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Onsite Incident Detection

VIRTUAL AUDITOR
Artificial Intelligence

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The challenge

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01 The challenge. Introduction

Where we start from

Currently the Telco Sector has:

- Employees in office
- External employees for network maintenance and deployment.

These **network maintenance and deployment jobs** are risky jobs, and companies perform controls on them through **field audits**. Audits perform inspections and detect whether the run or installation is flawed.

In addition, **contracts executing the risk work carry out their own inspections** and send reports with the volume of inspections carried out and the percentage of inspections in which they have been found if the execution is poorly performed or the installation has any defects.

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01 The challenge. VIRTUAL AUDITOR

STARTING POINT

MVP

Audits are performed randomly and provide limited value.

The most problematic sites and work teams do not receive special attention, which is detrimental to the overall effectiveness of the system.

Many errors in data collection that make it difficult to make the right decisions are unknown.

There are no technological elements to support business decision-making.

Make a more optimal use of available audit resources.

Reduce the number of work and site incidents by forecasting the incidents that will take place in each facility.

Improved control of incidents at each site and incurred by each team.

Development and evolution of Artificial Intelligence algorithms, simple maintenance, and with potential to expand to different areas within the work of Occupational Risk Prevention, among others.

Use of model predictions to improve the results of current audits.

Improved management of field work audits.

Prioritization of the review of facilities where incidents are predicted.

Deeper inspection of work/sites where incidents are predicted.

Minimization of equipment costs in the field, and maximization of their effectiveness.

PROBLEM | **CHALLENGE** | **SOLUTION** | **VIRTUAL AUDITOR**

The "virtual auditor" combines the knowledge of all auditors working in the Sector and the learnings learned from all the supervised work in recent years. In this way, with the appropriate variables that define each work, the probability of finding something significant in the performance of the work or in the situation of the facilities can be assessed prior to its realization.

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02
The solution

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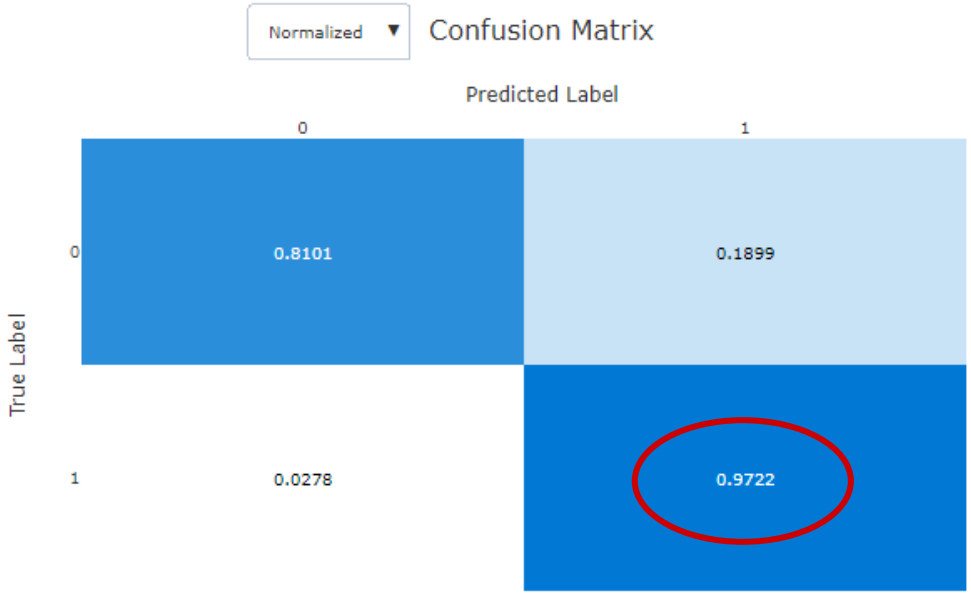
02 The solution. Determining the metric to optimize

Objective: to minimize False Negatives (it is predicted that there will be no incidence and in the end there is)

Metric used: Recall (minimizes False Negatives)

$$\text{Recall} = \frac{\text{True Positives}}{\text{True Positives + False Negatives}}$$

Reality \ Prediction	**0**	**1**
0	TN	FP
1	**FN**	TP



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02 The solution. Determination of input variables and more appropriate algorithm

Ejecutar	Id. de ejecución	Experimento	Estado
Ejecución 2...	AutoML_7b9dd0d2-cc50-43d1-9597-42...	ChoosingBestAlgV...	Completed
Ejecución 2...	AutoML_7fb8d1d7-0252-4a30-8650-4f1...	ChoosingBestAlgV...	Completed
		estAlgV...	Completed
		estAlgV...	Completed
		estAlgV...	Completed
			Completed
			Completed
			Completed
			Completed
			Completed

Nombre del algoritmo	Explicado	Valor ponderado de pun...	Muestreo	Ejecutar	Creada
MaxAbsScaler, SGD	Ver explicación	0.89219	100.00 %	Ejecución 3...	Nov 2, 2020 4:33 PM
MaxAbsScaler, LogisticRegression		0.89154	100.00 %	Ejecución 4...	Nov 2, 2020 4:43 PM
MaxAbsScaler, SGD					
MaxAbsScaler, LogisticRegression					
StandardScalerWrapper, LogisticRegressio					
StandardScalerWrapper, LogisticRegressio					
StandardScalerWrapper, LogisticRegressio					
StandardScalerWrapper, LogisticRegressio					
StandardScalerWrapper, SGD					

EJECUTANTE	TIEMPO	AUDITORÍA	Recall	
			EMPLAZAMIENTO	TRABAJO
Sin	Sin	Separada	0.9167	0.7436
Con	Sin	Separada	0.9444	0.6923
Sin	Con	Separada	0.9722	0.7692
Con	**Con**	**Separada**	**0.9722**	**0.7692**
Sin	Sin	Combinada	0.5902	
Con	Sin	Combinada	0.5823	
Sin	Con	Combinada	0.6174	
Con	Con	Combinada	0.6111	

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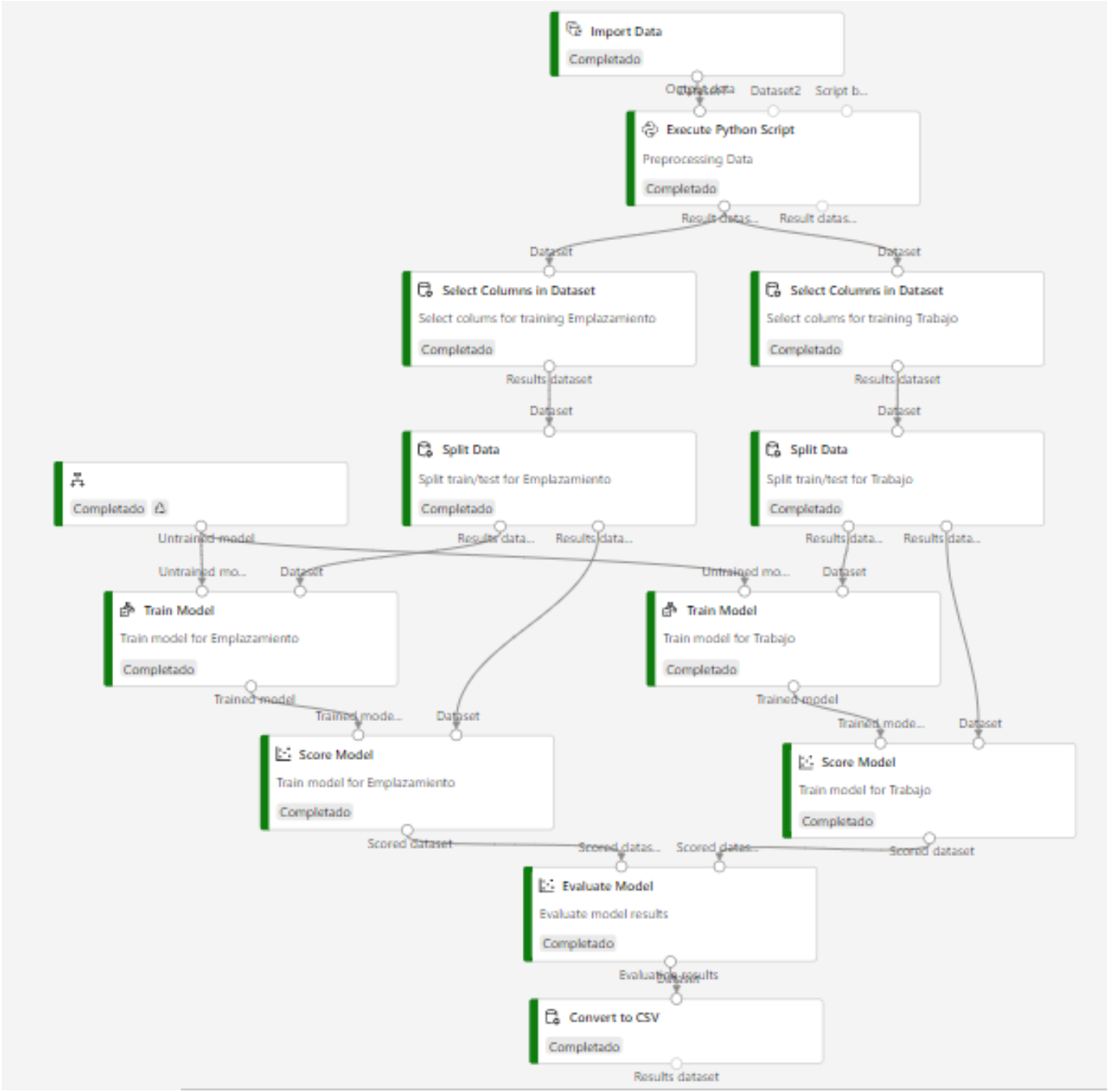
02 The solution. Training Pipeline



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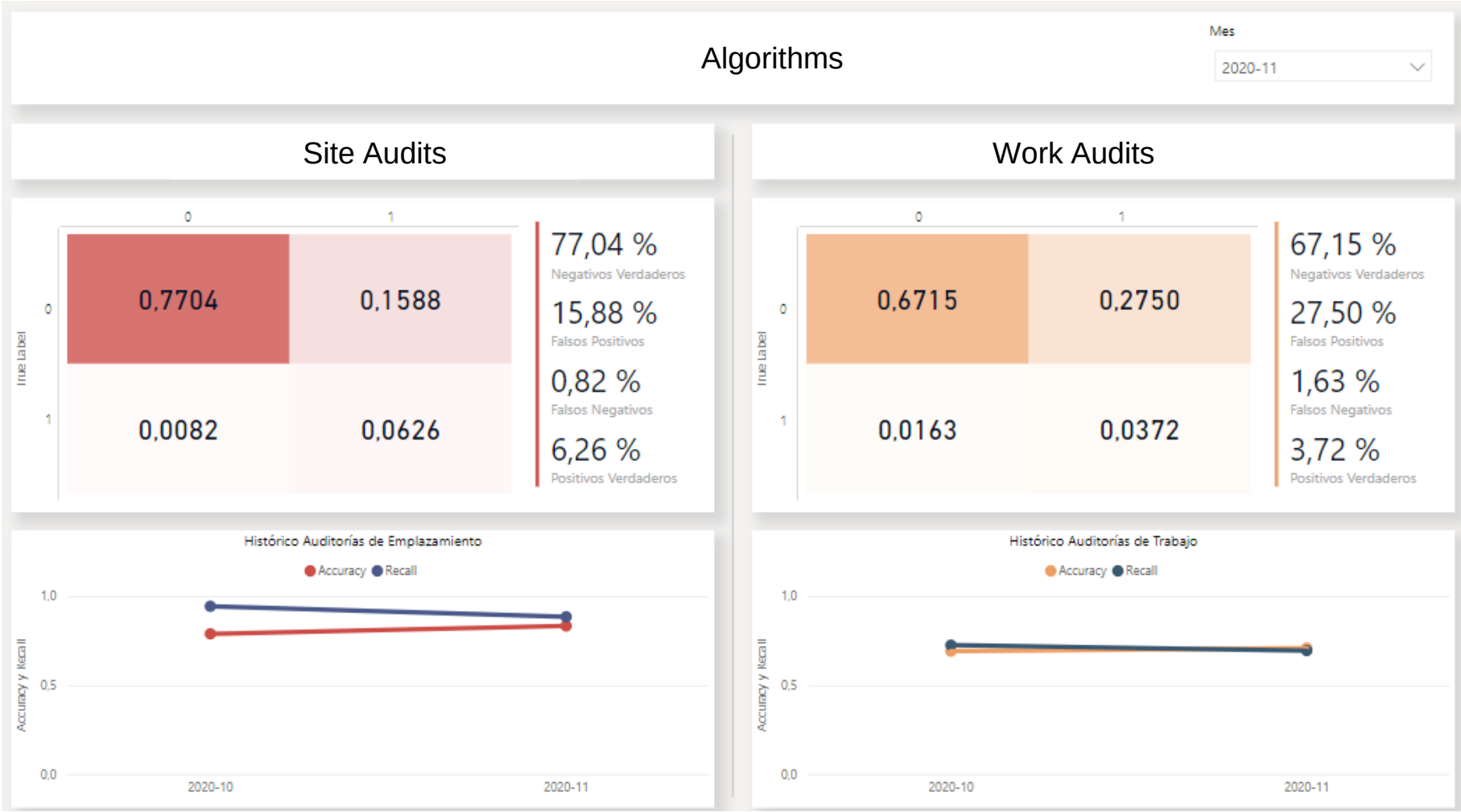
02 The solution. Monitoring consumption algorithms in a BI



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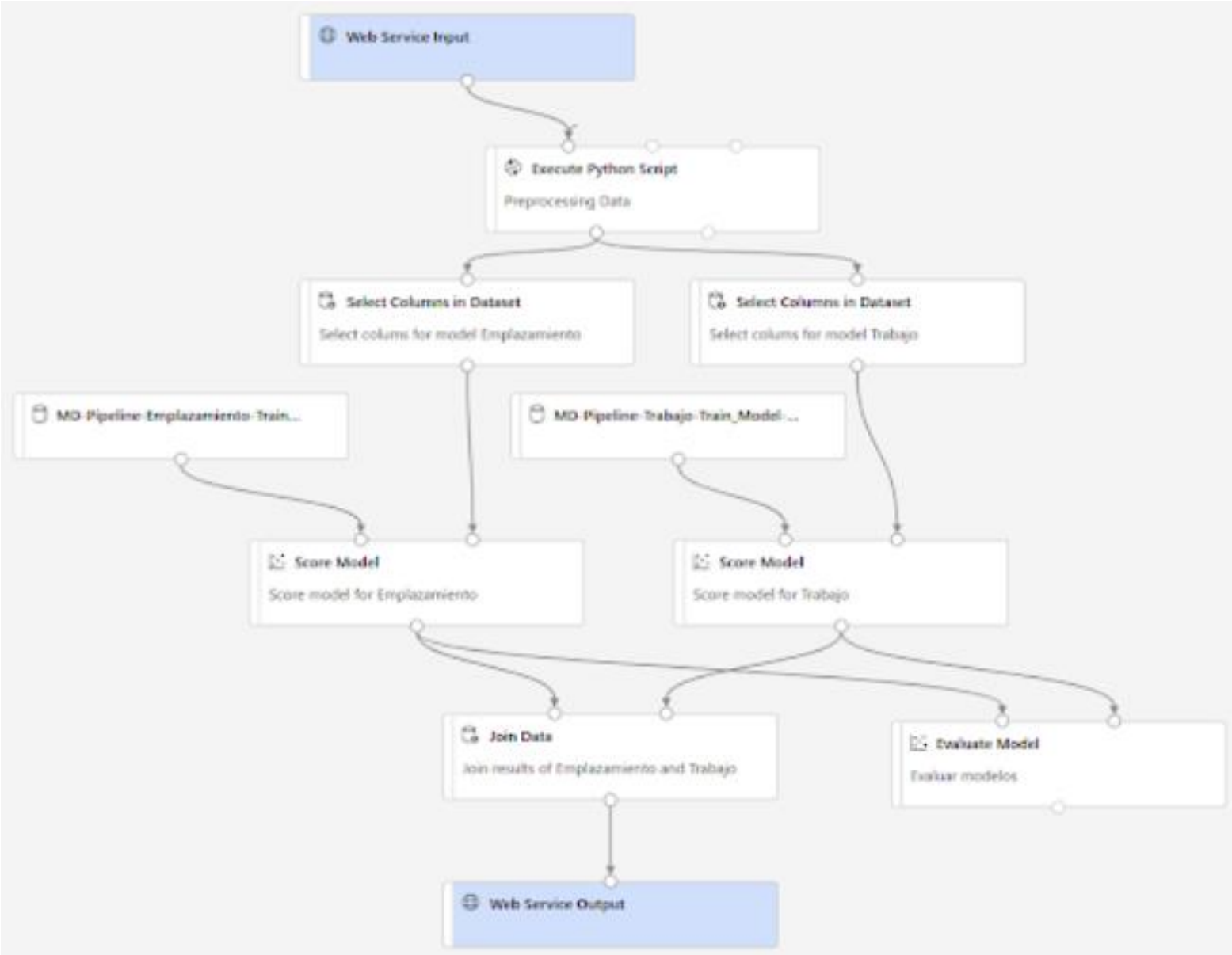
02 The solution. Working Pipeline



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02 The solution. Call to incidence predictor

Llamada :

Para llamar al algoritmo y que prediga si habrá una incidencia o no, dado los siguientes campos: Departamento, Provincia, Servicio, Ejecutante y Tier, se utilizará la siguiente llamada POST:

Endpoint URL =

Header =

```
{ 'Content-Type':'application/json', 'Authorization':('Bearer pif3N1uPq9jmxlVE0FiBdMln6HS694cd')}
```

Body =

```
{
        "Inputs": {
                "input1": [
                        {
                                "DEPARTAMENTO":
                                "PROVINCIA": '
                                "SERVICIO":
                                "EJECUTANTE":
                                "TIER":
                        }
                ]
        }
}
```

Input variables

Response:

La llamada dará la siguiente respuesta:

```
{
        "Results": {
                "output1": [
                        {
                                "Probability Emplazamiento": 0.0013537874887658875,
                                 "Probability Trabajo": 0.11077880818164025
                        }
                ]
        }
}
```

Output variables

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03
Business Impact of Algorithms

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03 Business Impact of Algorithms

1. Prioritize audits to jobs/sites where incidents are predicted.

2. Increased attention to work/sites where incidents are predicted.

3. Find more incidents without visiting more sites.

4 . Increasing the effectiveness of inspection equipment without increasing their cost.

5. By detecting more incidents, more incident data will be generated.

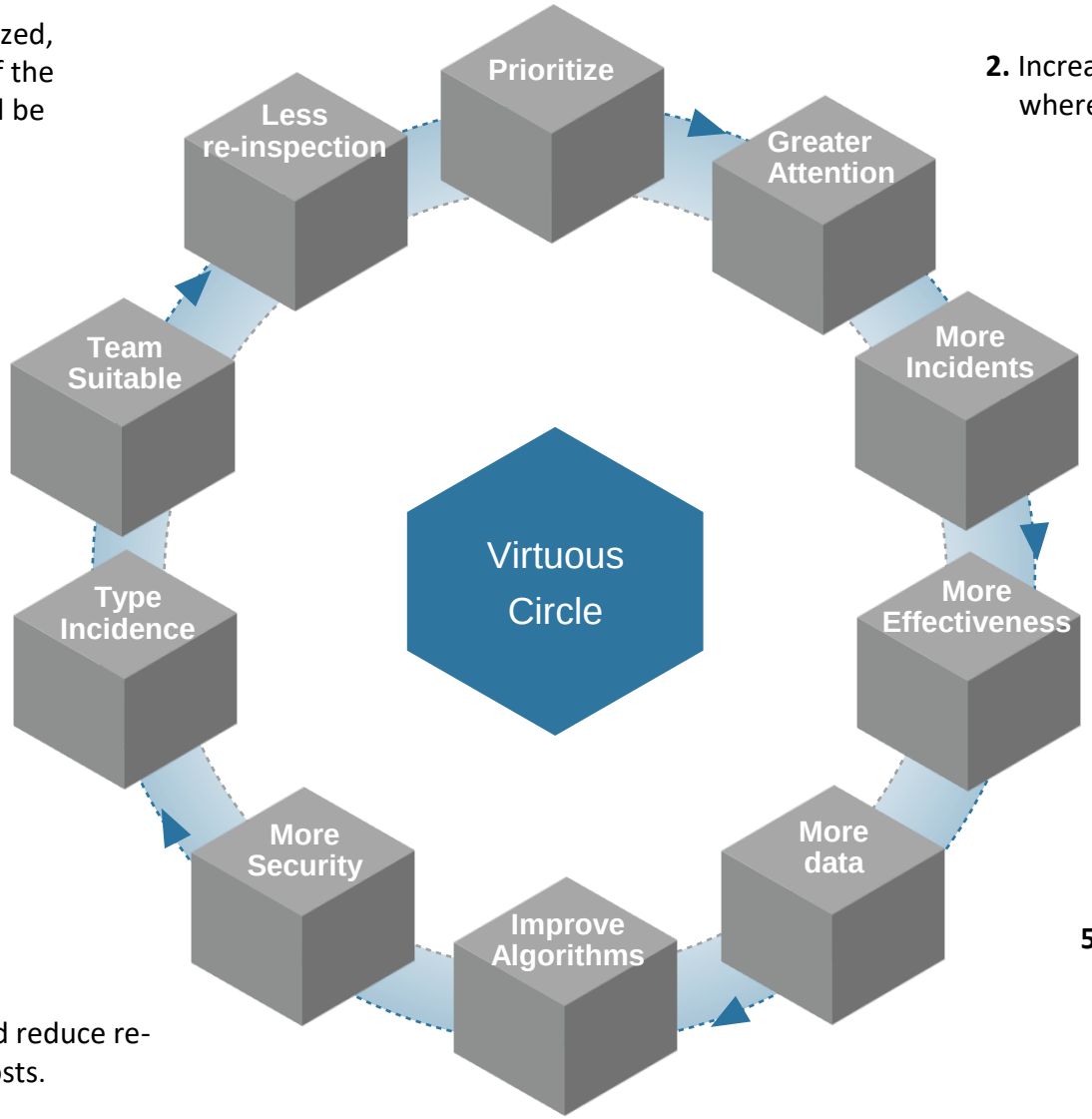
6. Improve the efficiency of algorithms by predicting incidents.

7. Increase safety and reduce re-inspection costs.

8. More incident data will allow current prediction models to evolve and the type of incidence to occur may be predicted.

9. It may be sent to the appropriate equipment on each occasion.

10. Costs will be minimized, and the effectiveness of the equipment shipped will be maximized.



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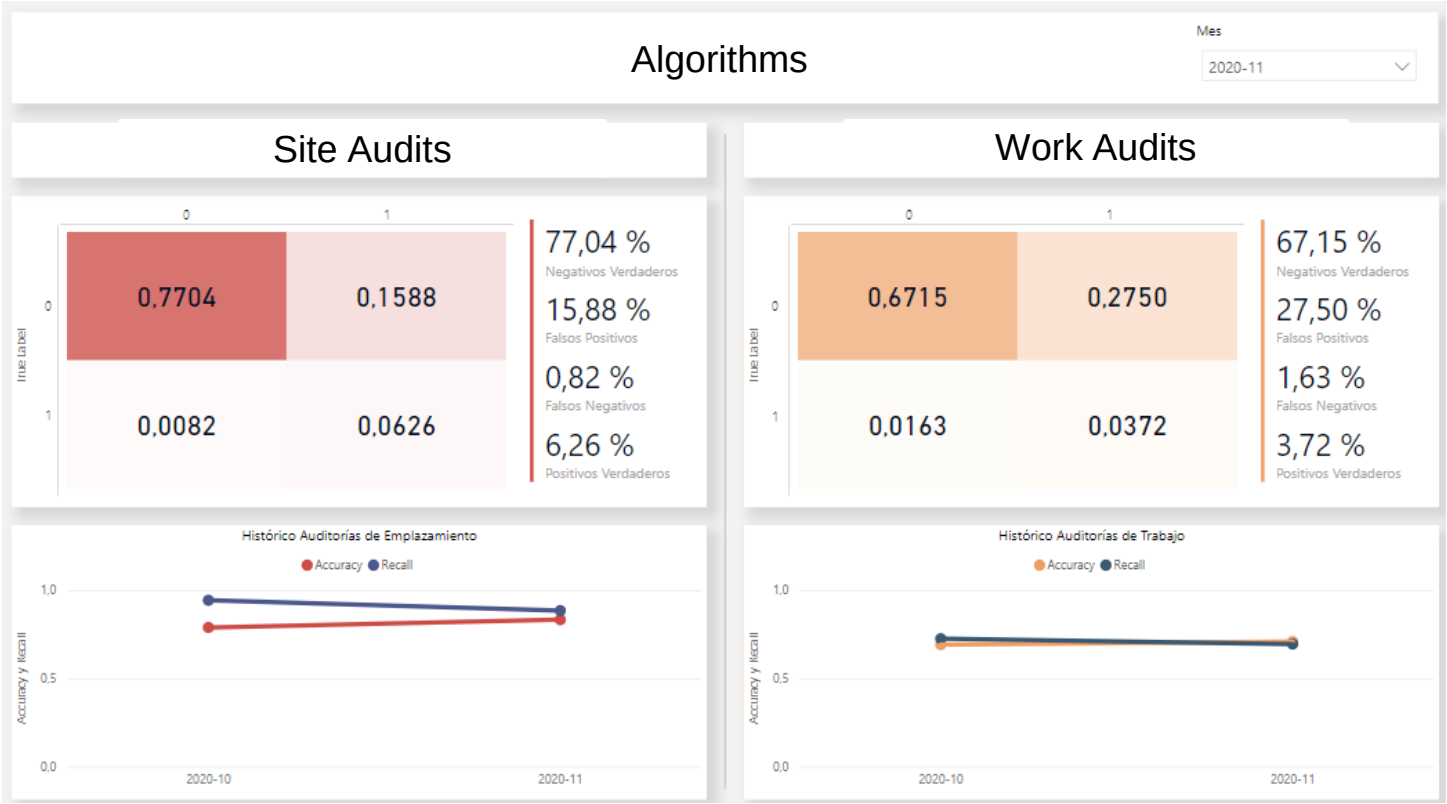
03 Business Impact of Algorithms

BI reporting of algorithms allows you to:

- Determine the audits to be carried out with the greatest/least need (**Audit traffic light**).
- **Monitor the improvement of algorithm predictions** over time



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04
BI Reporting

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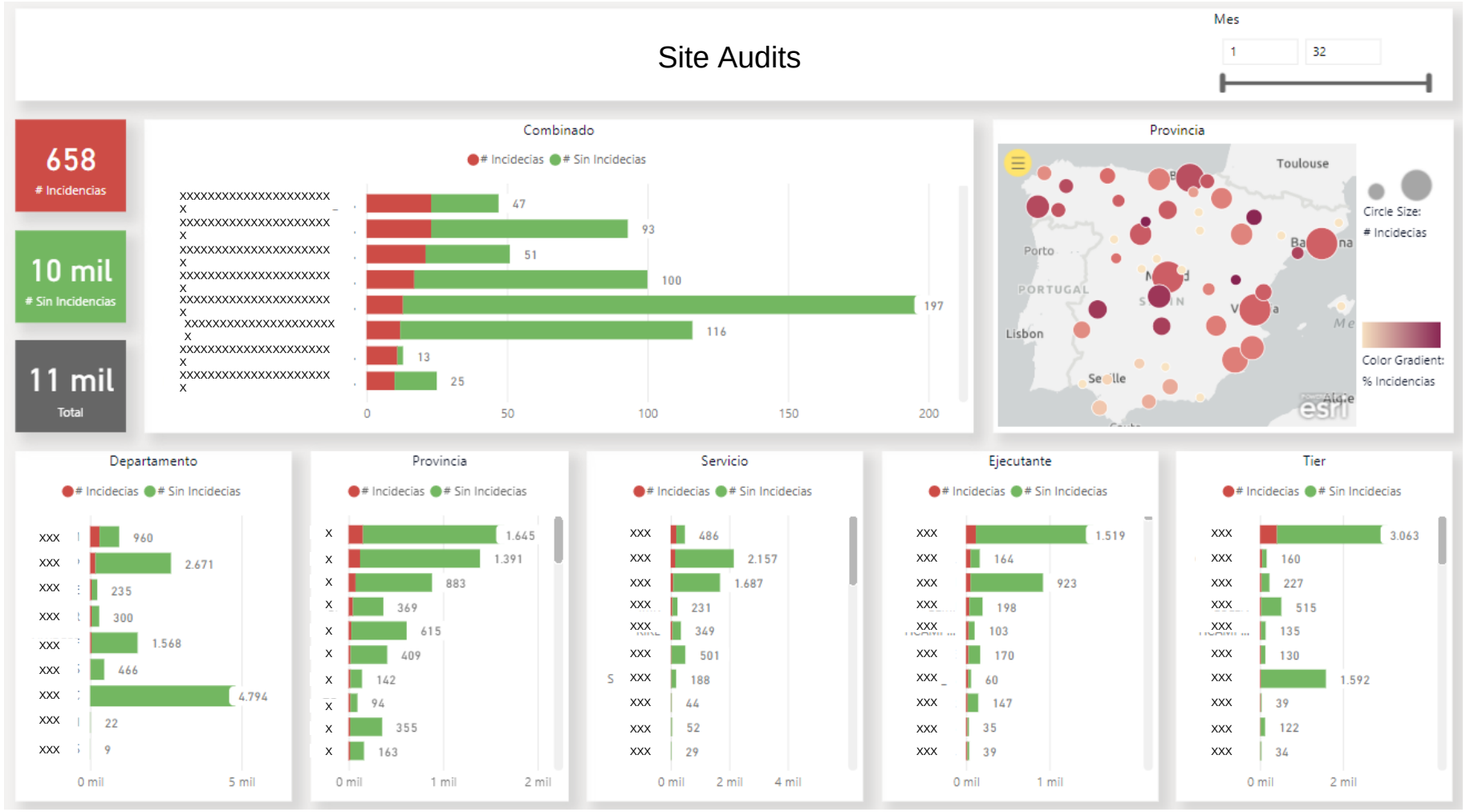
04 BI Reporting



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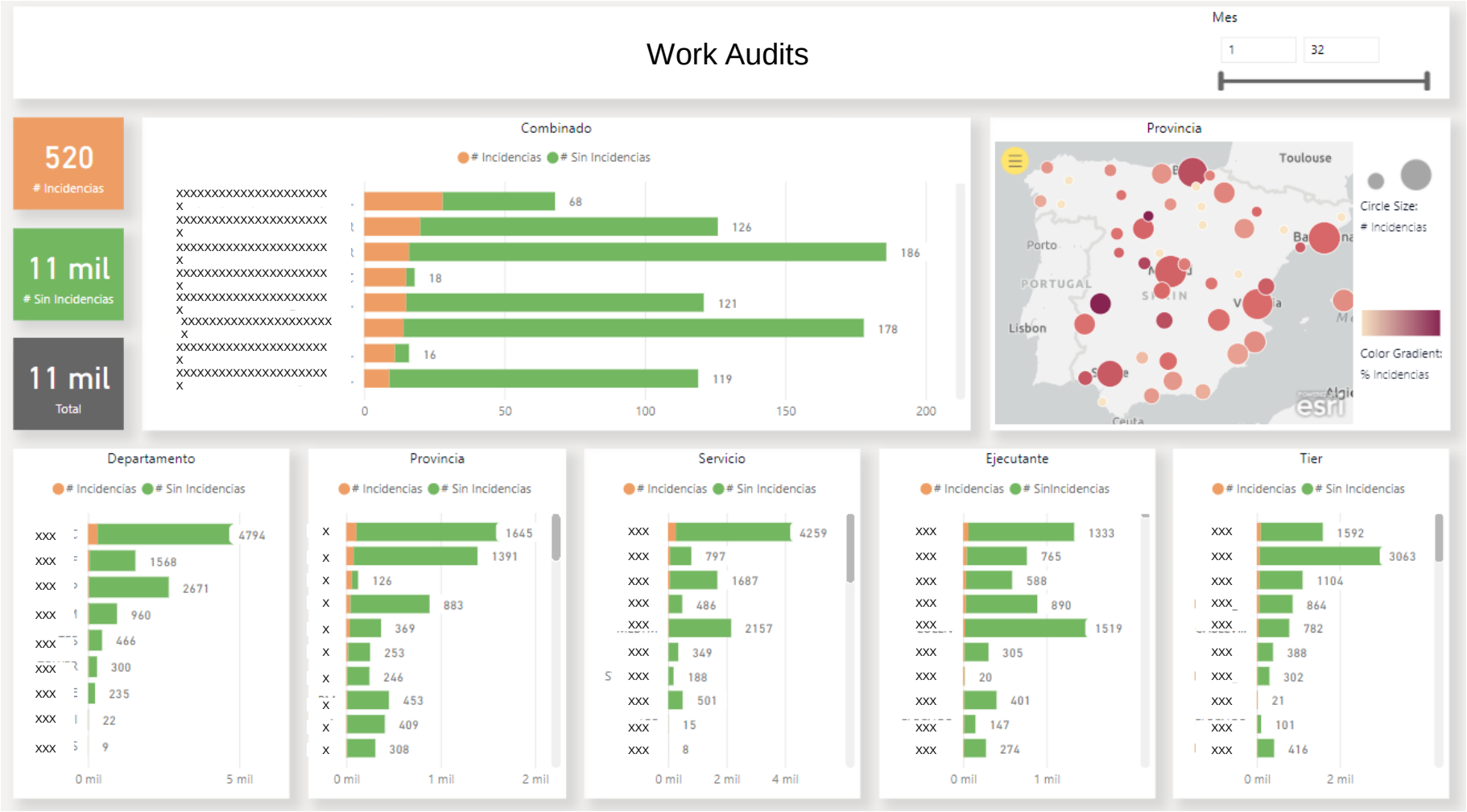
04 BI Reporting



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05
Business Impact of BI Reporting

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05 Business Impact of BI Reporting

Historical Reporting BI-enabled decision-making allows you to:

- Easily find the Department/Province/Service/Performer/Tier with the most incidents
- Easily find the specific team (combination of Department + Province + Service + Performer + Tier) with the most incidents
- Easily understand the total number of audits and incidents in each dynamic filtering that is performed.

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