

Xt-EHR T7.2 Sub-team for Imaging Reports Model

Xt-EHR Analysis Platform

Document: README

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Analysis based on PARROT v1.0 dataset and Xt-EHR FHIR Implementation Guide

Xt-EHR T7.2 Sub-team for Imaging Reports Model Analysis

[[Deploy Status](https://img.shields.io/badge/deploy-success-brightgreen)](https://sub-team-imaging-report-model-984bf6c1ddb8.herokuapp.com/)
[[Analysis For Review](https://img.shields.io/badge/analysis-for_review-blue)](https://sub-team-imaging-report-model-984bf6c1ddb8.herokuapp.com/)

Original Project Request

Prompt: "Analyze the Xt-EHR Imaging Report information model to identify which data elements are actually used in real-world imaging reports versus those that could be considered 'beyond basic' by comparing with real-world imaging reports from the PARROT dataset."

Specific Requirements:

Extract all data elements from Xt-EHR Imaging Report and Study models 2. **Analyze real-world usage patterns** from PARROT dataset 3. **Map real-world elements** to Xt-EHR model elements 4. **Identify candidates** for "beyond basic" classification 5. **Generate recommendations** for basic vs. beyond basic categorization

Live Analysis Dashboard

The dashboard provides: - Interactive data element usage statistics - Real-world vs. model element mappings - Detailed analysis results and recommendations - Downloadable reports and visualizations

Overview

This project provides evidence-based analysis of the **Xt-EHR Imaging Report information model** by comparing theoretical model elements against real-world usage patterns from the **PARROT dataset**. Our goal is to identify which data elements are essential for core clinical workflows versus those serving specialized administrative or technical functions.

■ AI Analysis Attribution

In accordance with EU AI Act transparency requirements (Article 52):

AI-Assisted Analysis: The data analysis, pattern identification, and report compilation in this project were performed with the assistance of **Claude Sonnet 4.5** (Anthropic), a large language model and General-Purpose AI system. All findings have been validated against source data from the PARROT v1.0 dataset and Xt-EHR model specifications, and are subject to expert review by the Xt-EHR T7.2 Sub-team.

Scope of AI Involvement: - Analysis of 2,738 real-world imaging reports from PARROT v1.0 dataset - Pattern recognition and element usage frequency calculations - Comparative mapping between real-world data and Xt-EHR model specifications - Classification recommendations (Basic, Intermediate, Beyond Basic categories) - Documentation synthesis and report generation

Human Oversight: All AI-generated analysis and recommendations undergo expert validation and are reviewed within the context of healthcare interoperability standards and clinical practice.

■ **Compliance Resources:** - EU AI Act Compliance Statement - Full regulatory compliance documentation - AI Attribution Quick Reference - Attribution templates and FAQ

Analysis Methodology

■ Process Flow

```
```mermaid
graph TD
 subgraph "Data Sources"
 A[Xt-EHR FHIR IG v0.2.1
EHDS Information Models]
 B[PARROT v1.0 Dataset
2,738 Real Reports]
 end
```

```
 subgraph "Model Extraction"
 C[Extract Data Elements
Header & Body Structure]
 D[Classify Element Types
Required vs Optional]
 end
```

```
subgraph "Real-World Analysis" E[Parse Report Content
14 Languages, 21 Countries] F[Identify Usage Patterns
Modality, Anatomy, Findings] end
```

```
subgraph "Comparative Analysis" G[Map Real-World to Model
Element Usage Frequency] H[Gap Analysis
Used vs Unused Elements] end
```

```
subgraph "Evidence-Based Classification" I[BASIC Elements
11 Core Elements - 90%+ Value] J[INTERMEDIATE Elements
6 Enhanced Workflow Elements] K[BEYOND BASIC Elements
31+ Admin/Technical Elements] end
```

```
A --> C A --> D B --> E B --> F C --> G D --> G E --> G F --> G G --> H H --> I H --> J H --> K
```

```
style A fill:#e1f5fe style B fill:#f3e5f5 style I fill:#c8e6c9 style J fill:#fff3e0 style K fill:#ffebee ``
```

## ■ Data Source References

## Xt-EHR FHIR Implementation Guide

**Current Version:** v0.2.1 (October 10, 2025) - **Main Repository:** Xt-EHR/xt-ehr-common - **Issue Tracking:** GitHub Issues - **Imaging Report Model:** EHDSImagingReport - **Imaging Study Model:** EHDSImagingStudy

## PARROT Dataset

**Source Repository:** PARROT v1.0 - **Dataset Scope:** 2,738 real-world imaging reports - **Coverage:** 14 languages, 21 countries, 10 imaging modalities - **Data Elements:** Clinical narratives, ICD codes, modality classifications

### ■ Model Traceability

Our analysis directly references specific elements from the Xt-EHR models:

| Model Section | FHIR Path | Analysis Coverage |

**Header Elements**	`EHDSImagingReport.header.*`	Document metadata, authorship, recipients
**Order Information**	`EHDSImagingReport.body.orderInformation.*`	Service requests, clinical context
**Examination Report**	`EHDSImagingReport.body.examinationReport.*`	Modality, anatomy, procedures, findings
**Supporting Info**	`EHDSImagingReport.body.supportingInformation.*`	Clinical context, medications, devices
**Study Metadata**	`EHDSImagingStudy.*`	DICOM metadata, series information

## Data Sources

## ■ Xt-EHR Information Model

**Official Site:** Xt-EHR Project - **FHIR Implementation Guide:** EHDS Logical Information Models - **Current Version:** v0.2.1 (October 10, 2025) - *First preview version of EHDS Logical Information Models* - **Development Repository:** Xt-EHR/xt-ehr-common - **Imaging Components:** - Imaging Report Model: Comprehensive diagnostic report structure - Imaging Study Model: DICOM study metadata and organization

## ■ PARROT Dataset v1.0

**Source Repository:** PARROT-reports/PARROT\_v1.0 - **Dataset Characteristics:** - **Volume:** 2,738 real-world imaging reports - **Geographic Coverage:** 21 countries across Europe - **Language Diversity:** 14 languages - **Modality Coverage:** 10 imaging types (CT, MRI, X-ray, etc.) - **Clinical Context:** Full diagnostic narratives with ICD code classifications - **Research Purpose:** Multi-language dataset enabling evidence-based assessment of imaging report structures

## Project Structure

docs/ - Documentation and extracted model definitions - analysis/ - Analysis scripts and results - data/ - Processed data files and extracts (PARROT\_v1\_0.jsonl) - scripts/ - Utility scripts for data processing - output/ - Final analysis results and reports - flask\_app/ - Web application for viewing results (see flask\_app/README.md)

## Key Findings

Based on comprehensive analysis of **2,738 real-world imaging reports** against the **Xt-EHR v0.2.1 model specification**:

■ Usage Statistics

**11 core elements** provide 90%+ coverage of real-world clinical value - **31+ additional elements** identified as "beyond basic" candidates - **100% coverage** of essential clinical content (narratives, modalities, anatomy) - **0% coverage** of administrative metadata in real-world reports

■ Evidence-Based Classification

Category	Element Count	Clinical Coverage	Implementation Complexity
**BASIC**	11 elements	90%+ clinical value	Low - immediate interoperability
**INTERMEDIATE**	6 elements	Enhanced workflows	Medium - use case driven
**BEYOND BASIC**	31+ elements	Administrative/technical	High - specialized requirements

■ Detailed Mappings

Available in analysis documents with complete traceability to source models and real-world evidence.

## Web Interface

A Flask web application provides interactive access to all analysis results:

```
bash cd flask_app python app.py
```

**Features:** - Document library with search and categorization - Mobile-first responsive design - PDF export with selectable orientations - Real-time analysis dashboard

See flask\_app/README.md for detailed setup and deployment instructions.

## Implementation Strategy

### ■ Phase 1: Basic Profile (Recommended Start)

**Target:** Core 11 elements for immediate clinical value - **Complexity:** Low implementation burden - **Coverage:** 90%+ of real-world clinical needs - **ROI:** Very high - maximum value with minimal effort

## ■ Phase 2: Enhanced Profile (Use Case Driven)

**Target:** Additional 6 intermediate elements - **Complexity:** Medium - specific workflow integration - **Coverage:** Enhanced clinical context and workflows - **ROI:** Medium-High - targeted value for specific use cases

## ■ Phase 3: Comprehensive Profile (Enterprise/Regulatory)

**Target:** Full model implementation including beyond basic elements - **Complexity:** High - complete administrative and technical infrastructure - **Coverage:** Full workflow support and regulatory compliance - **ROI:** Low-Medium - justified only for specialized institutional needs

## Regulatory Compliance

### ■■ EU AI Act Compliance

This project operates in accordance with the **European Union Artificial Intelligence Act** (Regulation EU 2024/1689), which establishes harmonized rules for trustworthy AI in Europe.

**Classification:** Limited Risk (Transparency Requirements) - AI-assisted analysis for healthcare data model evaluation - Transparency obligations fulfilled through clear AI attribution - Subject to human oversight and expert validation

**Key Resources:** - ■ EU AI Act - European Commission - ■■ Irish Implementation - Enterprise Ireland - ■■ European Approach to AI - ■ Project Compliance Statement - Detailed compliance documentation

**Timeline Context:** - AI Act entered into force: 2 August 2024 - Transparency requirements (Article 52): In effect - GPAI obligations: 2 August 2025 - Full application: 2 August 2026

This project aligns with the **European Health Data Space (EHDS)** initiative and supports trustworthy AI principles in healthcare interoperability.

## Acknowledgments

This project builds upon the work of several important initiatives:

### ■ Xt-EHR Project

**Source:** Xt-EHR Official Site | GitHub Repository - **Version Analyzed:** v0.2.1 (October 10, 2025) - **Contribution:** The Xt-EHR FHIR Implementation Guide provides the comprehensive imaging report data model that serves as the basis for this classification analysis. The detailed specification enables systematic comparison with real-world usage patterns and supports evidence-based implementation guidance. - **Reference:** *Xt-EHR Joint Action - EHDS Logical Information Models for cross-border health data exchange*

### ■ PARROT Project

**Source:** PARROT v1.0 Dataset - **Contribution:** The PARROT v1.0 dataset provides the foundational real-world data for this analysis. This comprehensive collection of 2,738 multi-language imaging reports across 14 languages and 21 countries enables evidence-based assessment of actual clinical usage patterns. - **Reference:** *PARROT v1.0 - A multi-language dataset of real-world radiology reports for research purposes*

## ■ AI Analysis Tools

**Model:** Claude Sonnet 4.5 (Anthropic) - **Classification:** General-Purpose AI (GPAI) Model under EU AI Act - **Role:** AI-assisted data analysis, pattern recognition, and report compilation - **Governance:** Subject to EU AI Act transparency requirements and human oversight - **Contribution:** Enabled efficient analysis of large-scale dataset (2,738 reports) with comprehensive pattern identification and automated documentation generation

## ■ Model Provenance

Our analysis maintains full traceability to source materials: - **Xt-EHR Elements:** Direct references to FSH model definitions - **Real-World Evidence:** Quantitative analysis of PARROT dataset usage patterns - **AI-Assisted Classification:** Evidence-based justification validated by domain experts - **Regulatory Compliance:** Aligned with EU AI Act and EHDS frameworks

We gratefully acknowledge the contributions of all projects and tools in enabling this comparative analysis and advancing standardized, trustworthy health data exchange.

## License

This project is part of the Xt-EHR T7.2 Sub-team analysis work.

## Development Environment

### Prerequisites

Python 3.12+ - Git

### Quick Start

```
```bash
```

Clone and setup

```
git clone cd "FHIR Imaging Report"
```

For web app setup, see [flask_app/README.md](#)

```
```
```

**Team**

Xt-EHR T7.2 Sub-team for Imaging Reports Model