replaceable components of the automated and interactive frameworks	Draft for a signal detector
Glossary: Definitions for technical terms used in other deliverables	Updated
Cost Estimate Update: updates to the cost estimate for the complete project, both with and without continued leverage of the common USNDC Modernization components	N/A*

* No update in E2

Leveraging Analysis & Design Artifacts



Provided by the US NDC

Developed by the Reengineering Teams

Provided by the IDC

SRD – System Requirements Document
SSD – System Specification Document
UC – Use Case
UIS – User Interface Storyboard
UCR – Use Case Realization

Traceability Relationship

Dependency Relationship

SSD Status

- E2 release version: v1.4
- Version history:
  - v1.0: initial baseline released at completion of I2 (November, 2014)
  - v1.1 & 1.2: updates from the I2 review (February 2015)
  - V1.2.1: additional updates from the IDC team (May 2015)
  - V1.3: release for E1 (December 2015)
- Additional updates incorporated since 1.3 reflect elaboration of analysis products (use cases, storyboards)

SSD E2 Summary of Updates (1 of 2)

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SSD Section	Summary of E1 Changes
3.2.1.1 Data Sources	Moved specs on selecting data when **data acquisition is enabled or disabled** (S-5974, 5978) to Section 3.2.1.3 Data Acquisition Control; removed S-5975 since the intent of the spec is covered in S-5974, 5978
3.2.1.2 Data Acquisition Status	Added spec about **notification of new alphanumeric data** (S-6485);
3.2.1.3 Data Acquisition Control	Moved specs on selecting data when **data acquisition is enabled or disabled** (S-5974, 5978) that used to be in Section 3.2.1.1 Data Sources; removed S-1186
3.2.1.5 Data Forwarding	Added introductory text to define what is meant by **data forwarding**.
3.2.1.6 Waveform Formats	Changed requirement trace from SRD-611 to SRD-430 for S-1234, 1235, 1236, 5970 because the formats described in these specs are IMS accepted formats
3.2.3.3 Beamforming	Added specs about creating, storing and using **detection feature maps** (S-6467, 6468, 6469, 6470); removed S-5788
3.2.4.1 Signal Detection Processing	Reworded spec S-5642 to say that the System shall **prevent association of microbarom** signals to events
3.2.5.5 Seismic Station Signal Detection Phase Assignment	Removed spec S-1523 because it was a duplicate of S-1495.
3.2.6.5 Station Quality Metric	Reworded spec S-1572 to say the station quality metric is **computed for events**, not stations for each event hypotheses
3.2.6.7 Event Consistency	Removed spec about the capability to **correct Event Consistency checks** (S-6221)
3.2.7.1 Event Hypothesis Relocation	Updated specs to use the term **signal detection feature measurements** instead of event hypothesis relocation parameters (S-1591, S-1593, S-1594, S-6290),removed spec S-1609 because it was a duplicate of S-1615, moved S-1615 from Section 3.2.11.2 Event Interaction to Section 3.2.7.1 Event Hypothesis Relocation
3.2.8.1 Magnitude Estimation	Added specs for computing the **different magnitude types** (mb, mbMLE, mbrel, ms, msVMAX, msMLE (S-6486, 6487. 6488, 6489, 6490, 6491)
3.2.10.4 Processing Stage Storage	Removed spec about **preserving analyst processing results** (S-1863) because it is redundant with S-2043
3.2.11.1 Waveform Interaction	Rewrote spec S-6295 to make the **detection feature map** for an infrasound signal more generic
3.2.11.2 Event Interaction	Updated specs to use the term **event catalog** instead of reference events (S-1915, 1917, 1918)
3.2.14 Bulletins and Reports	Specs about requesting and providing **data and reports via email** were changed to be IDC only; Specs about subscribing to and receiving **radionuclide data** were changed to be Common
3.2.15.1 System Configuration	Added spec **about installing software updates on the Backup** with affecting the Primary (S-6463) and added spec about installing updates (S-2275) that used to be in the Training Subsystem section of the document.

SSD E2 Summary of Updates (1 of 2)

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SSD Section	Summary of E1 Changes
3.2.15.2 Common Object Interface	Spec about the capability for the Researcher to access the database through an ANSI/ISO standard SQL interface was changed to be IDC only
3.2.15.5 Database Synchronization	Added spec about **synchronizing meteorological data** from the Primary to the Backup in near real-time (S-6472)
3.2.16.2 Station State-of-Health	Added specs for **computing station quality metrics** (S-6481, 6482, 6483)
3.2.20.3 External Interface User Interfaces	Added spec for **viewing station calibration results** (S-6434), updated spec S-5586 to be a general spec to **securely issue commands to IMS stations**
3.2.20.4 External Interfaces Storage	Removed specs for **securely issuing specific commands to the stations** (S-5587, 5588, 5589, 5590, 5591) – covered in generic spec S-5586
3.2.22 Design Constraints	Added requirement trace SRD-355 to spec about **maintaining and controlling System software** via configuration management software (S-2233). SRD-355 discusses configuration management and control software for all discrete subsystems.
3.2.23.6 Training Subsystem	Moved spec about **installing updates** (S-2275) to Section 3.2.15.1 System Configuration
3.2.24.1 Reliability, Maintainability, Availability	Removed spec for **supporting mission duration** of the Training Subsystem (S-2322)

Use Case Descriptions Status

- 21 Use cases delivered in Iteration E2
- Reviewed draft versions with the IDC team during the Iteration
  - January 2016 (7 UCs): UC-02.01, UC-02.02, UC-02.04, UC-03, UC-03.02.01, UC-03.02.02, UC-03.02.03
  - March-May 2016 (13 UCs): UC-02.05, UC-02.07, UC-02.09, UC-02.010, UC-02.11, UC-03.01, UC-03.02.04, UC-03.02.05, UC-03.02.06, UC-03.04, UC-14.01, UC-14.02, UC-14.03
- Feedback from the IDC reviews has been addressed in the E2 release

UC ID	UC Title
UC-02.01	System Determines Waveform Data Quality
UC-02.02	System Enhances Signals
UC-02.04	System Detects Signals
UC-02.05	System Measures Signal Features
UC-02.07	System Resolves Event Conflicts
UC-02.09	System Refines Event Magnitude
UC-02.10	System Evaluates Moment Tensor
UC-02.11	System Finds Similar Events
UC-03	Analyzes Events
UC-03.01	Selects Data for Analysis
UC-03.02.01	Determines Waveform Data Quality
UC-03.02.02	Enhances Signals
UC-03.02.03	Detects Signals
UC-03.02.04	Measures Signal Features
UC-03.02.05	Refines Event Location
UC-03.02.06	Refines Event Magnitude
UC-03.02.07	Evaluates Moment Tensor
UC-03.04	Builds Event
UC-14.01	Assesses Event Consistency
UC-14.02	System Screens Events
UC-14.03	System Controls Monitoring Stations

Use Case Model Survey Status

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- E1 version released January, 2016
- Summary of E2 updates:

UCMS Section	Summary of Changes
1.1 Actor Descriptions	Added the user **IMS Command Generations System**
2.2 System Receives Station Data 2.5 System Acquires Meteorological Data 2.11 System Detects Events using Waveform Correlation 2.14 System Builds Events using Signal Detections 2.20 System Predicts Signal Features 2.23 Refines Event 2.31 Compares Events 2.32 Scans Waveforms and Unassociated Detections 2.39 Views System Results 2.43 Defines Processing Sequence 2.48 Configures Analysis Interfaces 2.51 Analyzes Mission Performance 2.61 Views Event History 2.71 Replays Test Data Set 2.80 Develops New Algorithms and Models 2.88 Performs Standalone Analysis	Updated the **architecturally significant statement** to better explain why the use case is architecturally significant.
2.10 System Enhances Signals 2.12 System Detects Signals	Updated brief description to include **detection feature maps**
2.13 System Measures Signal Features	Updated brief description to better explain **iterative feedback based processing sequence**
2.90 N/A	Removed UC, **combined System Assesses Event Consistency with Assesses Event Consistency**
2.91 Assesses Event Consistency	Updated brief description to reflect that the **System use case was combined with the Analyst use case**
2.92 System Screens Event	Updated brief description to make more clear and use terminology from the CTBT
2.93 System Controls Monitoring Stations	**Changed name** and made a System use case; updated the brief description to **reflect that this is a System use case**
2.94 Performs Expert Technical Analysis	Updated the brief description to **clearly distinguish the two types of expert technical analysis**

User Interface Storyboards Status

- 17 UI Storyboards delivered in Iteration E2
- SNL reviewed draft versions of these use cases with the IDC team in at the IDC in January and April 2016, and on conference calls between March and May 2016
- Feedback from the reviews has been addressed in the E2 release

Use Case	UI Storyboard Title
UC-03	Analyzes Events
UC-03.01	Selects Data for Analysis
UC-03.02.01	Determines Waveform Data Quality
UC-03.02.02	Enhances Signals
UC-03.02.03	Detects Signals
UC-03.02.04	Measures Signal Features
UC-03.02.05	Refines Event Location
UC-03.02.06	Refines Event Magnitude
UC-03.04	Builds Event
UC-07.01	Analyzes Mission Performance
UC-11.02	Develops New Algorithms and Models
UC-13.02	Performs Standalone Analysis
UC-14.04	Performs Expert Technical Analysis
Common Components	Defining States UIS Component
	Event List UIS Component
	Undo Redo Display UIS Component
	Workspace Management UIS Component

Use Case Realizations Status

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- Four UCRs delivered in Iteration E2
- SNL reviewed draft versions of the UCRs with the IDC team June, 2016
- Feedback from the review has been addressed in the E2 release

UCR ID	UCR Title
UCR-01.04	System Acquires Meteorological Data
UCR-02.06	System Builds Events using Signal Detections
UCR-03.03	Scans Waveforms and Unassociated Detections
UCR-14.04	Performs Expert Technical Analysis

Glossary Status

Glossary Term	Summary of E1 Changes
Active Review	Updated to include sentence that the System prevents changes by automated processing to data in Active Review
Catalog Event	Added
Channel Mask	Added
Detection Feature Map	Added
Event Catalog	Added
Event Hypothesis Location Solution	Updated to include sentence that a location solution is based on a set of defining signal detection measurements, e.g., time, azimuth, slowness
Filter, Waveform	Updated to use the term derived waveform and added complex types of filters to the definition
Geographic Region	Added
Machine Readable Earthquake Data Report	Removed
Processing Stage	Replaced the term“ Analyst 1” with “traditional analyst roles”
Reference Event Database	Removed, replaced with Event Catalog
Signal Detection Template	Replaced the term “reference event” with “event”
Z-Detector	Added

- E2 release version: v1.2
- Includes various updates resulting from elaboration of analysis products (Use Cases, Storyboards)

Data Model Report Status

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- Released initial Data Model Report and Data Model-to-IDC Schema Mapping documents in E1 (version v1.0)
- In E2 we are only delivering an update of the Data Model Report.
- Summary of E2 Updates
  - Updated and added class diagrams for Network, Network Membership, Station Membership, Station, Site, Site-Relative Position
  - Added classes Instrument, Instrument Response and Calibration to the discussion of the class diagram for Channels
  - Expanded the class diagrams for Derived Channels, Channel Masks and Signal Processing Operation
  - Updated the class diagrams for Derived Channel Products (called Processing Results in E1 version)
  - For the Event class, broke out the Event Screen class into two – Event Screening Category class and Event Screening Criterion class
  - Expanded the classes for Location Solution
  - Are still missing important concepts such as the details of how station processing operations (e.g. beamforming) are captured.

Architecture Document Status (1 of 2)

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- Released draft Architecture Document in E1 (version v0.1)
- Summary of E2 Updates
  - Expanded introduction to go into more details about the NDC and IDC systems
  - Updated Section 3 – Scope
  - Updated the architecturally significant statements for the architecturally significant use cases in Section 4.1 – Use Case View
  - Reorganized Section 4.2 – Logical View, added Event Source Determination as a new domain (Section 4.2.1)
  - Removed discussion of the two messaging technologies in Section 4.2.6.4 Inter-Process Communications
  - Added Processing Context as a Pattern (Section 4.2.7); updated discussion of the Control class
  - Added two new Plugin Interfaces in Table 4.1 that were originally in Table 4.2 – Meteorological Data Update and Waveform Data Quality
  - Added new Plugin Interface Waveform Correlator in Table 4.2
  - Added Error Handling and System Logs to the discussion of Event Analysis Classes in Section 4.2.7.5

Architecture Document Status (2 of 2)

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- Released draft Architecture Document in E1 (version v0.1)
- Summary of E2 Updates
  - Added Geographic Information Systems (GIS) to the discussion of Key Features (Section 4.2.8)
  - Sections 4.3 – Implementation View, 4.4 – Process View and 4.5 – Deployment View written
  - Section on Works Cited was removed
  - Updated Appendix A. Specifications
  - Added Appendix B. BPMN for Processing Sequence Control

Other Deliverable Status

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- Delivered an initial draft of the IDC RP2 Architecture Document, based on content from the US NDC Modernization Architecture document
  - E1 release intended to provide context for UCR discussions
- Delivered a briefing discussing the proposed scope and content of Component Interface Definitions to be developed in the Elaboration and Development phases of the project

E3 Deliverables Plan Summary

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- System Specification Document – updated as needed
- Use Case Descriptions – 31 additional UCs
- User Interface Storyboards – 13 additional Storyboards
- Use Case Realizations – 4 additional UCRs
- Architecture Document – updated
- Component Interface Definitions
  - Updates or new components?
- Data Model
  - Update to Data Model Report
- Executable Architecture Reports
  - Additional reports detailing ongoing prototyping efforts and results

Summary

- IDC RP2 Elaboration Iteration E2 is complete
- IDC RP2 E2 deliverables released
- Proposed E3 deliverables plan for discussion