1. **Overview**

This document describes the design, data, and computational specifications for ***BCDS Model No. 002 – Auto-assignment of Combined Disability Determinations for Knee related issues.*** The model conforms to BCDS requirements by defining the specifications for the three core components of BCDS models: 1) the Decision Determination Matrix (DDM); 2) the Target Claim Feature-Set Data and Computational Specifications; and 3) the Claimant Feature-Set Data and Computational Specifications. Each of these components are summarized below. **The related data and computational specifications are provided as Appendix 2 (Made available via the GitHub).**

1. **Ear Model Decision Determination Matrix**

The Knee Model DDM is a **30 by 145,457** matrix composed of a series of claim characteristic patterns that, when satisfied, yield a CDD for a set of **Knee** issues that is consistent with that produced by authorized VA personnel **92.95%** of the time. The columns represent a set of predictive characteristics or “feature set.” The rows constitute predictive patterns – the various combinations of values for these features, and a specific CDD that results when the pattern is satisfied.

As indicated earlier, the complete DDM for the Ear Model is located on the BCDS GitHub in a file entitled **BCDS\_Knee\_Model\_DDM\_v1r0.accb.** Table 1 below provides a basic description of each of Ear Model Feature. The related data and computational specifications are provided later.

**Table 1: Feature Set Definitions**

| **Feature** | **Definition** |
| --- | --- |
| Claimant Age | The age of the claimant when the target claim was filed (Range in units of 10 beginning at 20) |
| Sequential Number of Knee claims | The number of supplemental claims previously adjudicated containing at least one Ear Contention. |
| Number of Knee Contentions | The number of ear related contentions included in the target claim. |
| Prior Knee CDD | The ear-related CDD resulting from the claim most recently adjudicated by VBA for ear related issues. |
| Age of the Knee CDD | The period of time between the date of claim for the target claim and the effective date of the prior ear related CDD (in Years, rounded to whole numbers) |
| Age of the Claim | The elapsed time between the date of auto-adjudication and the date of claim for the target claim (in Years, rounded to whole numbers) |
| Contention Code 230 | The number of occurrences in the target claim and previous claims of the **Amputation - above the knee** code |
| Contention Code 270 | The number of occurrences in the target claim and previous claims of the **Amputation - Legs** code within the Target Claim |
| Contention Code 3690 | The number of occurrences in the target claim and previous claims of the **Knee Condition - Bilateral** code within the Target Claim |
| Contention Code 3700 | The number of occurrences in the target claim and previous claims of the **Knee Condition - Left** code within the Target Claim |
| Contention Code 3710 | The number of occurrences in the target claim and previous claims of the **Knee Condition – Right** code within the Target Claim |
| Contention Code 3720 | The number of occurrences in the target claim and previous claims of the **Knee Sprain** code within the Target Claim |
| Contention Code 3730 | The number of occurrences in the target claim and previous claims of the **Knee Strain** code within the Target Claim |
| Contention Code 3780 | The number of occurrences in the target claim and previous claims of the **Leg Condition - Bilateral** code within the Target Claim |
| Contention Code 3790 | The number of occurrences in the target claim and previous claims of the **Leg Condition - Left** code within the Target Claim |
| Contention Code 3800 | The number of occurrences in the target claim and previous claims of the **Leg Condition – Right** code within the Target Claim |
| Contention Code 8919 | The number of occurrences in the target claim and previous claims of the **Knee Replacement** code within the Target Claim |
| Diagnostic Code 5055 | The number of occurrences in previously adjudicated claims for the **Knee Replacement** diagnostic code for disability determinations for the ear. |
| Diagnostic Code 5161 | The number of occurrences in previously adjudicated claims for the **Amputation – Upper Third of the Leg** diagnostic code in the preceding disability determination for the ear. |
| Diagnostic Code 5162 | The number of occurrences in previously adjudicated claims for the **Amputation – Lower or Middle Third of the Leg** disability code in previous disability determinations for the ear. |
| Diagnostic Code 5163 | The number of occurrences in previously adjudicated claims for the **Amputation of Leg with Defective Stump** disability code in previous disability determinations for the ear. |
| Diagnostic Code 5164 | The number of occurrences in previously adjudicated claims for the **Amputation of Leg – Loss of Natural Knee Action** diagnostic code in previous disability determinations for the ear. |
| Diagnostic Code 5165 | The number of occurrences in previously adjudicated claims for the **Amputation of Leg Permitting Prosthesis** disability code in previous disability determinations for the ear. |
| Diagnostic Code 5256 | The number of occurrences in previously adjudicated claims for the **Ankylosis of the Knee** diagnostic code in previous disability determinations for the ear. |
| Diagnostic Code 5257 | The number of occurrences in previously adjudicated claims for the **Impairment of the Knee, General** diagnostic code in previous disability determinations for the ear. |
| Diagnostic Code 5258 | The number of occurrences in previously adjudicated claims for the **Dislocated cartilage, semilunar – knee** diagnostic code in previous disability determinations for the ear. |
| Diagnostic Code 5259 | The number of occurrences in previously adjudicated claims for the **Removal of cartilage, semilunar - knee** diagnostic code in previous disability determinations for the ear. |
| Diagnostic Code 5260 | The number of occurrences in previously adjudicated claims for the **Limitation of flexion, knee** diagnostic code in previous disability determinations for the ear. |
| Diagnostic Code 5313 | The number of occurrences in previously adjudicated claims for the **Injury affecting hip extension and knee flexion** diagnostic code in previous disability determinations for the ear. |
| Diagnostic Code 5314 | The number of occurrences in previously adjudicated claims for the **Injury affecting knee extension and hip flexion** diagnostic code in previous disability determinations for the ear. |
| Diagnostic Code 5315 | The number of occurrences in previously adjudicated claims for the **Injury to hip adduction; knee and hip flexion** diagnostic code in previous disability determinations for the ear. |

1. **Target Claim Feature-Set Data and Computational Specifications**

As Table 1 (above) suggests, some – but not all – predictive characteristics are derived from data contained in the claim that is to be adjudicated (the Target Claim). Primarily, these features characterize the claimant at the time of filing, as well as claimant perceived changes in the status or severity of the ear related disability, which are captured within “contention” related data. Additionally, claim-specific data is captured to provide reference and descriptive information that will allow the authorized VA personnel to easily identify the claim in other systems, and evaluate the CDD for the ear generated by the BCDS system. The specifications for each feature are defined in Table 2 below.

**Table 2: Target Claim Computational Specifications**

| **Feature** | **Field Name (s)** | **Purpose** | **Calculation** |
| --- | --- | --- | --- |
| *Veteran Identifier* | *VET\_ID* | *Reference Only* | *Direct Extract (SSN - alpha numeric)* |
| *Veteran Name* | *XXXXXXXXXXXX* | *Reference Only* | *Direct Extract (Alpha-numeric)* |
| *Regional Office* | *RO\_Number* | *Reference Only* | *Direct Extract (Numeric)* |
| *Claim Identifier* | *CLAIM\_ID* | *Reference Only* | *Direct Extract (Alpha-numeric)* |
| *EP Code* | *END\_PRODUCT\_CODE* | *Reference Only* | *Direct Extract (Alpha-numeric)* |
| *Date of Claim* | *DATE\_OF\_CLAIM* | *Reference Only* | *Direct Extract (Date)* |
| Age of the Veteran | DATE\_OF\_BIRTH | Predictive Characteristic | ([Date of claim] – [Date of birth]) / 365 rounded to the nearest year. ***NOTE: the original development date provided DOB as a year and not a date.*** |
| Number of Knee Contentions |  | Predictive Characteristic | A numeric count of the contentions associated with the target claim\_ID that are Ear Related (See\_\_\_\_\_\_\_\_\_\_\_\_) |
| Number of Contentions |  | Predictive Characteristic | A numeric count of the contentions associated with the target claim\_ID. |
| Age of the Claim | DATE\_OF\_CLAIM | Predictive Characteristic | ([Current\_Date]-[date\_of\_claim]) / 365 rounded to the nearest year. |
| Contention Codes (Table 1) |  | Predictive Characteristic | Stored as the count of previous occurrences of the codes assigned, including the target claim. |

1. **Claimant Feature-Set Data and Computational Specifications**

Claimant related features are derived by identifying related disability determination decisions and supporting data for the claimant identified in the target claim. For the Ear Model, these data relate primarily to the most recent rating profile adjudicated for ear related issues (defined as records for the claimant with a rating profile date immediately preceding the date of claim for the target claim). These data include key attributes and findings of the disability determination, including proximity in time to the current claim, and the previous determination as to the validity and severity of the disability. Almost all claimant features are calculated. The specifications for each are provided in Table 3 below.

**Target 3: Claimant Feature-Set Computational Specifications**

|  |  |  |  |
| --- | --- | --- | --- |
| **Feature** | **Field Name (s)** | **Purpose** | **Calculation** |
| Prior Knee CDD | Constraint: Maximum Profile\_Date where less than target claim\_date | Predictive Characteristic | CDD={100X(1 – (1-R1/100)(1-R2/100)…(1-Rn/100)} / 100 for DSBLTY\_DECN\_TYPE\_CD = SVCONNECT or 1151G |
| Age of Knee CDD | Constraint: Maximum Profile\_Date where less than target claim\_date | Predictive Characteristic | [current\_date]-[begin\_date]/365 rounded to nearest year, for the most recent ear-related rating profile and decision prior to the target claim date. |
| Diagnostic Codes (See Table 1) | Constraint: Maximum Profile\_Date where less than target claim\_date | Predictive Characteristic | Stored as the count of previous occurrences of the diagnostic codes assigned by the fully adjudicated claim immediately prior to the target claim |