

Bee2Fire Detection

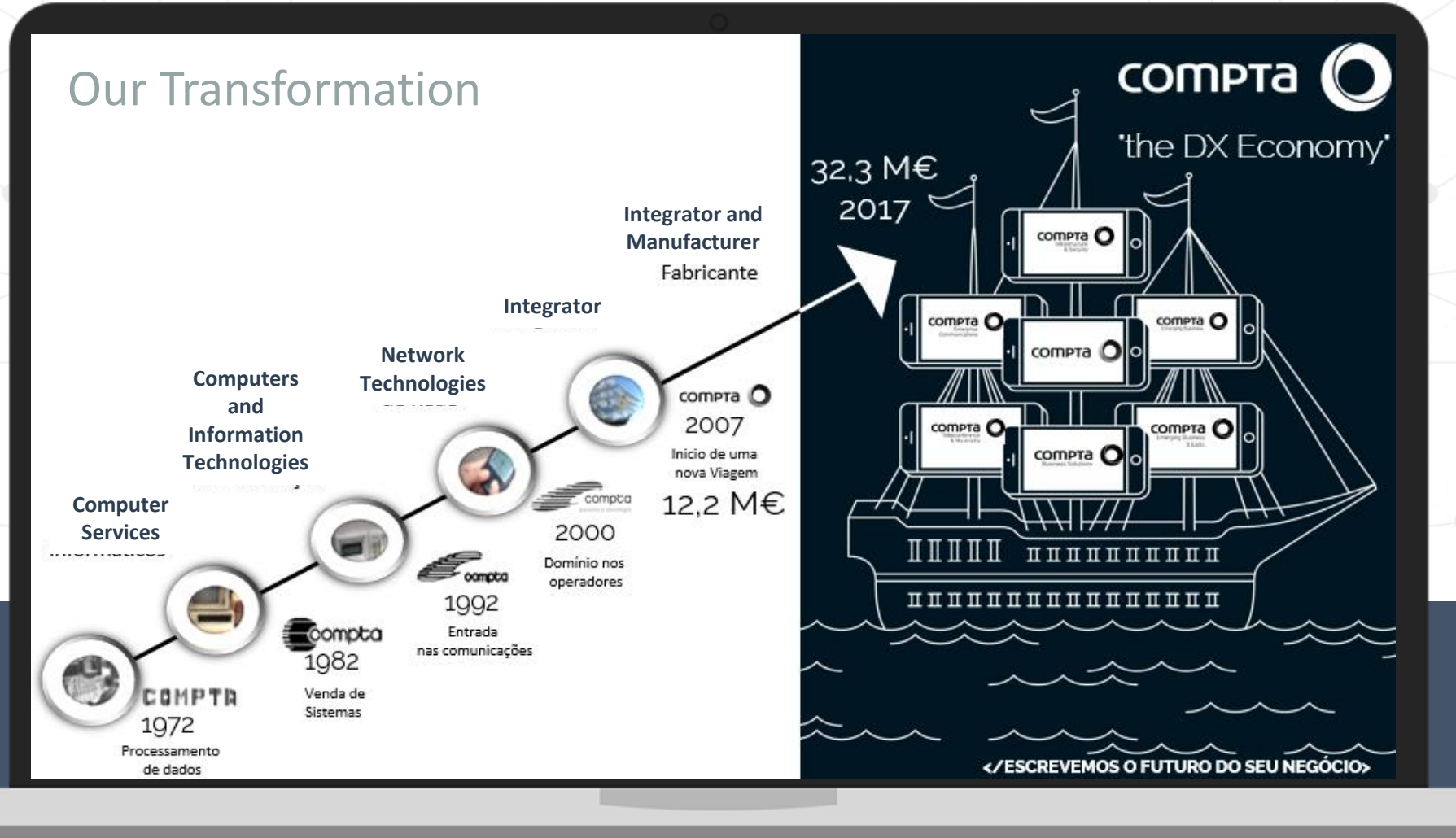
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Assistant Professor at Nova University of Lisbon

46 Years in the Market



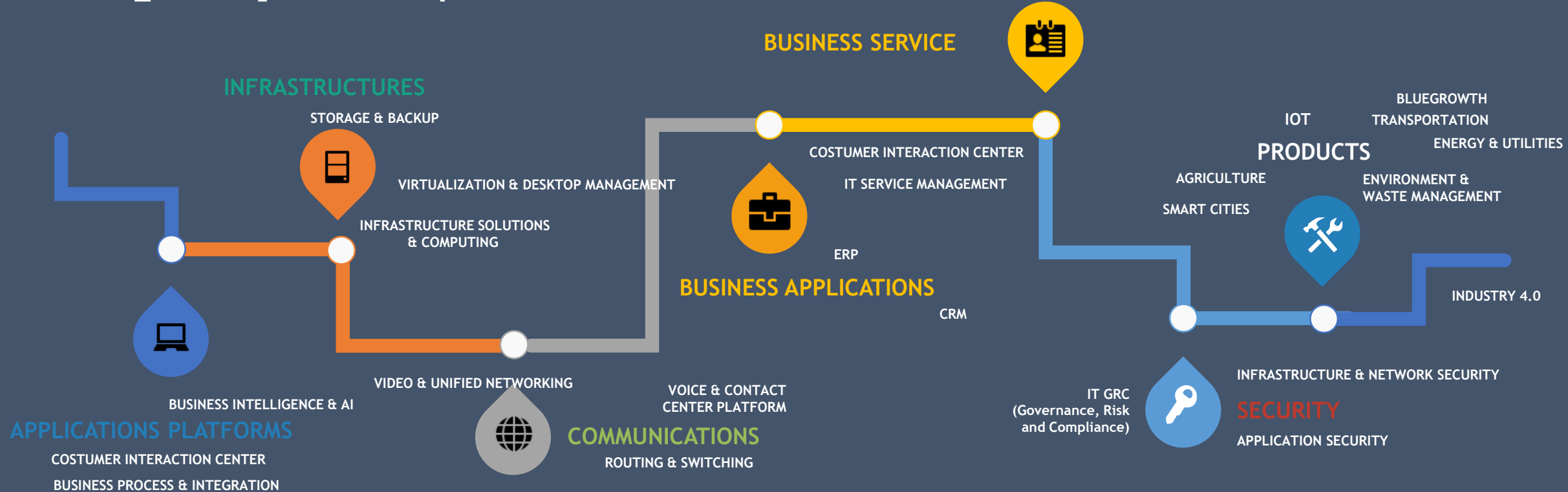
Technology is with us!



WE ARE WRITING OUR SUCCESS WITH
THE SUCCESS OF OUR COSTUMERS

Offer

A sum of skills, products, solutions and services.



Wildland fires – A Worldwide Problem

- Every year wildland fires are responsible for the loss of human lives, environment and economic damage
- The mitigation of this problem depends of different players, from governmental agencies, private companies and individuals.
 - Forest management
 - Risk assessment
 - Early detection
 - Decision support tools
 - Field infrastructure
 - Personal trained and equipped

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 - Forest management
 - **Risk assessment**
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 - Field infrastructure
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01 FIRE DETECTION

- » AUTOMATIC
- » 365X24
- » LOW RATE OF FALSE ALARMS

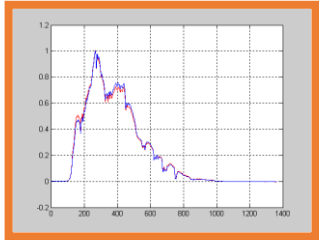
02 SURVEILLANCE

- » INSPECTION
- » 360^a
- » OPTICAL

03 DECISION SUPPORT SYSTEM

- » FIRE PROPAGATION
- » WIND BEHAVIOR
- » FIRE BARRIERS

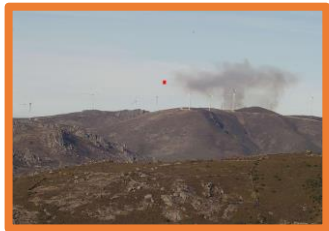
THREE DETECTION TECHNOLOGIES (PATENTED)



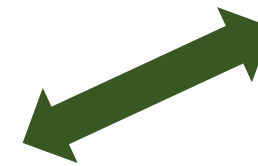
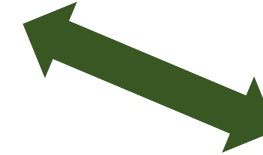
- Optical Spectrometry: detects smoke from fires up to 15km away through comparative analysis of sunlight spectra



- Thermal: detects fires up to 2km away through space-time temperature analysis



- Image: detects fire, up to 15 km, through visual recognition algorithms.



Always Looking for New Solutions

- Through
 - Inhouse research & development
 - Through partnerships with significant players
- IBM Watson contest
 - IBM Weather company for a better risk and fire behaviour assessment
 - IBM Watson Visual Recognition as a tool to integrate deep learning in the wildland fires early detection



Global Champion of IBM Watson Build 2018



SEE₂ FIRE DETECTION

powered by Watson AI

FIRE DETECTION AND PREDICTION POWERED BY ARTIFICIAL INTELLIGENCE

the ultimate tool for automatic early detection of forest fires

act before it's too **LATE**



First 20 minutes are crucial!!!

The Solution

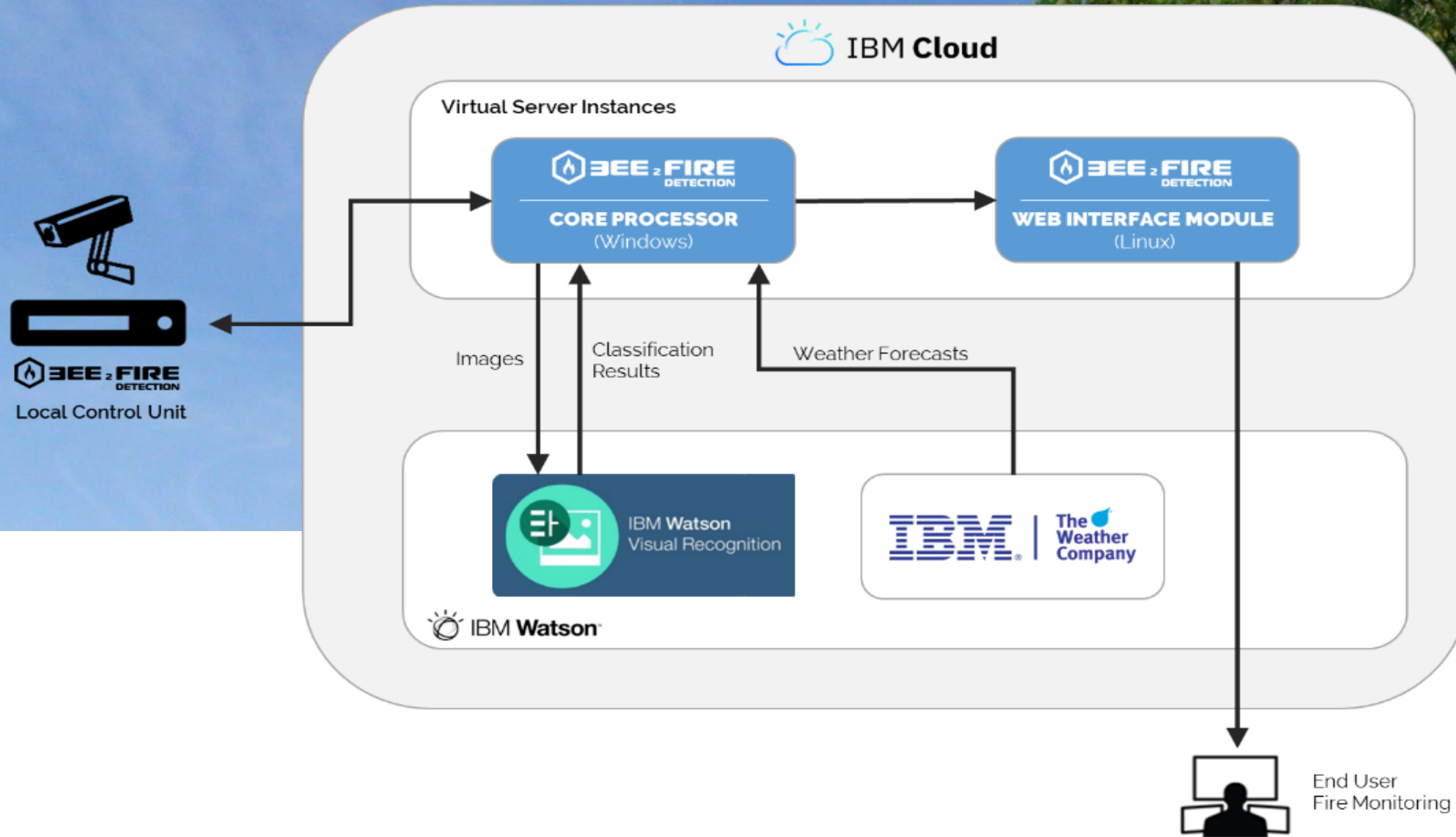


1) Predicts: constantly measures the "Fire Danger Level Forecast", powered by IBM Weather Company

2) Detects: early Fire Detection powered by IBM Watson AI Visual Recognition.

3) Recommends: estimates the fire propagation over the terrain and suggests where and how to act first.

Architecture



System Access



**BEE₂ FIRE
DETECTION**
powered by Watson AI

← → ↻ Not secure | 159.8.26.204/b2f/login

**BEE₂ FIRE
DETECTION**

Login

Username*
watsonbuild

Password*
.....

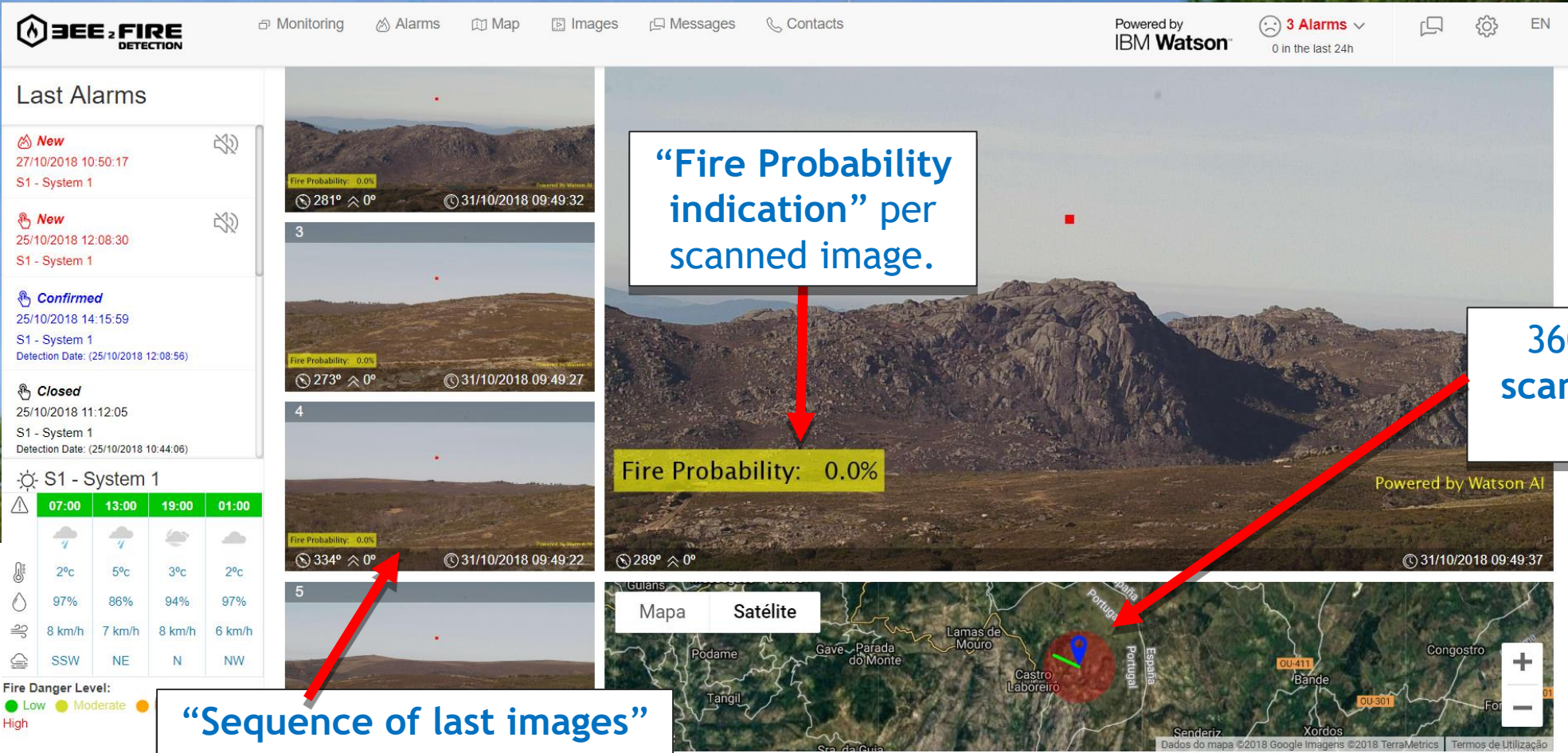
Login

Powered by
IBM Watson | **The Weather Company**

Compta@2018 - Bee2FireDetection

Service login @
IBM Cloud

Operator Screen



Monitoring Alarms Map Images Messages Contacts

Powered by IBM Watson 3 Alarms 0 in the last 24h EN

Last Alarms

- New**
27/10/2018 10:50:17
S1 - System 1
- New**
25/10/2018 12:08:30
S1 - System 1
- Confirmed**
25/10/2018 14:15:59
S1 - System 1
Detection Date: (25/10/2018 12:08:56)
- Closed**
25/10/2018 11:12:05
S1 - System 1
Detection Date: (25/10/2018 10:44:06)

S1 - System 1

07:00	13:00	19:00	01:00
2°C	5°C	3°C	2°C
97%	86%	94%	97%
8 km/h	7 km/h	8 km/h	6 km/h
SSW	NE	N	NW

Fire Danger Level:
● Low ● Moderate ● High

“Fire Probability indication” per scanned image.

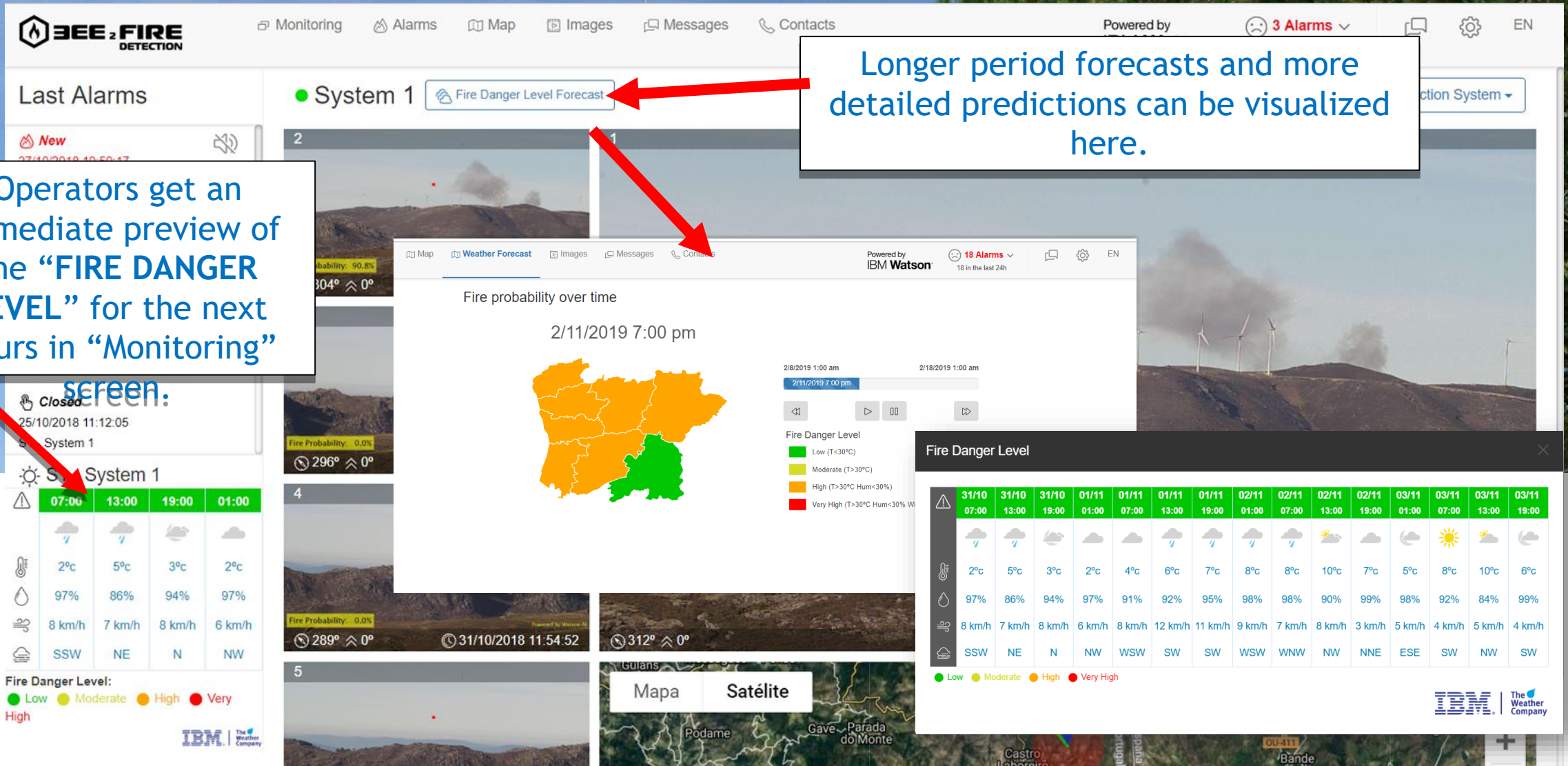
360 degree circular scan performed by the camera.

“Sequence of last images” to assist operator in decision making

Fire Probability: 0.0%

Mapa Satélite

Prediction



The screenshot displays the BEE2 FIRE DETECTION monitoring interface. At the top, there are navigation tabs for Monitoring, Alarms, Map, Images, Messages, and Contacts. A status bar shows 'Powered by' and '3 Alarms'. The main area is divided into several sections:

- Last Alarms:** A list of recent alarm events.
- System 1:** A central panel for 'System 1' with a 'Fire Danger Level Forecast' button. A red arrow points from this button to a detailed forecast window.
- Weather Forecast:** A window titled 'Fire probability over time' for '2/11/2019 7:00 pm'. It features a map of the region with color-coded fire danger levels (Low, Moderate, High, Very High) and a legend.
- Fire Danger Level:** A detailed forecast table for 'System 1' showing temperature, humidity, wind speed, and direction over a 14-day period.
- Map:** A satellite map view of the area, with 'Mapa' and 'Satélite' options.

IBM and The Weather Company logos are visible at the bottom right.

Longer period forecasts and more detailed predictions can be visualized here.

Operators get an immediate preview of the “FIRE DANGER LEVEL” for the next hours in “Monitoring” screen:

System 1

07:00	13:00	19:00	01:00
2°C	5°C	3°C	2°C
97%	86%	94%	97%
8 km/h	7 km/h	8 km/h	6 km/h
SSW	NE	N	NW

Fire Danger Level:
● Low ● Moderate ● High ● Very High
High

Detection



**BEE₂ FIRE
DETECTION**
powered by Watson AI

The screenshot displays the BEE₂ FIRE DETECTION monitoring dashboard. At the top, there are navigation tabs for Monitoring, Alarms, Map, Images, Messages, and Contacts. The main header shows 'Powered by IBM Watson' and '3 Alarms' in the last 24 hours. The central panel is titled 'Fire: S1 - System 1' and includes buttons for 'Message', 'Review', and 'Thermal'. Below this is a table of alarm events:

Detection Date	Status	Nº Occurrence	Danger Level	Coordinates
27/10/2018 10:50:06	New	0	Undefined	0

Below the table are several thermal images of a landscape with wind turbines. A central image shows a fire probability of 90.8%. To the right of this image are two buttons: 'False Alarm' (red) and 'Confirm Alarm' (green). A red arrow points from the 'False Alarm' button to a text box on the right. Another red arrow points from the 'Confirm Alarm' button to a text box on the left. A third red arrow points from the 90.8% fire probability text to a text box in the center. The bottom of the dashboard features a weather forecast for 'S1 - System 1' and a map showing the location of the system in a rural area of Portugal.

2) An ALARM is triggered with a "siren sound"

1) Image with high-potential of a fire situation was detected.

3) Operator makes the evaluation and indicates if it's a "Real Fire" or "False Alarm"

Detection - Fire Confirmation



**BEE₂ FIRE
DETECTION**
powered by Watson AI

Confirm Alarm

Resources Management:

Fire Department (Compta) Civil Protection (Compta)

Coordinates [View on Map](#)

42.0540028 -8.1245605

Message to Send:

Personalized Message Message with Alert and Coordinates

Notes:

Alarm Notes

Last Alarms

Fire: S1 - System 1

Detection Date: 27/10/2018 10:50:06 Status: New

S1 - System 1

07:00	13:00	19:00	01:00
2°C	5°C	3°C	2°C
97%	86%	94%	97%
8 km/h	7 km/h	8 km/h	6 km/h
SSW	NE	N	NW

Fire Danger Level: High

Mapa Satélite

Google

Powered by IBM Watson

3 Alarms 0 in the last 24h

EN

Dados do mapa ©2018 Google Imagens ©2018 TerraMetrics | Termos de Utilização

In case of a “real fire situation” = location coordinates are added, operator can add a note and **CONFIRM** the alarm.

Upon confirmation, the firefighting entities (and others) are notified.

Firefighting Assistance (add-on module)



**BEE₂ FIRE
DETECTION**
powered by Watson AI

Monitoring Alarms Map Weather Forecast Images Messages Contacts

Powered by IBM Watson 16 Alarms 16 in the last 24h

Last Alarms

- New 07/02/2019 19:39:38 S1 - System 1
- New 07/02/2019 19:39:32 S1 - System 1
- New 07/02/2019 19:38:53 S1 - System 1
- New 07/02/2019 19:38:48 S1 - System 1
- New 07/02/2019 19:37:23 S1 - System 1
- New 07/02/2019 19:37:18 S1 - System 1

S1 - System 1

07:00	13:00	19:00	01:00
4°C	5°C	3°C	3°C
94%	84%	94%	90%
6 km/h	7 km/h	6 km/h	5 km/h
WSW	WSW	SW	SW

Fire Danger Level: Low

Fire Propagation Simulation

Fire Perimeter Basic Fire Behaviour Fire Barriers

07/02/2019 19:35:44

The
Weather
Company
An IBM Business

“Fire Evolution Module” to assist in firefighting measures and action plan.

Roadmap (v2.0 additional modules)



BEE₂ FIRE
DETECTION
powered by Watson AI



“Drone Assistant Module” to provide additional data for “decision-making” support

Unique & Innovative Proposition

Available “as-a-service”, capable of integrating existing standard HD cameras and consequently reducing costs and time of deployment.

Fast and accurate detection with expected very low rates of false alarms via Watson AI Visual Recognition and with very low dependency of human subjectivity, visual acuity, and fatigue .

Constantly evolves: self-learning capabilities, constantly improving its accuracy as the number of “fire”/”non-fire” situations occur.

Go-to-Market



Target Customers:

1) Municipalities, Counties, Local Government

- Forest Protection, Civil Protection
- Natural Parks Protection
- Wildlife and Ecosystem protection entities

2) Forest Related Industries:

- Celluloses, Pulp and Paper industry
- Rubber, Cork, Wood Producers
- Large Agricultural Plantations
- Mining Industry

3) Industrial yards with highly inflammable materials:

- Lumber yards
- Tyre yards
- Waste treatment yards and landfills
- Chemical plants



Thank you

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