Modelo de Estructuras de Navegación para el Tránsito de OpeRaciones (MENTOR)

CONTENTS

WHY did we need MENTOR?: High level user requirements

WHAT is MENTOR exactly?: Objectives and scope, functionalities, results

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WHERE is MENTOR been applied?: Studies and Programmes

MENTOR

WHY?

Air Navigation Directorate
(ATS responsible)

ATM Operations
Directorate

Main Functions include:

- **ATM system monitoring**
- **ATM system optimization**
- **ATM resources planning**

WHAT capacity/demand ratios should be expected?

WHAT ATFM delays should be expected?

Analysis needs, including "What if " capabilities

HOW can I improve my ACC's sector configuration planning?

Optimization needs

MENTOR

WHAT?

MENTOR is a **Macroscopic** simulation tool, based on flight plan data, aiming to support the decision making process in ATFCM.

Actual scenario:

Aena's flight plan data base

Aena's Airspace structure data base

User defined scenario:

MENTOR flight plan builder

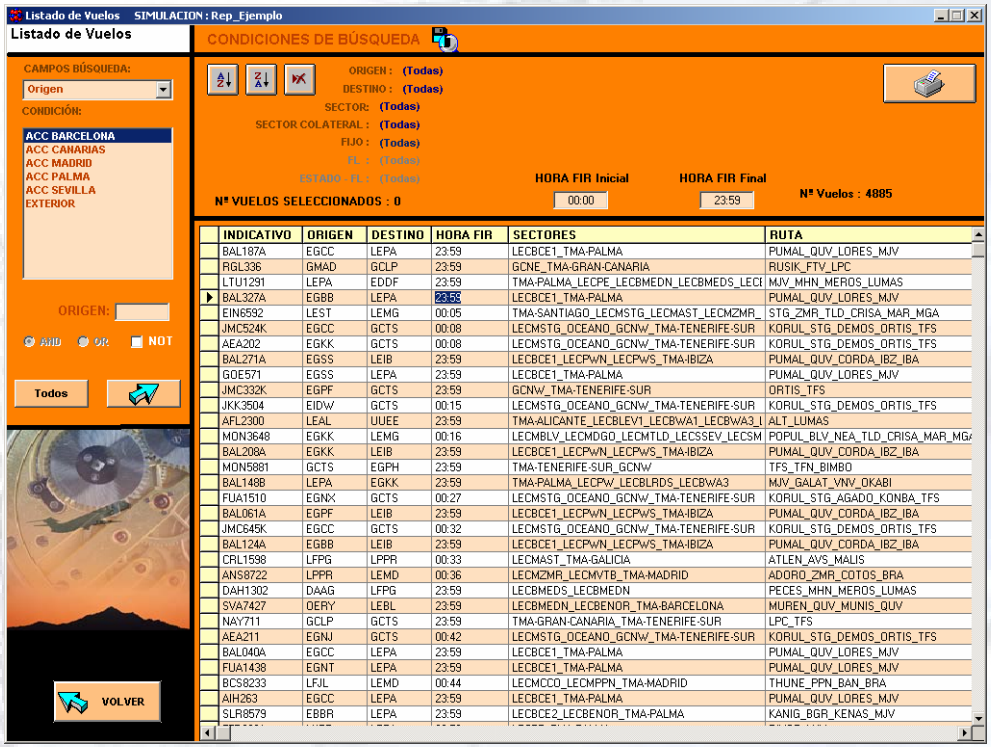
MENTOR Airspace structure builder

Output:

- **Traffic load**
- **ATFM Delay (CFMU emulation)**
- **Optimum sector configuration**

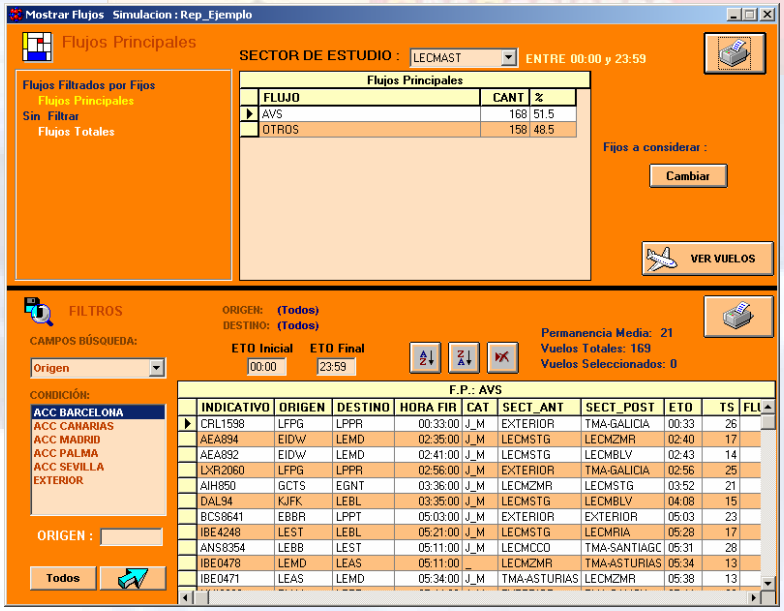
Metrics

METRICS: STATISTICS

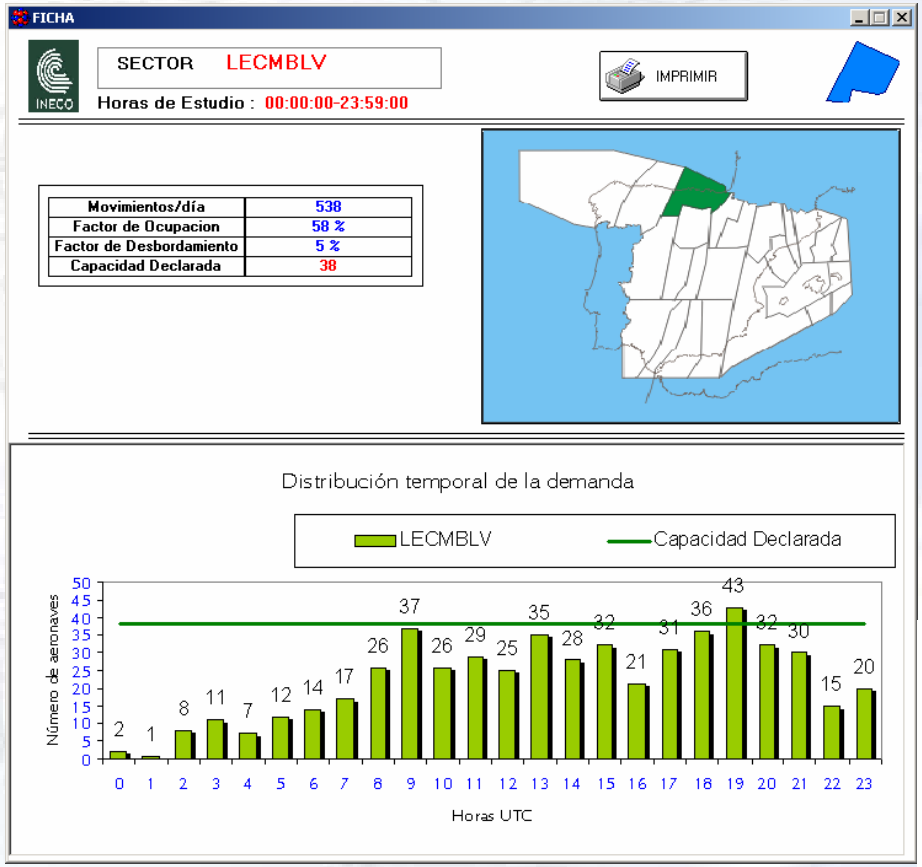


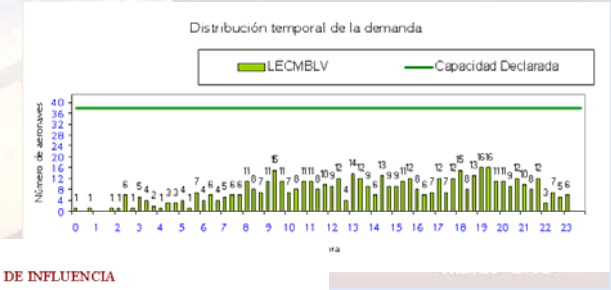
FLIGHT PLAN DATA

ROUTE AND FLOWS LOAD

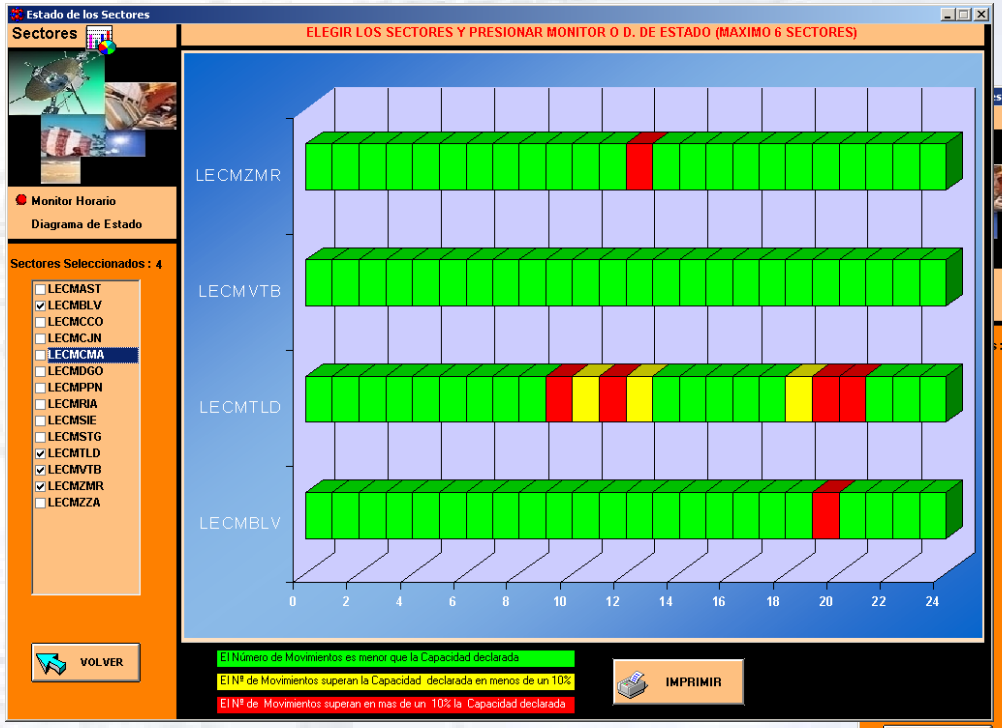


METRICS: SECTOR CHARACTERIZATION



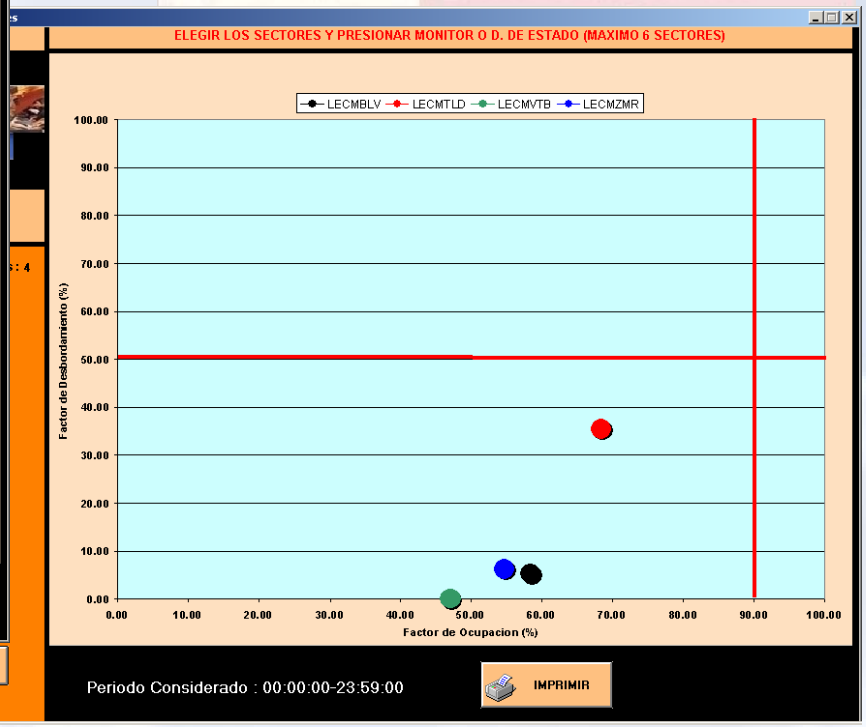


METRICS: SECTORS COMPARED

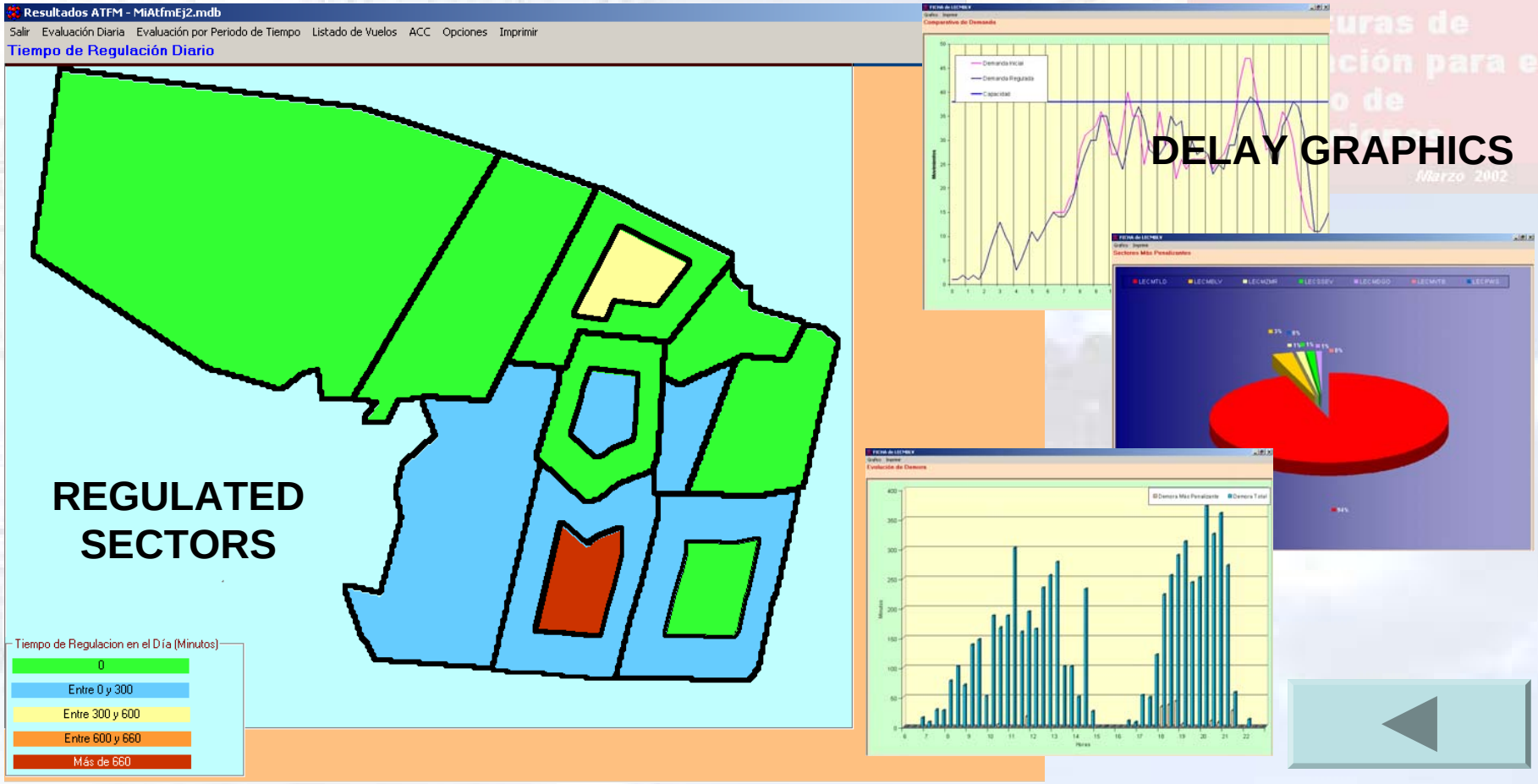


HOURLY MONITOR

EFFICIENCY DIAGRAM



METRICS: ATFM



METRICS: SECTOR CONFIGURATION OPTIMIZATION

	NIGHT						MORNING							AFTERNOON							NIGHT			
Reference Week	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Monday, 26/07/04	1	1	1	1	3C	5A	4A	4A	3A	3A	3A	5B	5B	3A	3A	3A	5B	5B	5B	4A	2A	2A	1	1
Tuesday, 27/07/04	1	1	1	1	2A	4C	5B	5B	6A	5A	5A	5A	5A	3C	3C	3C	5B	5B	5B	4A	2A	1	1	1
Wednesday, 28/07/04	1	1	1	1	3C	5A	5A	5A	4A	4A	4A	5A	5A	4A	2A	5A	5A	5A	5A	5A	2A	1	1	1
Thursday, 29/07/04	1	1	1	1	3C	4A	4A	4A	4A	4A	3A	5B	5B	2A	2A	2A	5B	5B	5B	3A	2A	1	1	1
Friday, 30/07/04	1	1	1	1	3C	5B	6A	6A	5A	5A	5A	5A	6B	5A	3A	3A	5A	5A	5A	5A	4A	2A	1	1
Saturday, 31/07/04	1	1	1	1	3C	5A	6A	6A	6B	6B	6A	6A	5A	5A	6A	6A	6A	5A	5A	5A	5A	2A	2A	1
Sunday, 01/08/04	2A	2A	1	1	4C	6A	6A	6A	6A	5A	5A	6A	6A	5C	5C	6A	5A	5A	5A	5A	5A	4A	1	1

METRICS: SECTOR CONFIGURATION OPTIMIZATION

11:00 H — 12:00H — 13:00 H

1 hour

1 hour

1 hour

1 hour

LECMAPP

4C	LECMARR	80%	83%	95%	103%
	LECMDIR	82%	80%	98%	101%
	LECMEN	98%	101%	115%	117%
	LECMWES	79%	75%	81%	90%

METRICS: SECTOR CONFIGURATION OPTIMIZATION

11:00 H — 12:00H — 13:00 H

LECMAPP

		1 hour	1 hour	1 hour	1 hour
4C	LECMARR	80%	83%	95%	103%
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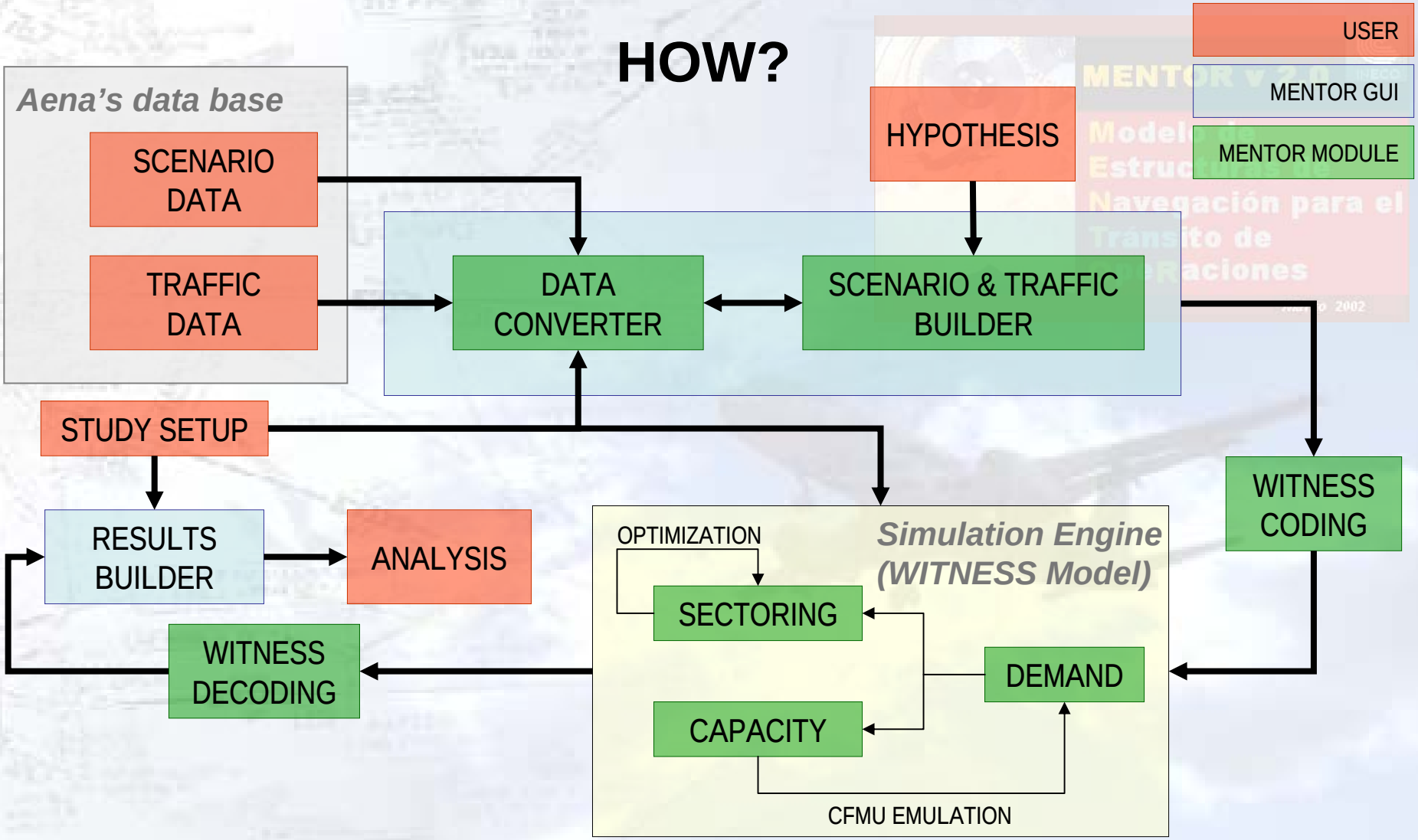
	LECMWES	79%	75%	81%	90%

5	LECMARR	95%	103%
	LECMDIR	98%	101%
	LECMEST	81%	86%
	LECMNOR	85%	87%
	LECMWES	81%	90%

MENTOR

HOW?


USER
MENTOR GUI
MENTOR MODULE
Aena's data base
SCENARIO DATA
TRAFFIC DATA
HYPOTHESIS
DATA CONVERTER
SCENARIO & TRAFFIC BUILDER
STUDY SETUP
WITNESS CODING
RESULTS BUILDER
ANALYSIS
OPTIMIZATION
Simulation Engine (WITNESS Model)
SECTORING
DEMAND
CAPACITY
CFMU EMULATION
WITNESS DECODING

WHERE?

Demo

MENTOR v2.0 is installed:

In all the Spanish ACC's (5) with 2 licenses available (FMP and Head of Operations).

Used for:

- **Find out capacity bottlenecks**
- **Forecast ATFM delays**
- **Assess tactical proposals (re-routing, level capping…)**

In the Spanish Air Navigation Headquarters.

Used for:

- **Assess strategic proposals (Airspace design)**
- **Strategic sector configuration planning**