RPA P7: SOFTWARE PROGRAM DEVELOPMENT & SUPPORT

Federal Aviation Administration

Presented to: REDAC Subcommittee on Airports

By: Qingge Jia/David Brill

Date: March 21, 2018

RPA P7 Overview

Need

There is a need to develop and maintain user-friendly software programs that meet the current and future requirements of the FAA for airport design, construction, and maintenance and management tools. This RPA provides continuous support for airport Advisory Circulars, as well as the data management and data analysis needs of the Airport Technology branch.

Objectives

Goals:

- To upgrade FAA programs to current technologies.
- To meet FAA standards, and IT standards.
- To meet software industry standards.
- To develop tools that better serve FAA research needs.

Outputs:

- Software, websites, source code, and documentation.

Accomplishments

- FAA PAVEAIR 3.0.2 released in February 2, 2017.
- Created French/Spanish versions of PAVEAIR.
- Developed FAA Prediction Curve Library.
- Added Micro Paver e70 compatibility.
- Created BAKFAA/ProFAA file parsers
- Implemented Object-Oriented (OO) design in all programs.
- FAA PAVEAIR improvements.
- Branch Website improvements and database accessibility improvements.

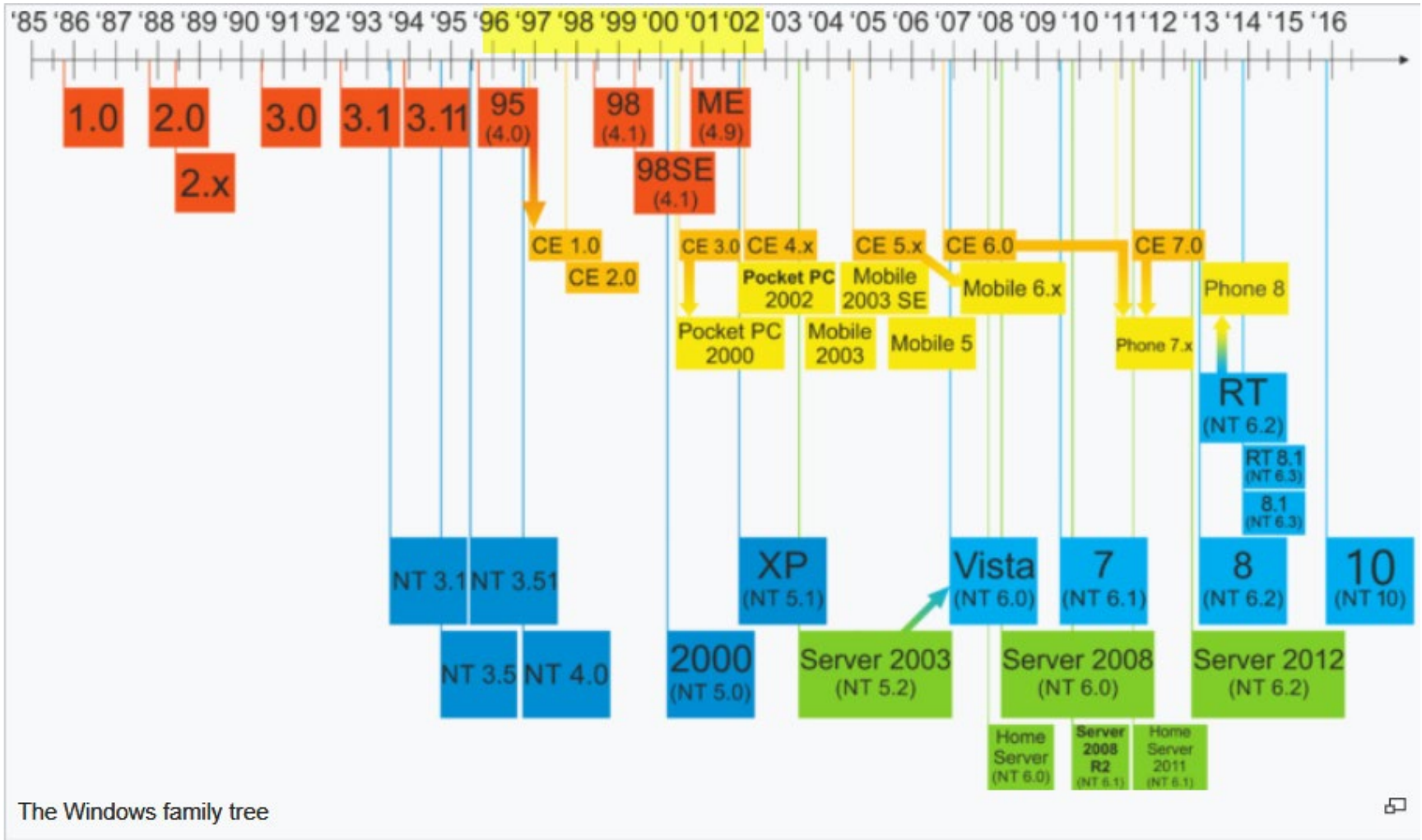
FAA Pavement Software Programs

Name	Date of Adoption	Advisory Circular	Description
PAVEAIR	N/A	Recommended in 150/5380-7B	Web-based application for airport pavement management system, including PCI evaluations.
COMFAA 3.0	2011	150/5335-5C	Automatic PCN computation
FAARFIELD 1.4	2016	150/5320-6F	FAA Rigid and Flexible Interactive Elastic Layer Design. Mechanistic-Empirical thickness design. Uses NIKE3D for rigid and LEAF for flexible.
ProFAA	2009	150/5380-9	Longitudinal roughness profile analysis, roughness index computation, and aircraft ride simulation.
FEAFAA 2.0	NA		3D FEM program for rigid pavement response computation. Up to 9 slabs. Used to improve and extend FAA-NIKE3D.
BAKFAA	2003	Recommended in 150/5370-11A	FAA back-calculation of elastic layer properties using LEAF. Also computation of elastic layered system responses and used for LEAF development.
LEAF	2003	NA	Layered Elastic Analysis FAA. Windows DLL layered elastic computational engine written in Visual Basic. Can be compiled to a DLL and used as a component of other programs. (BAKFAA)
ICAO-ACR	2018	NA	Program extension to compute Aircraft Classification Rating (ACR) according to proposed new ICAO ACR-PCR standard. Can be compiled to a .NET DLL and used as a component of other programs.

FAA Requirements

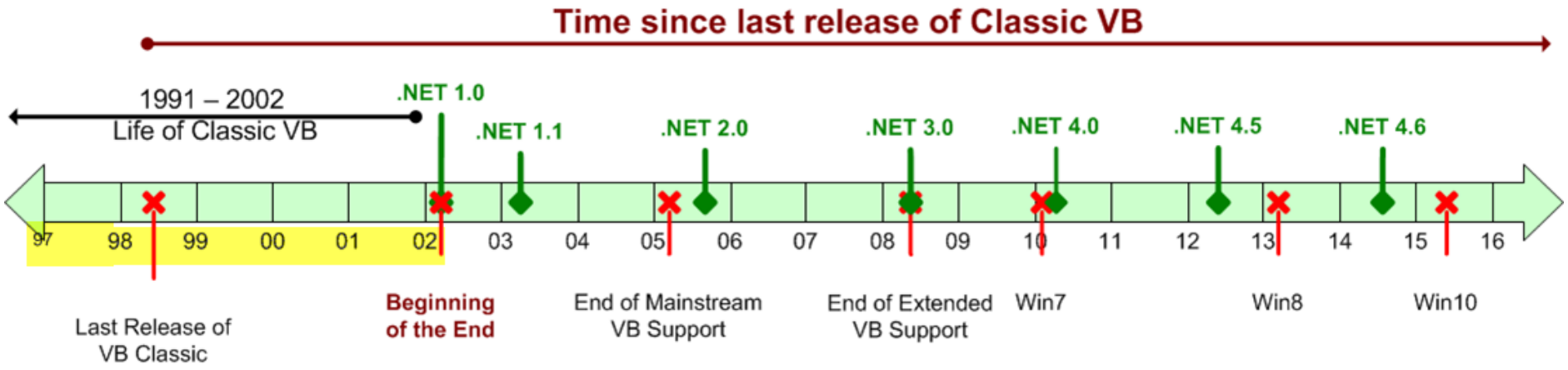
- FAA Information Security and Privacy Program Policy.
- Privacy Policy
- Accessibility – Section 508 Compliance
- FAA Template and Branding
- Editorial Style Guide
- Federal Source Code Policy

Software Environments, Operating Systems



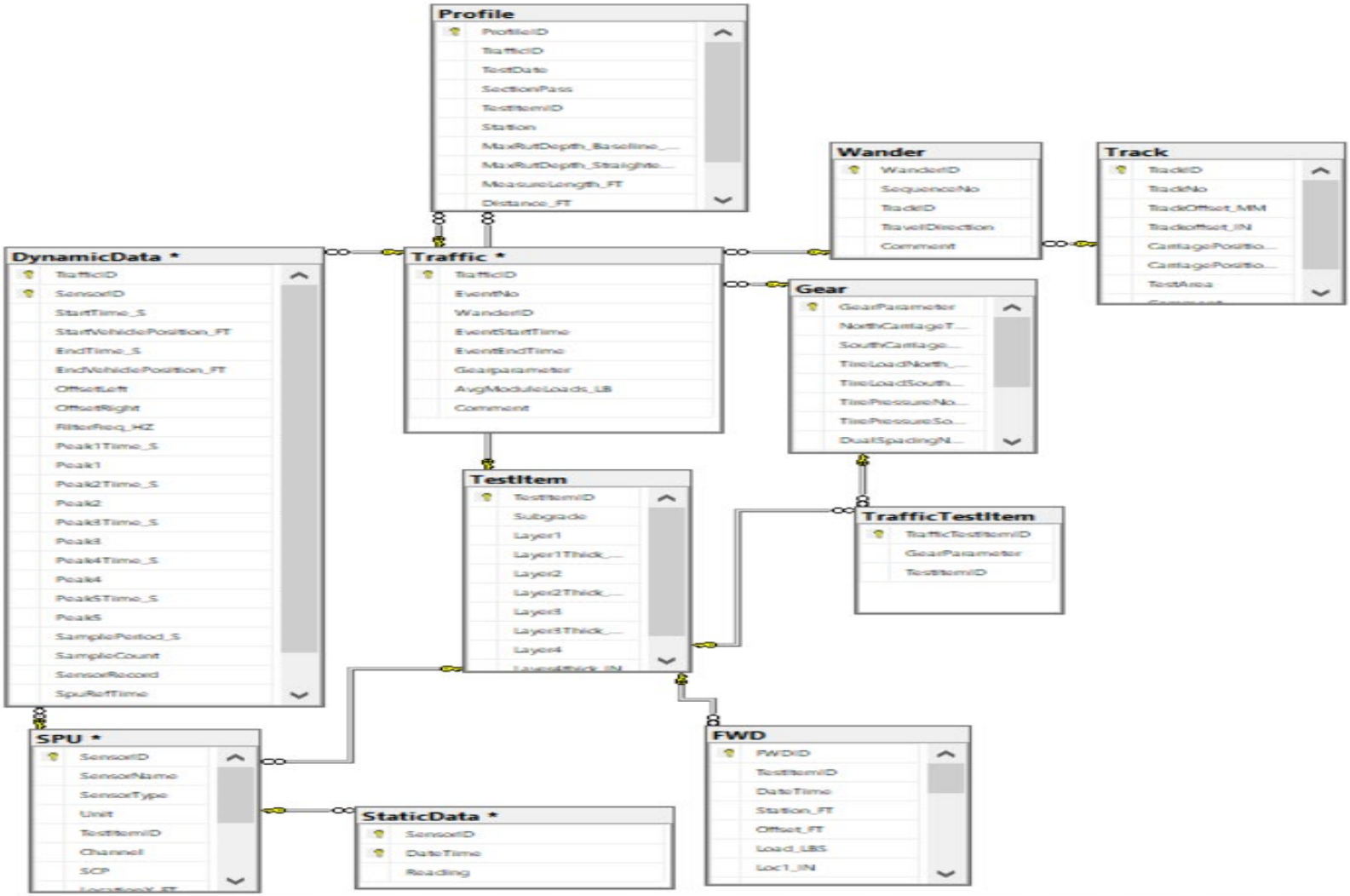
The Windows family tree

Visual Basic Timeline

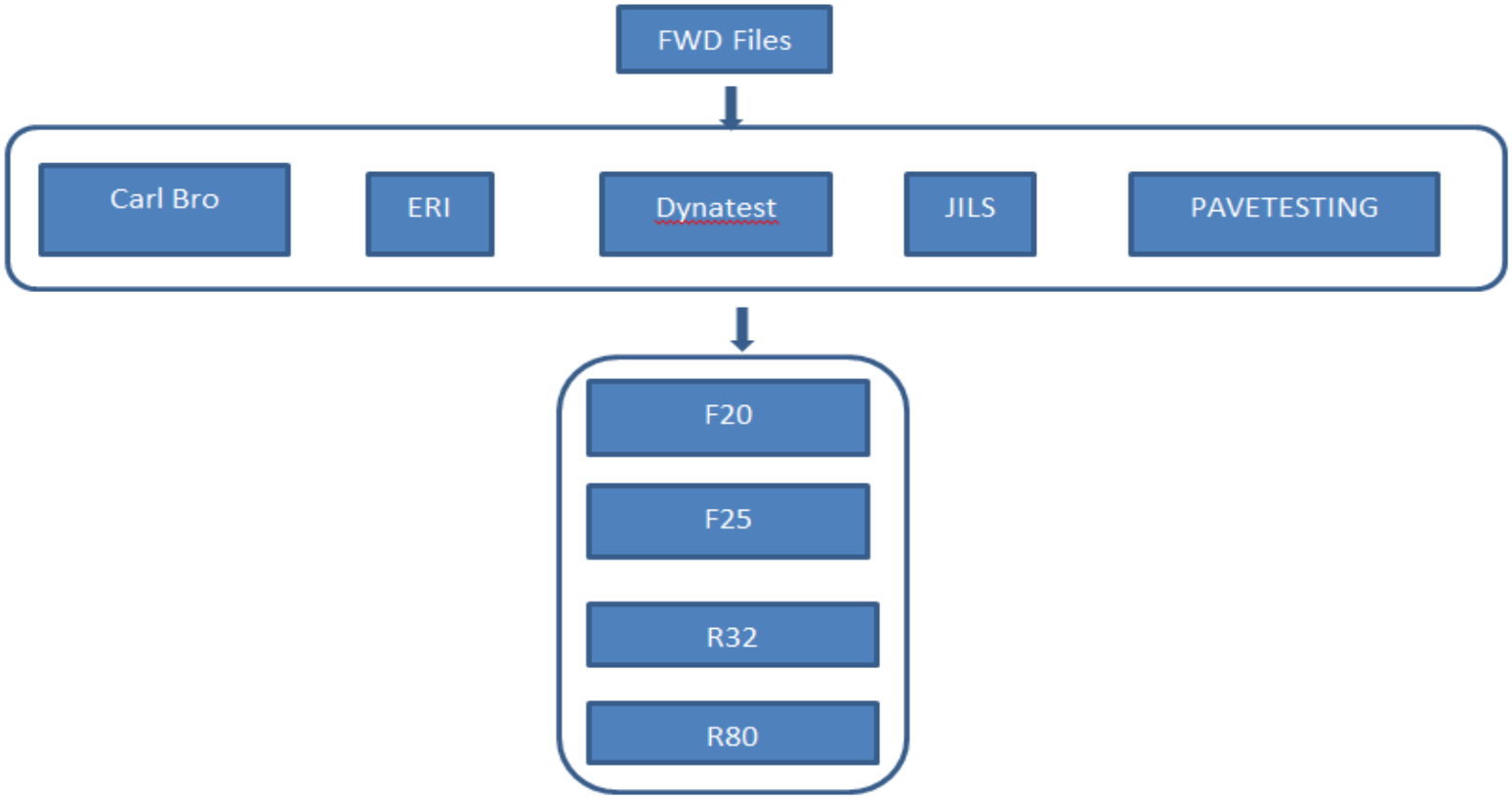


- *“Computers in the future may weigh no more than 1.5 tons.”*
  - Popular Mechanics, forecasting the relentless march of science, 1949
- *"There is no reason anyone would want a computer in their home."*
  - Ken Olson, president, chairman and founder of Digital Equipment Corp., 1977
- "640K ought to be enough for anybody."
  - Bill Gates on computer memory, 1981

CC5 Database Tables and Relationship



FWD File Parsing



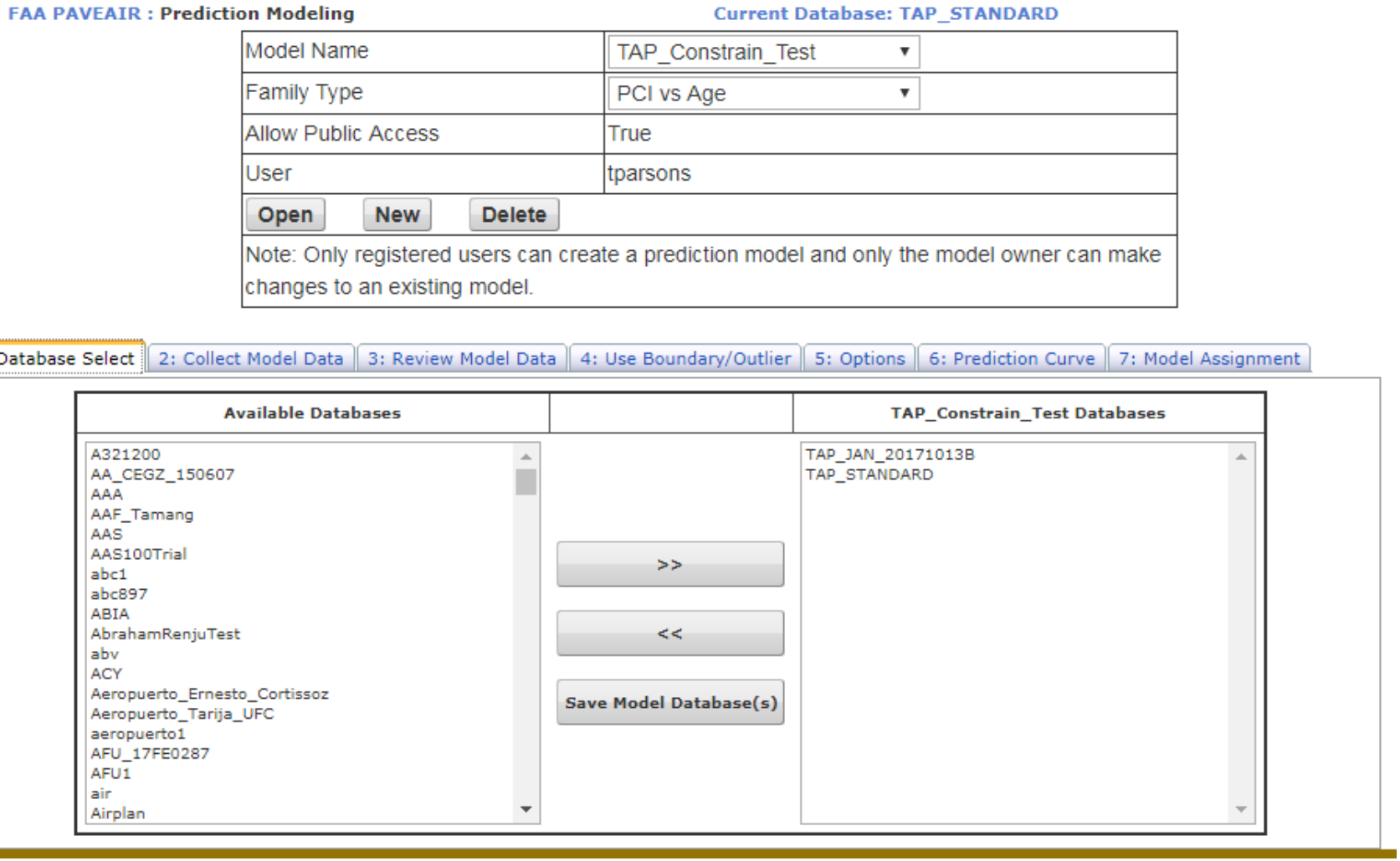
Pavement M&R Cost - Road

PCI	Stopgap	Preventive	Major	Unit
0	$0.60	$1.52	$5.56	ft²
10	$0.39	$1.32	$5.56	ft²
20	$0.29	$0.73	$5.56	ft²
30	$0.21	$0.58	$5.56	ft²
40	$0.19	$0.35	$5.56	ft²
50	$0.14	$0.21	$2.19	ft²
60	$0.11	$0.11	$1.88	ft²
70	$0.09	$0.05	$1.70	ft²
80	$0.06	$0.02	$1.31	ft²
90	$0.01	$0.01	$1.27	ft²
100	$0.00	$0.00	$0.00	ft²

M&R Cost - Airfield

PCI	Stopgap	Preventive	Major	Unit
0	$1.24	$0.57	$8.39	ft²
10	$0.45	$0.47	$8.39	ft²
20	$0.14	$0.42	$8.39	ft²
30	$0.05	$0.23	$8.39	ft²
40	$0.03	$0.14	$8.39	ft²
50	$0.02	$0.08	$1.78	ft²
60	$0.02	$0.04	$1.66	ft²
70	$0.01	$0.02	$1.60	ft²
80	$0.00	$0.01	$1.27	ft²
90	$0.00	$0.01	$1.26	ft²
100	$0.00	$0.00	$0.00	ft²

Multiple Databases in Prediction Model



French


Accueil
Inventaire
Travail
PCI
Modèle prédictif
Analyse d'état
Entretien et réfection (E et R)
Rapports
Cartes
Outils
Connexion
Zone membres
Aide
FAA PAVEAIR
Base de données activeTAP_STANDARD
Bienvenue à FAA PAVEAIR
FAA PAVEAIR est une application Web publique conçue pour aider les organisations dans l'évaluation, la gestion et l'entreien de leurs réseaux de chaussées. PAVEAIR est conçu pour répondre aux exigences d'un système de gestion des chaussées d'aéroport tel
La FAA est heureuse d'annoncer la sortie de FAA PAVEAIR v3.0.2. Cette version inclut plusieurs nouvelles fonctionnalités importantes, telles que: des modèles de prédiction améliorés, un outil d'analyse de condition amélioré, l'utilisation de modèles de prédiction dans la planification d'analyse de condition et de M & R et le support de MicroPAVER e70.
Les questions concernant l'application ou les données peuvent être adressées à Qingge Jia, responsable du programme FAA PAVEAIR, à l'adresse suivante: qingge.jia@faa.gov.
Des détails sur les améliorations apportées à FAA PAVEAIR sont disponibles dans le Journal des changements
Pour les nouvelles et les événements à venir, s'il vous plaît visitez le Nouvelles et Evènements page.
Ouverture de session
Nom d'utilisateur
Mot de passe
Se souvenir de moi la prochaine fois
Ouverture de session
Enregister
Mot de passe oublié?
Bases de données:
Utilisez le bouton "Sélectionner une base de données" ci-dessous pour sélectionner une base de données. Vous devrez vous connecter pour accéder à vos bases de données utilisateur. Les bases de données publiques sont en lecture seule.
Sélectionner une base de données

Spanish

Casa | Inventario | Trabajo | PCI | Modelado de Predicción | Análisis de Condición | M&R | Informes | Mapas | Herramientas | Cerrar sesión | Área de Miembros | Ayuda

FAA PAVEAIR : Condition Analysis

Base de données actuelleTAP_STANDARD

Demonstration network for PAVEAIR seminar, May 2016, South Carolina

Red	Demonstration	Demonstration		
Rama	APRON	Apron		
Sección	01	01	TWA	Hangars

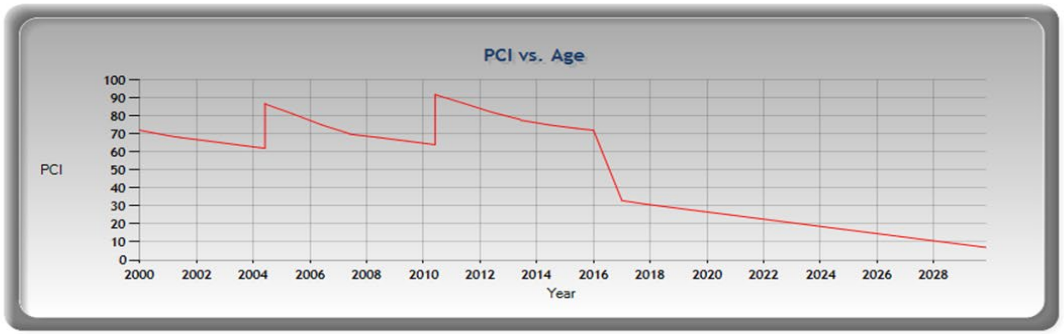
Estado Fecha de Inicio		Años
1/1/2000	(MM/DD/YYYY)	30

Continuar con el nivel de red

Continuar con nivel de rama

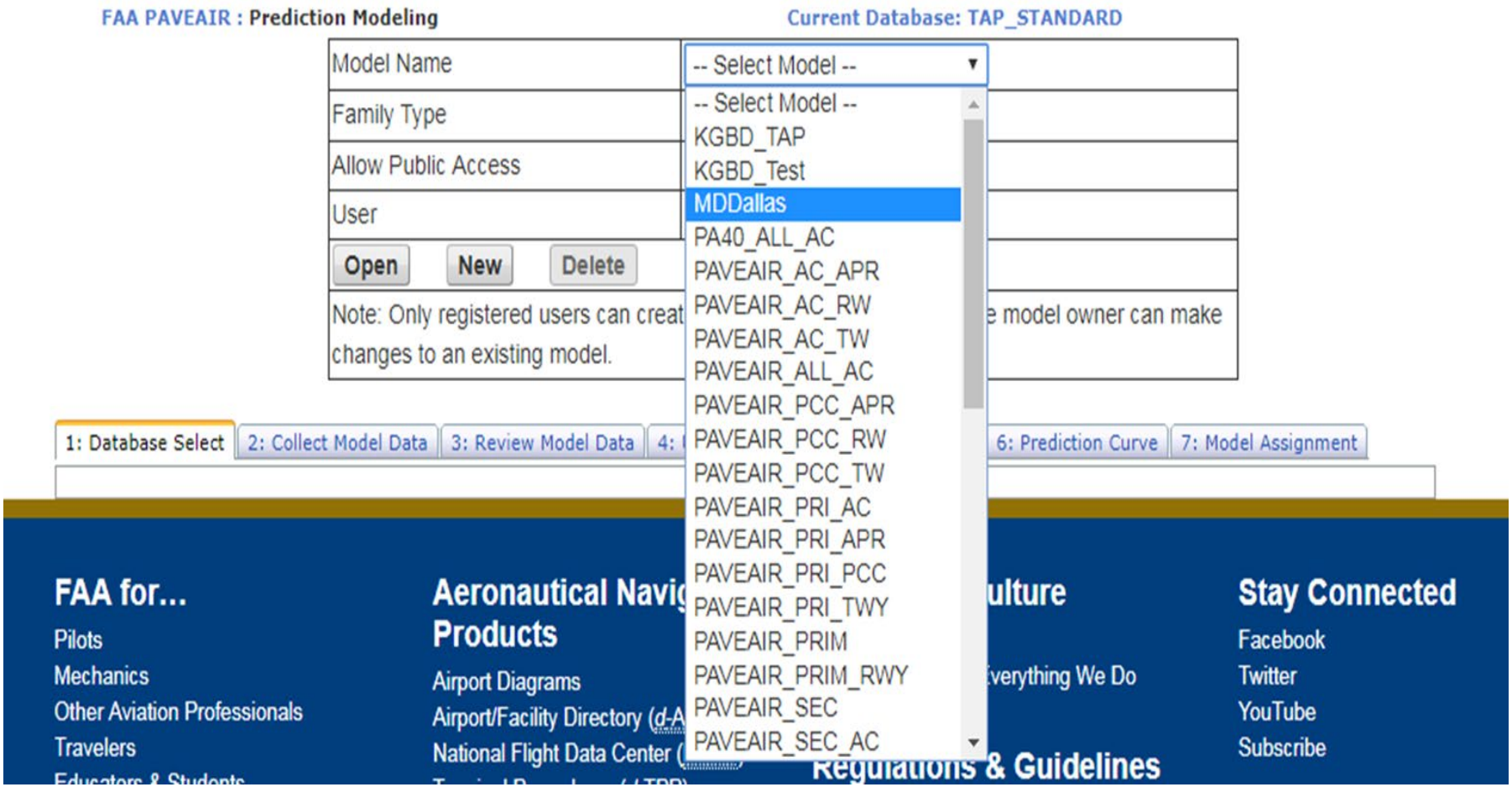
Continuar con el nivel de sección

- (•) Usar curva asignada a la familia
- ( ) Usar la curva estándar degrada 2 puntos por año
- ( ) Usar la curva estándar degrada 3 puntos por año
- ( ) Usar la curva estándar degrada 4 puntos por año
- ( ) Usar la curva estándar degrada 5 puntos por año



Red	Rama	Sección	Fecha	Actividad	PCI	Años	Àrea	Unidad
Demonstration	APRON	01	01-01-2000	Interpolation	72	13	150000	ft²
Demonstration	APRON	01	01-01-2001	Interpolation	69	14	150000	ft²
Demonstration	APRON	01	06-01-2001	Inspection	68	15	150000	ft²

Prediction Modeling Library

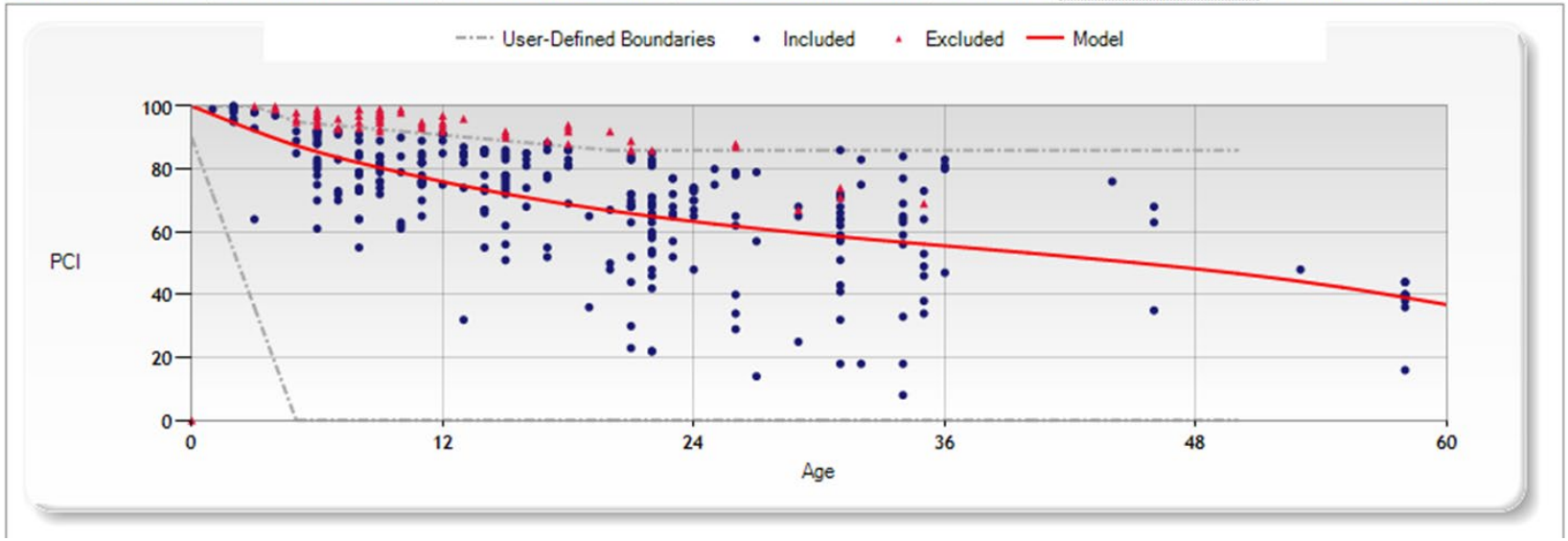


Prediction Model Library – AC, TW

FAA PAVEAIR : **Prediction Modeling** Current Database: TAP_STANDARD

Model Name	PAVEAIR_AC_TW
Family Type	PCI vs Age
Allow Public Access	True
User	fclibrary
Open New Delete	
Note: Only registered users can create a prediction model and only the model owner can make changes to an existing model.	

1: Database Select | 2: Collect Model Data | 3: Review Model Data | 4: Use Boundary/Outlier | 5: Options | 6: Prediction Curve | 7: Model Assignment



Traffic Model – PA40

Home | Inventory | Work | PCI | Prediction Modeling | Condition Analysis | M&R | Reports | Maps | Tools | Extended Life | Logout | Member Area | Help

Current Database: GSO

Network:

GSO

Branch:

RW05L-23R

Start Date:

6/1/2014 The earliest date that data is available is 6/1/2014

End Date:

8/28/2016 The latest date that data is available is 8/28/2016

aircraft like 'a3%' Filter

Show Help

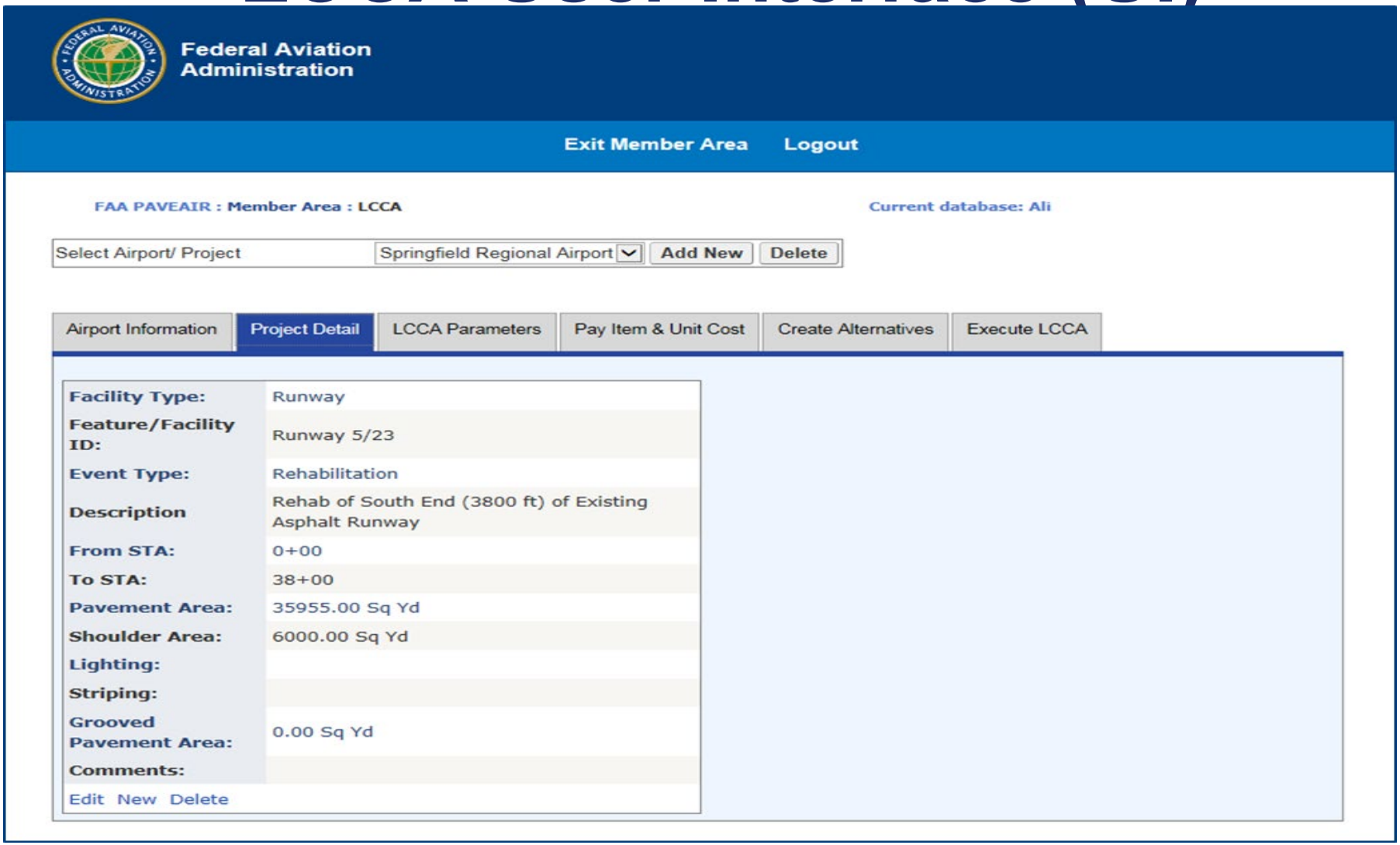
◉Both ○23R ○05L

Run Query

Aircraft	Arrivals	Departures
A306	69	69
A310	12	12
A319	66	63
A320	22	23

Data shown represents 503 days of data between 6/1/2014 and 8/28/2016 (61.3% complete between requested dates 6/1/2014 and 8/28/2016).

LCCA User Interface (UI)

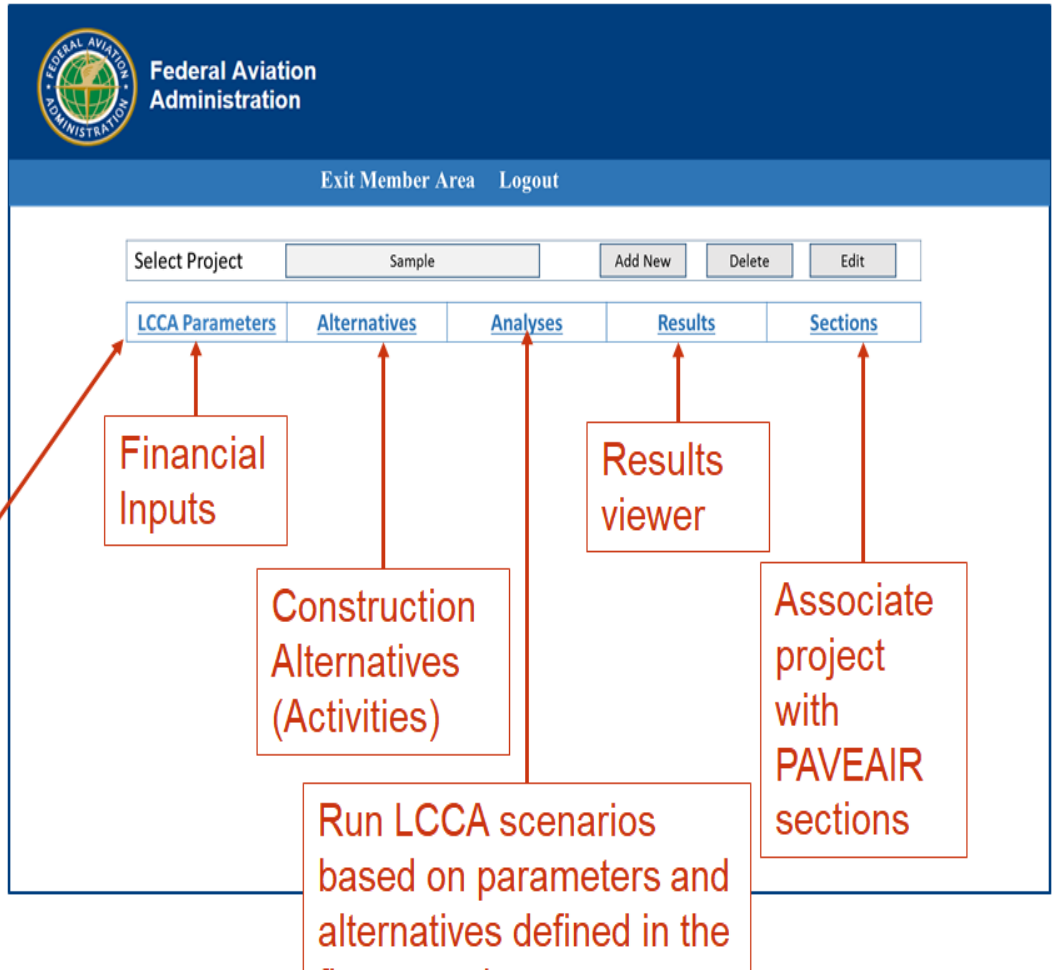


LCCA UI

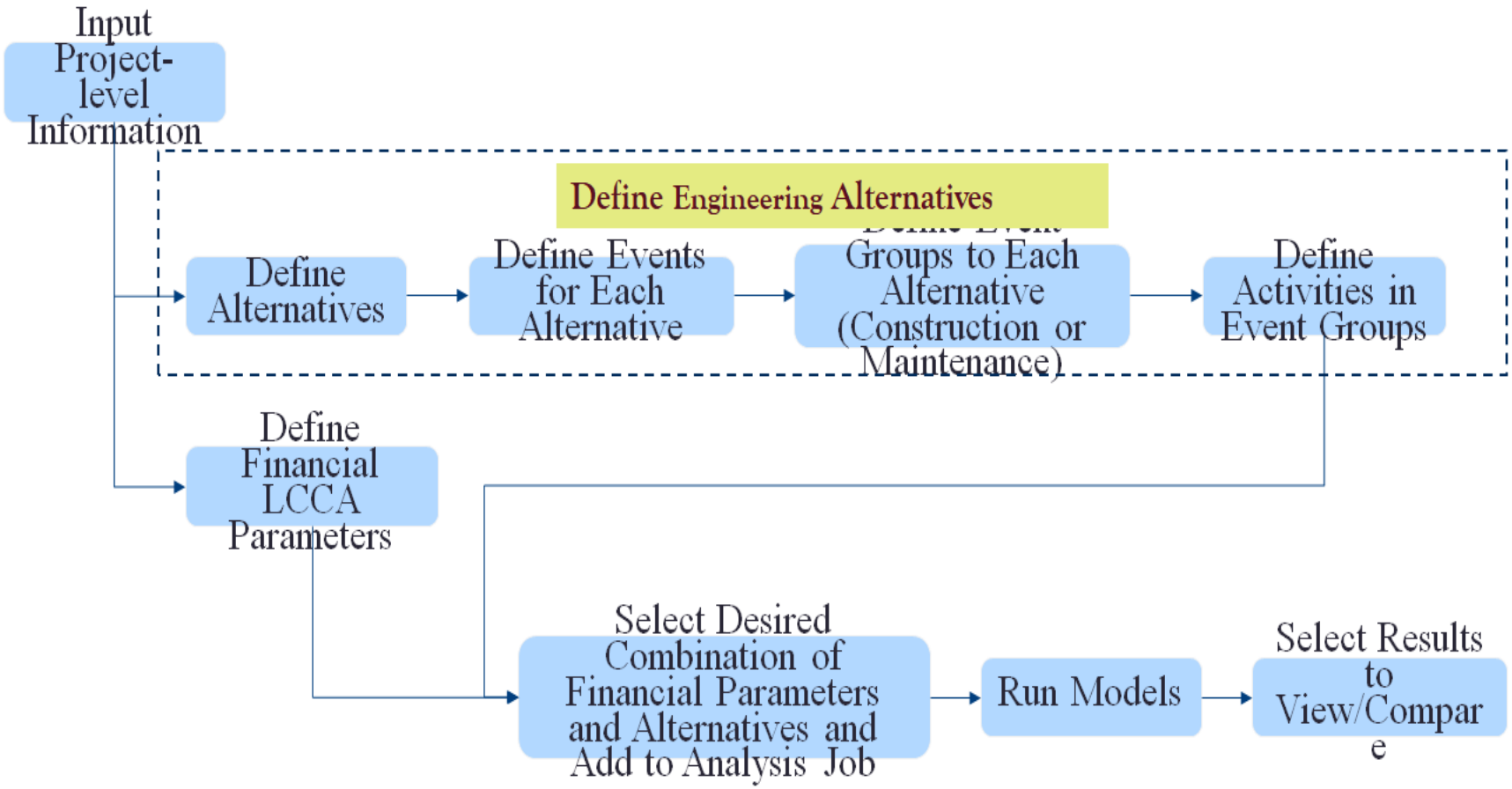
- Drop down lists to open a project

- Add New and Edit to define or edit the general information of a project

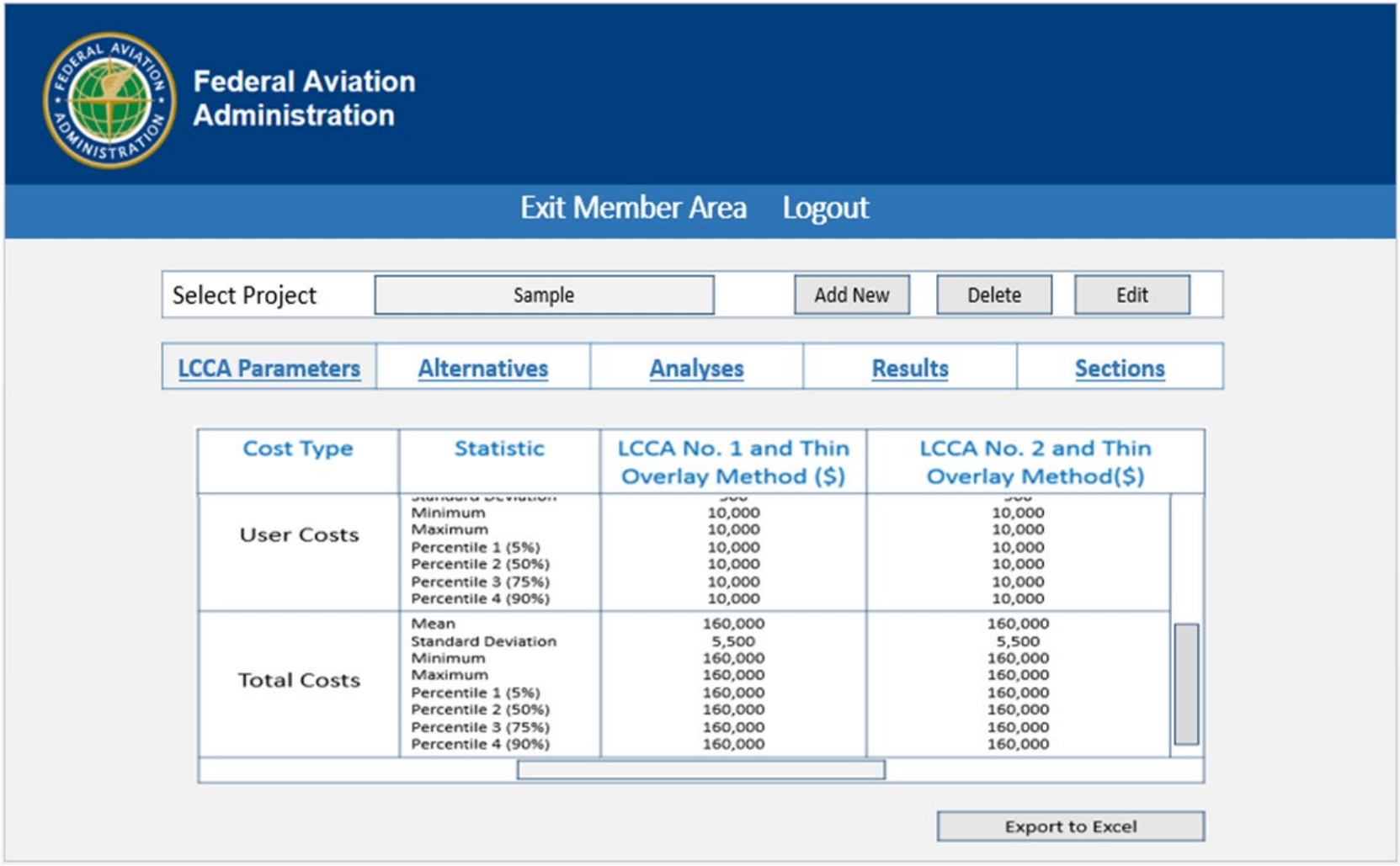
Keep the tab-based interface concept, which is consistent with other parts of PAVEAIR (e.g., M&R and Prediction Modeling)



LCCA Workflow



LCCA Result

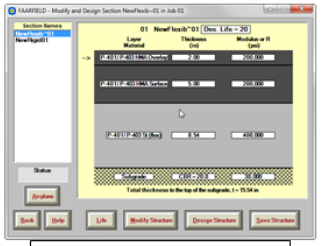


Cost Type	Statistic	LCCA No. 1 and Thin Overlay Method ($)	LCCA No. 2 and Thin Overlay Method($)
User Costs	Minimum	10,000	10,000
	Maximum	10,000	10,000
	Percentile 1 (5%)	10,000	10,000
	Percentile 2 (50%)	10,000	10,000
	Percentile 3 (75%)	10,000	10,000
	Percentile 4 (90%)	10,000	10,000
Total Costs	Mean	160,000	160,000
	Standard Deviation	5,500	5,500
	Minimum	160,000	160,000
	Maximum	160,000	160,000
	Percentile 1 (5%)	160,000	160,000
	Percentile 2 (50%)	160,000	160,000
	Percentile 3 (75%)	160,000	160,000
	Percentile 4 (90%)	160,000	160,000

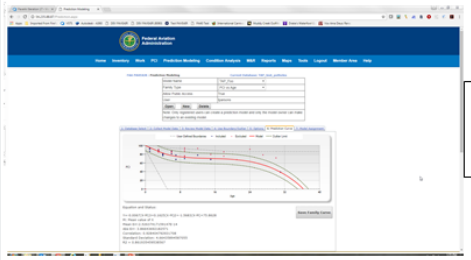
BAKFAA development

- **FWD file parsing**
- **Objected-Oriented Design**
- **UI improvements**

Software Integration



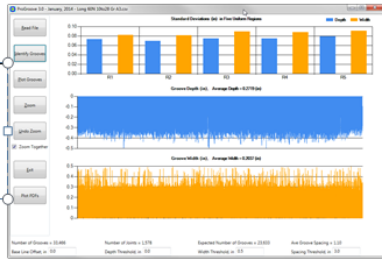
FAARFIELD
Thickness Design
Load Rating

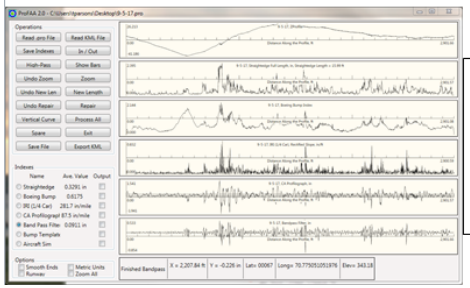


PAVEAIR
PMS Data

Domain Object Model

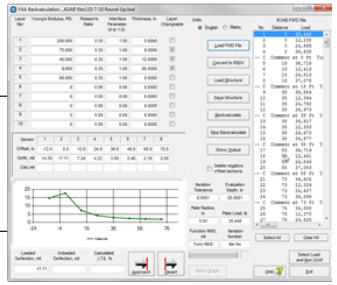
ProGroove
Groove
Condition





ProFAA
Roughness
Condition
Evaluation

BAKFAA
Strength
Evaluation



www.airporttech.tc.faa.gov