ANACOM AUTORIDADE NACIONAL DE COMUNICAÇÕES

Spectrum Monitoring and Enforcement of Science Services from the Perspective of the Regulator

Flávio Jorge, Vitor Rabuge, Luis Pedro, Manuel Sá, Rui Fernandes

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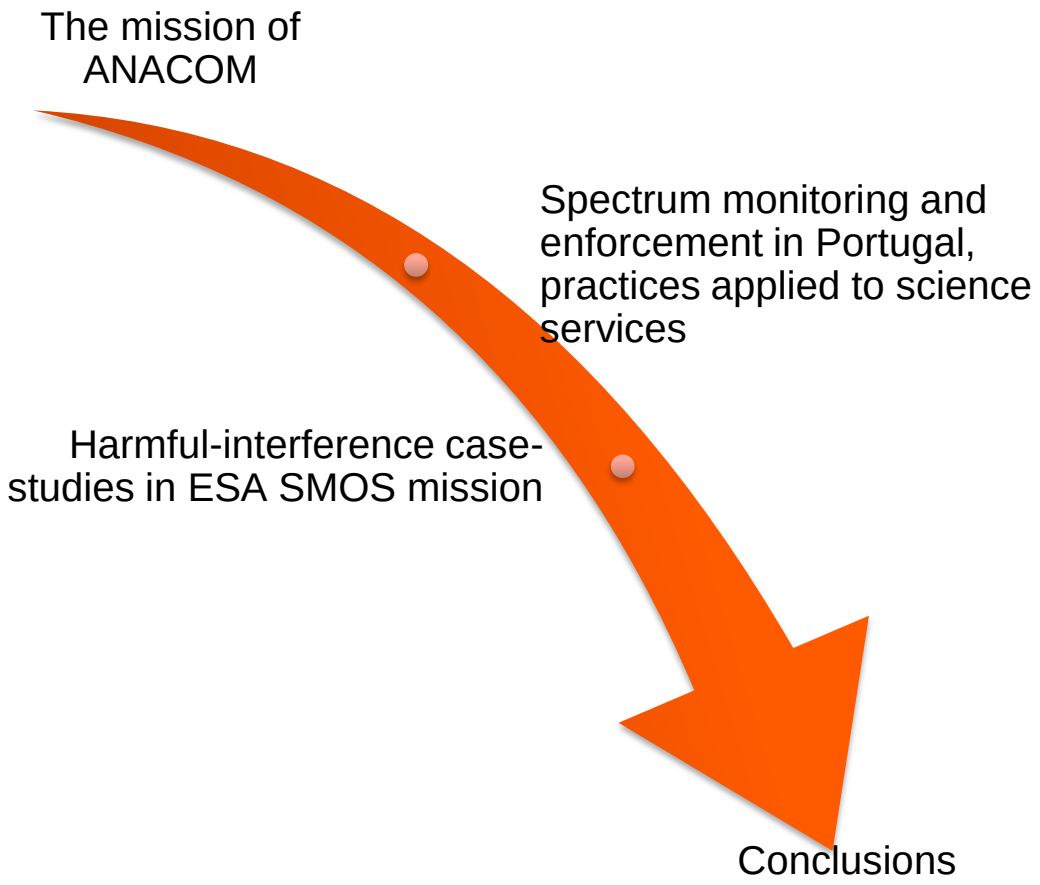
The mission of ANACOM
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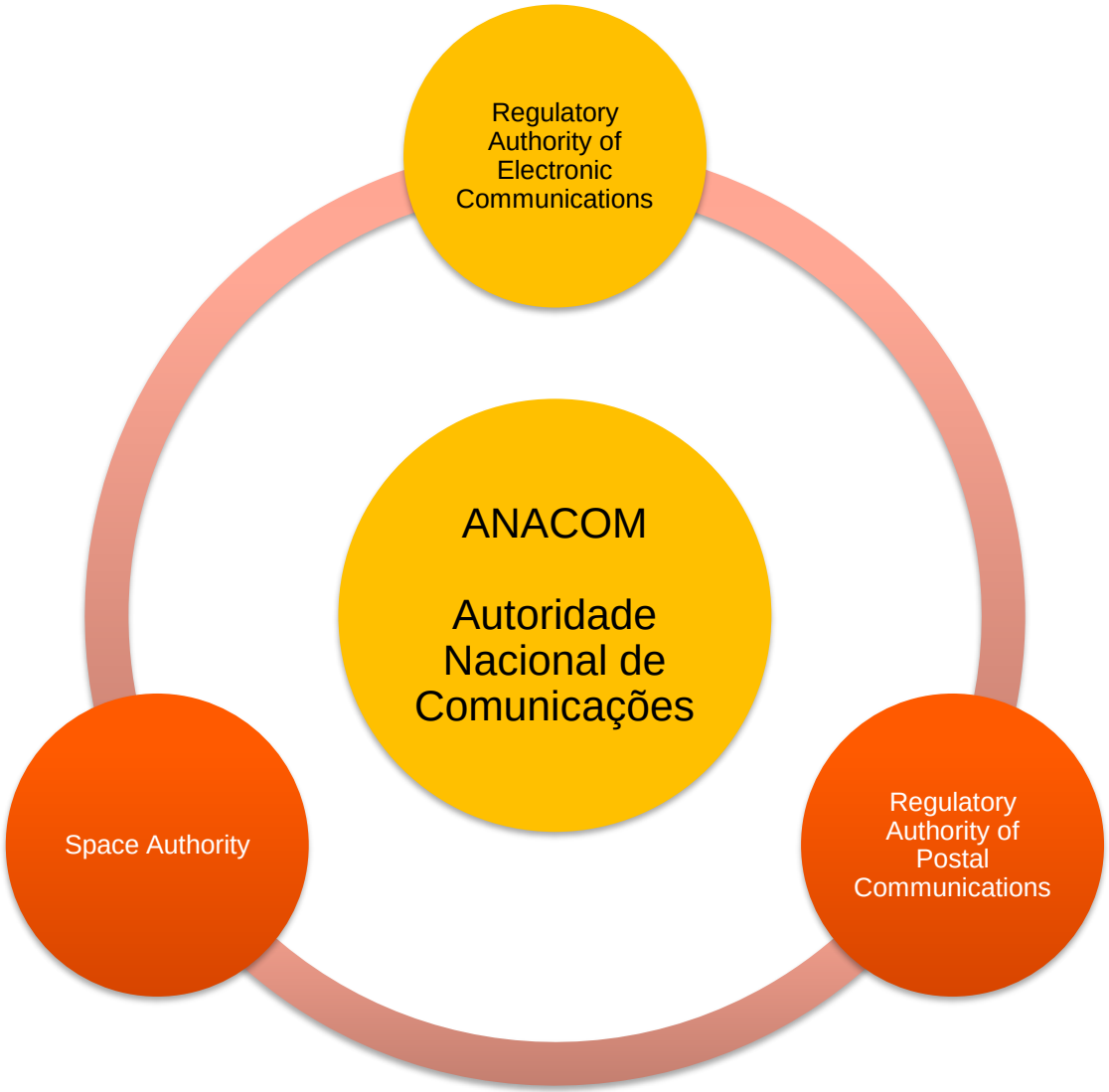
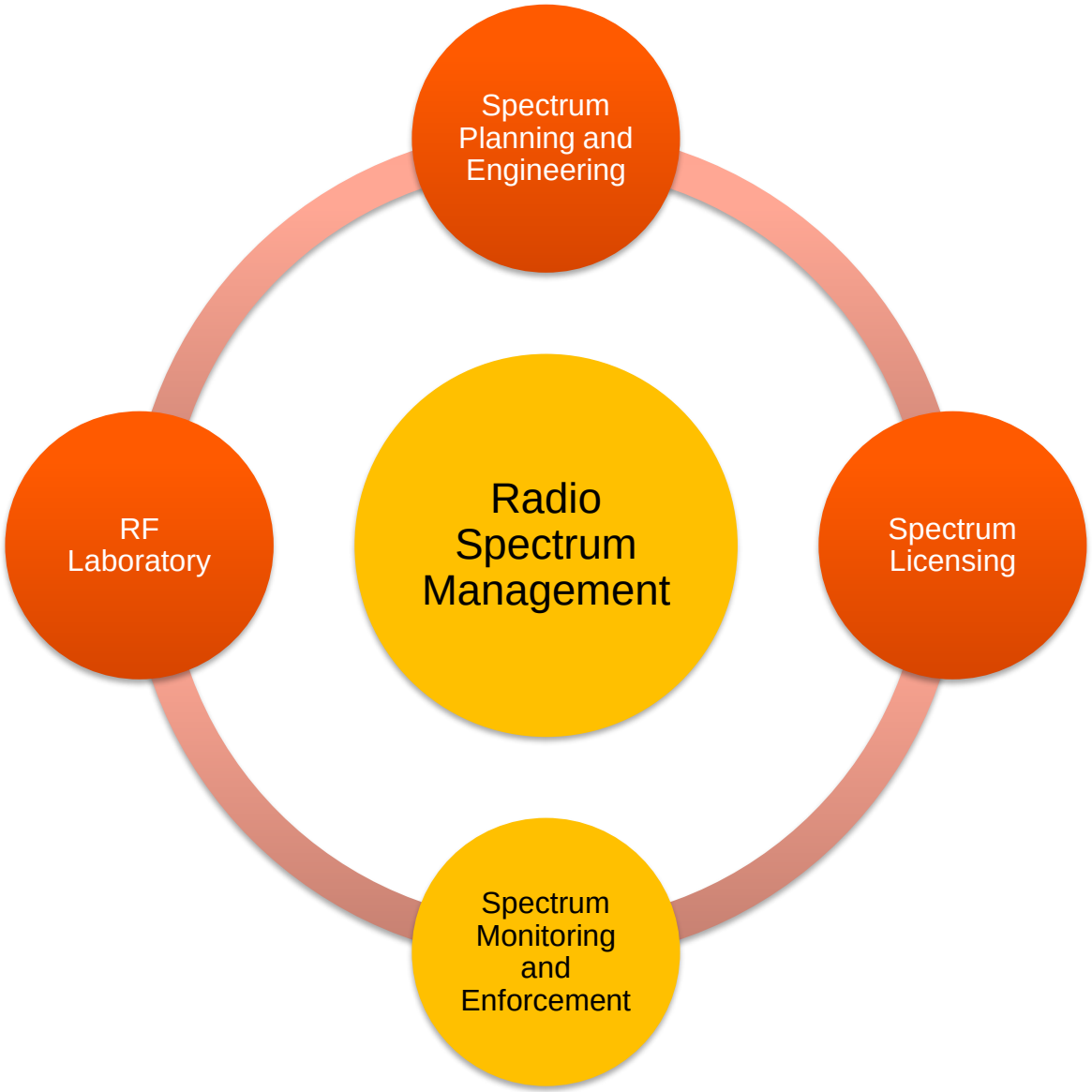
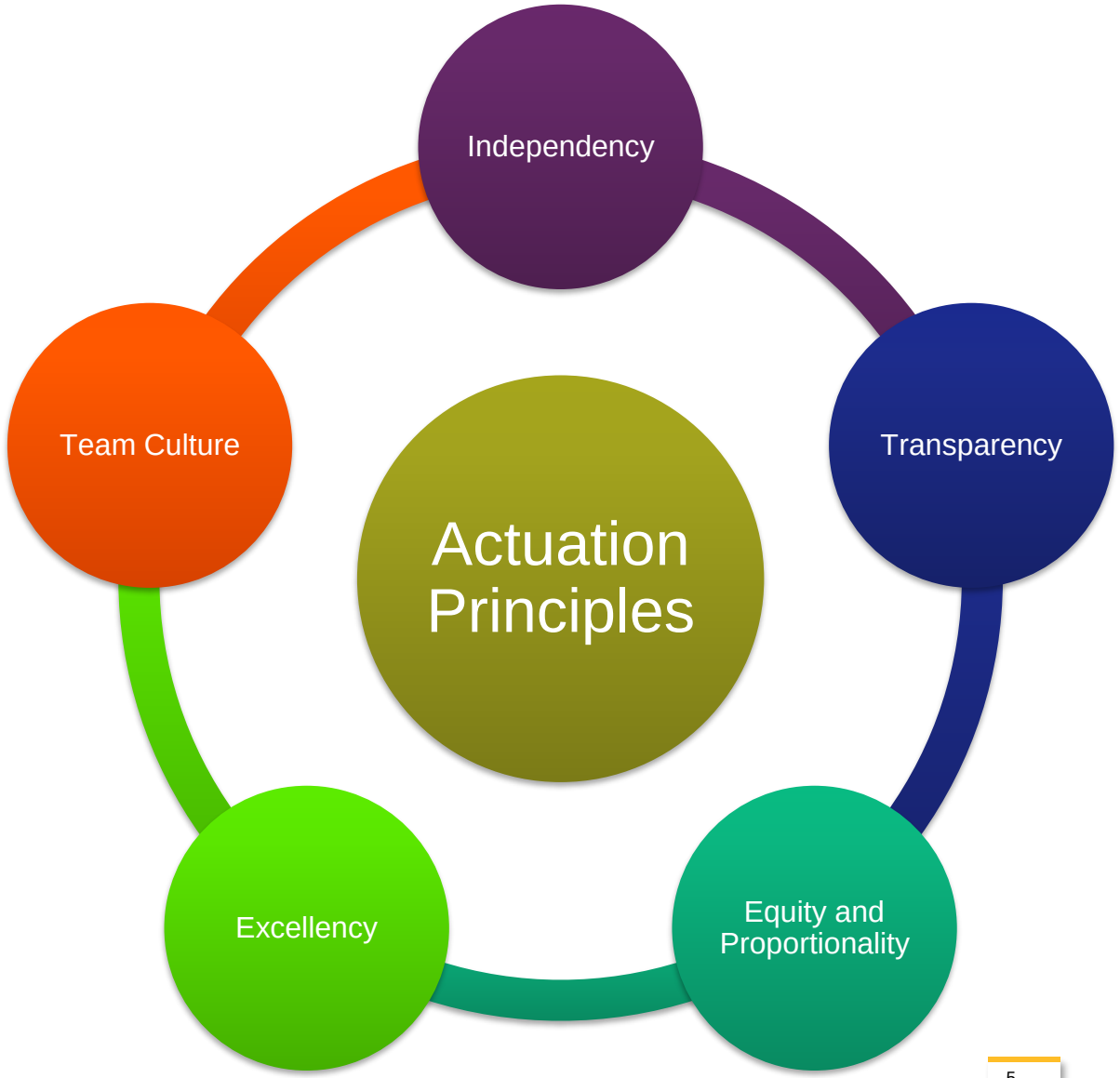
1. The mission of ANACOM

The mission of ANACOM



The mission of ANACOM





2. Spectrum monitoring and enforcement in Portugal, practices applied to science services

Spectrum Monitoring and Enforcement – where spectrum management converges

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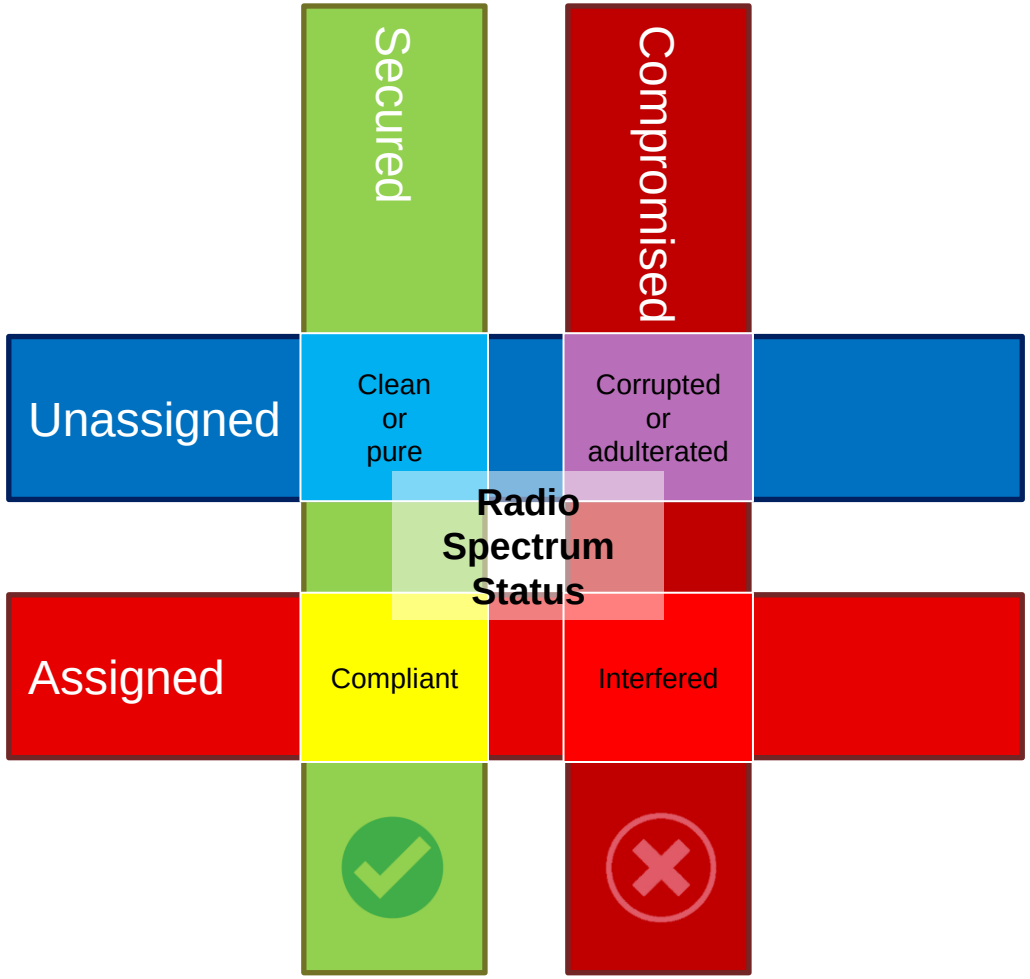
24 hours, 7 days a week, 365 days a year



Spectrum Monitoring and Enforcement – Infrastructure

Porto

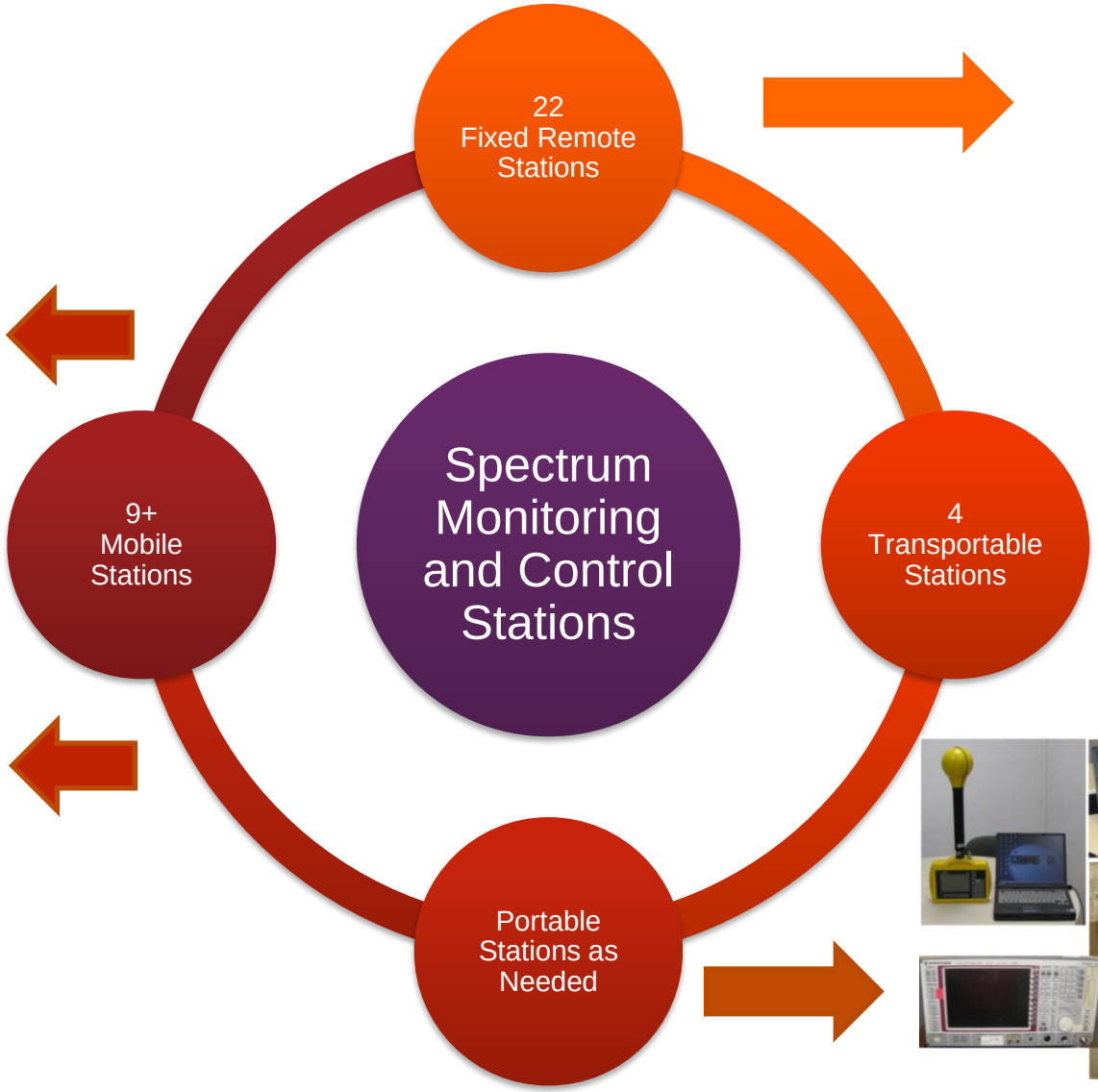
Ponta Delgada, Azores

Spectrum Monitoring and Control Centres

Funchal, Madeira

Barcarena

Spectrum Monitoring and Enforcement – Infrastructure



Spectrum Monitoring and Enforcement – Practices applied to science services

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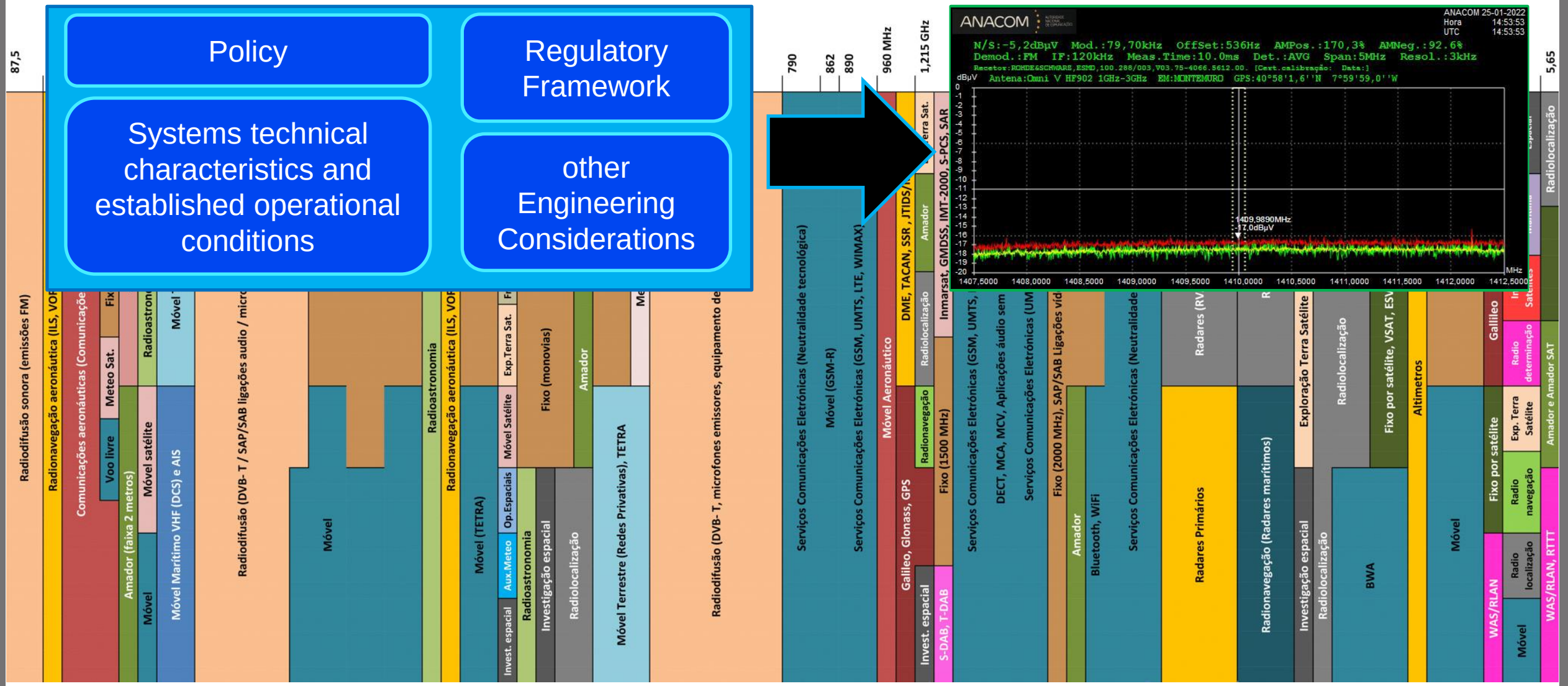
- Policy
- Regulatory Framework
- Systems technical characteristics and established operational conditions
- other Engineering Considerations



Spectrum Monitoring and Enforcement – Practices applied to science services

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Policy

Regulatory Framework

Systems technical characteristics and established operational conditions

other Engineering Considerations

All requests are attended and duly investigated

External Requests

Other National Regulatory Authorities

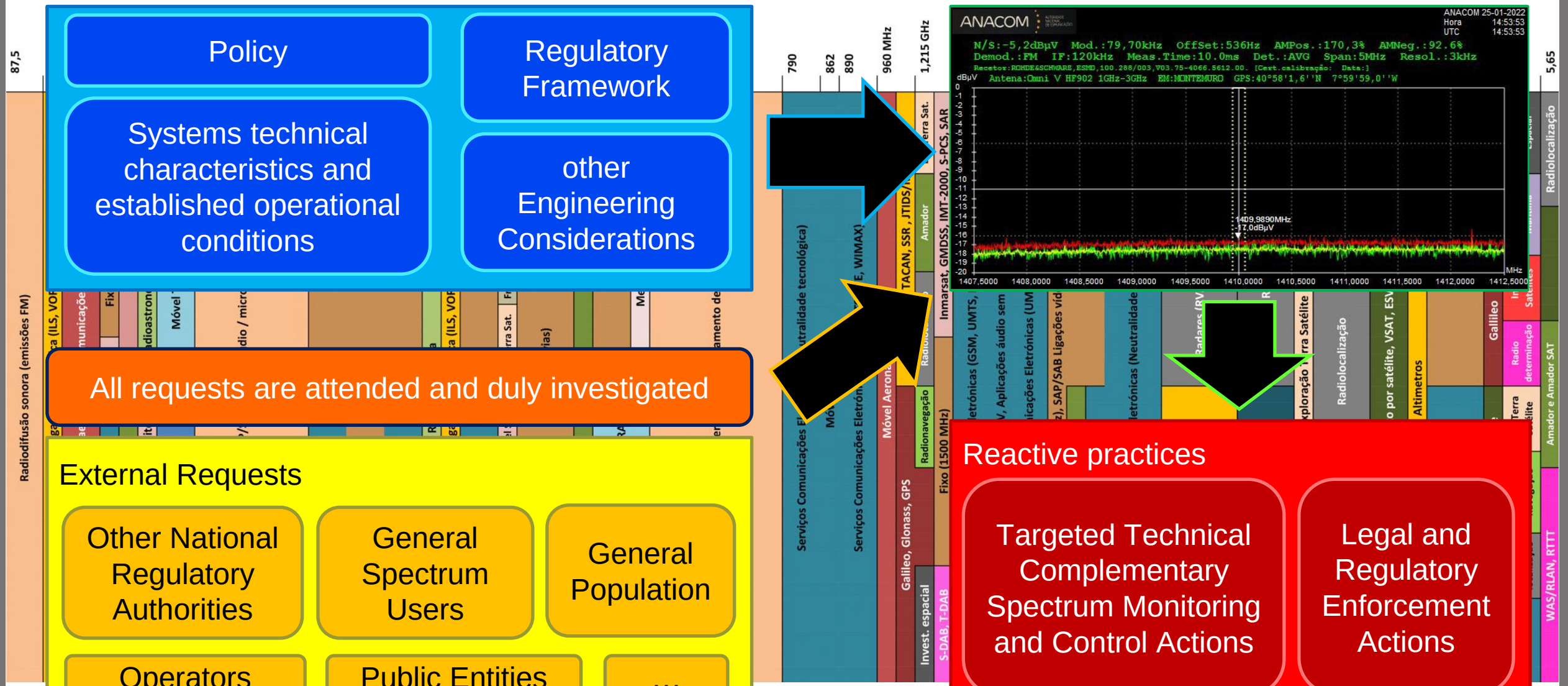
General Spectrum Users

General Population

Operators

Public Entities

…



Reactive practices

Targeted Technical Complementary Spectrum Monitoring and Control Actions

Legal and Regulatory Enforcement Actions

Spectrum Monitoring and Enforcement – Practices applied to science services

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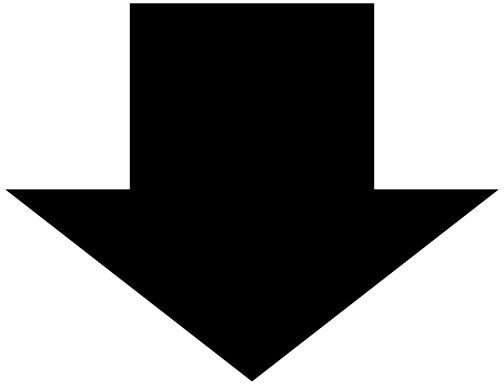
Targeted Technical Complementary Spectrum Monitoring and Control Actions



Anomaly Mitigation

Design and deployment of a targeted action plan so to ensure the due investigation of specific detected and/or reported anomalies

Technical characterization of the anomaly

- Time of occurrence
- Duration
- Persistence
- Periodicity
- Power
- Frequency
- Bandwidth
- Emission Class
- Signal Nature
- …

Geographical localization of the anomaly

- First reference: the area where the anomaly has been first detected
- Affected area delimitation
- Preliminary localization
- Precise localization
  - Physical access to the targeted area
  - RFI scenario
  - Radiowave propagation mechanisms and phenomena

Physical identification of the anomaly

- Technical study of the cause for the anomaly
- Physical identification of the anomaly source

Spectrum Monitoring and Enforcement – Practices applied to science services

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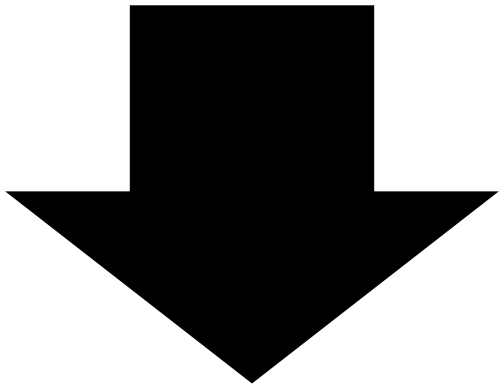
Legal and Regulatory Enforcement Actions



Legal and Regulatory Enforcement

Identification of the responsible entity for the identified system

Legal and Regulatory Enforcement

- Identifying violations to the in-force laws and regulations
- Adopting precautionary measures
- Applying sanctions provided for by law
- Collecting fines

3. Harmful-interference case-studies in ESA SMOS mission

Harmful-interference case-studies in ESA SMOS mission – #1

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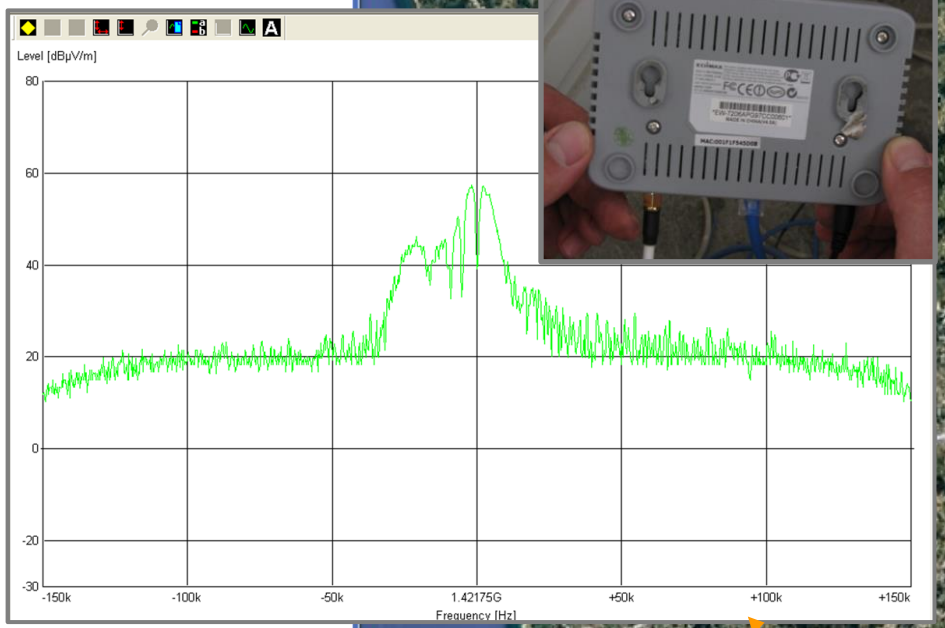
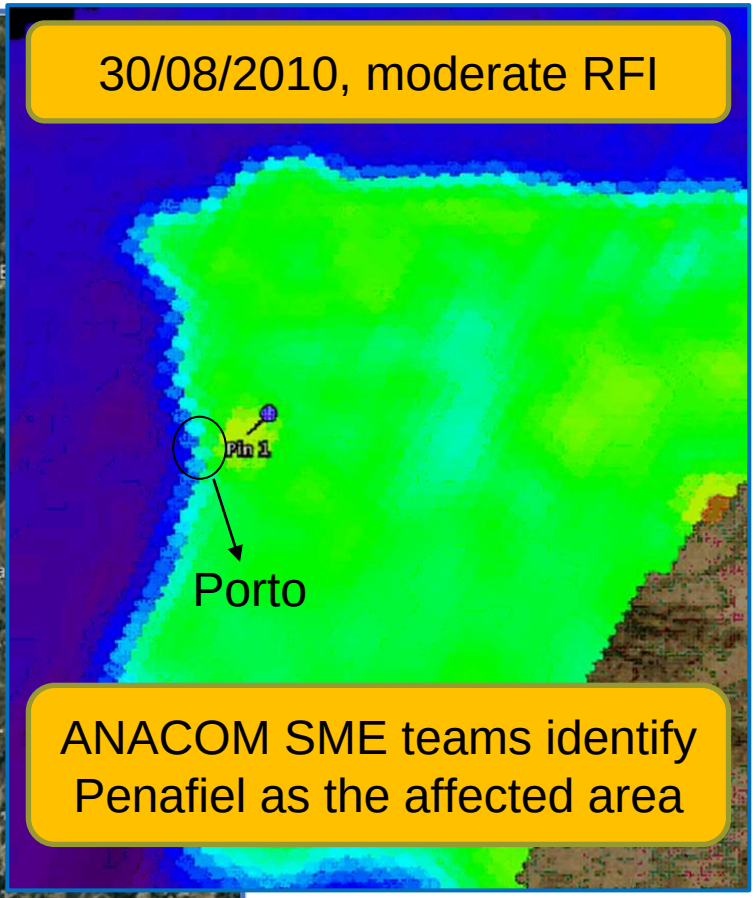
ANACOM SME teams detect, localize and identify a source #1 – internet AP



30/08/2010, moderate RFI



ANACOM SME teams identify Penafiel as the affected area

Harmful-interference case-studies in ESA SMOS mission – #1

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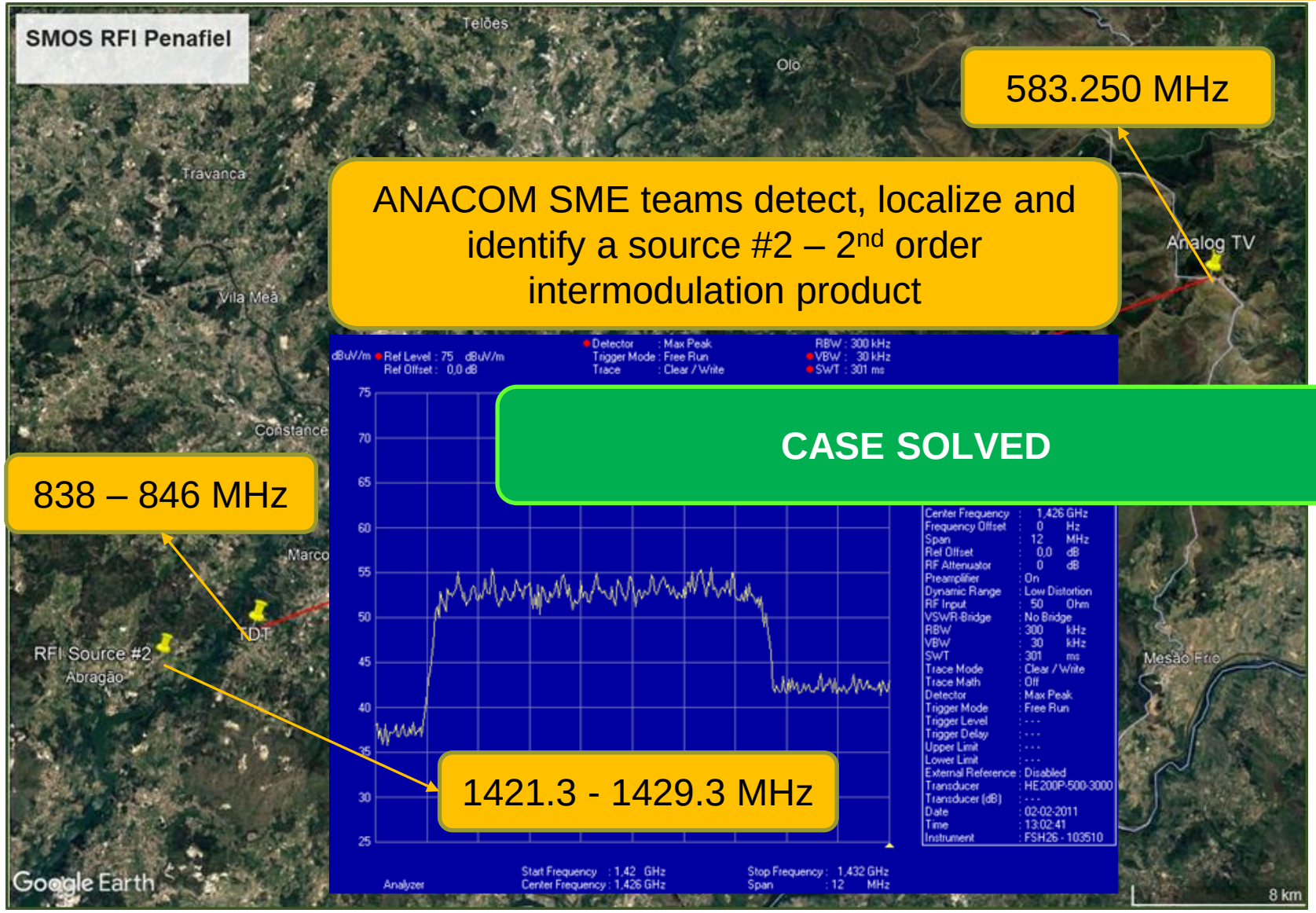

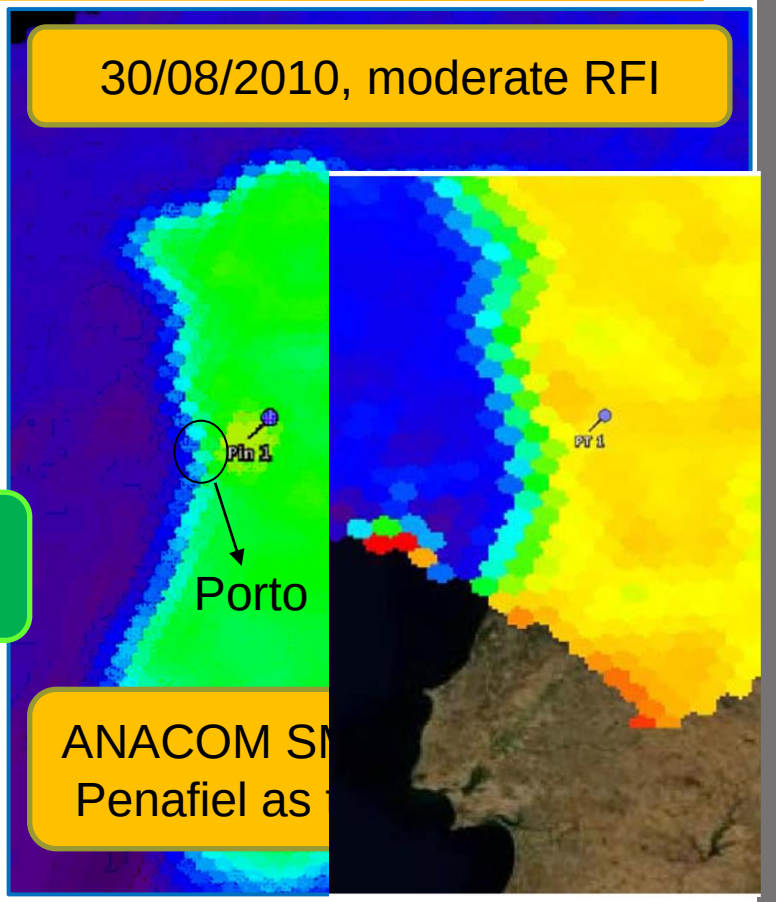

Harmful-interference case-studies in ESA SMOS mission – #2

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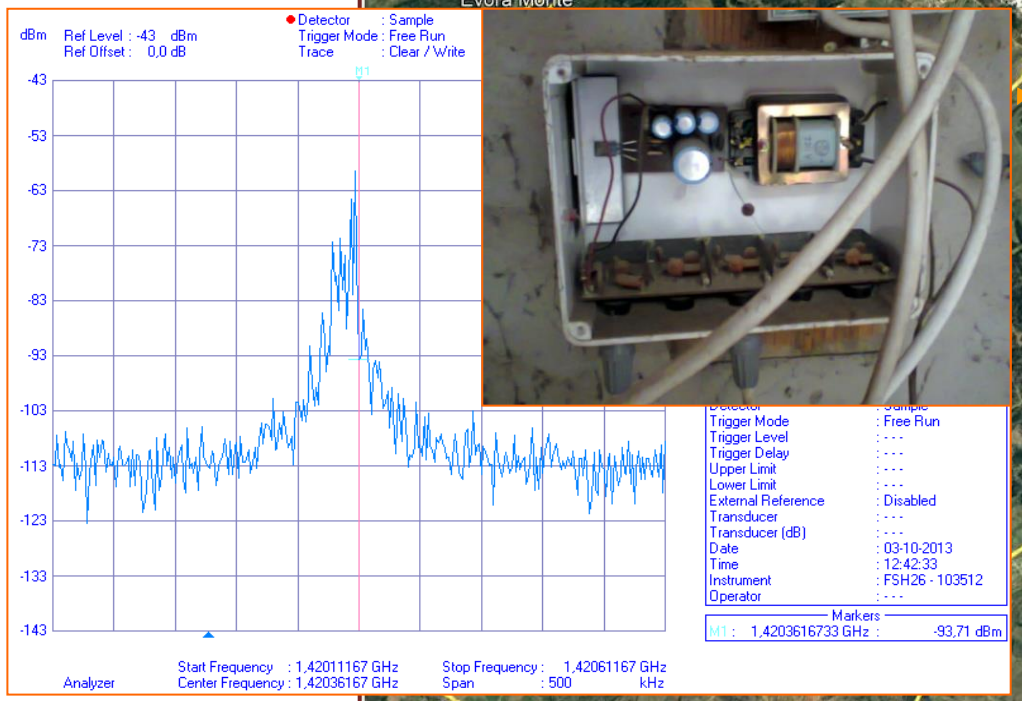
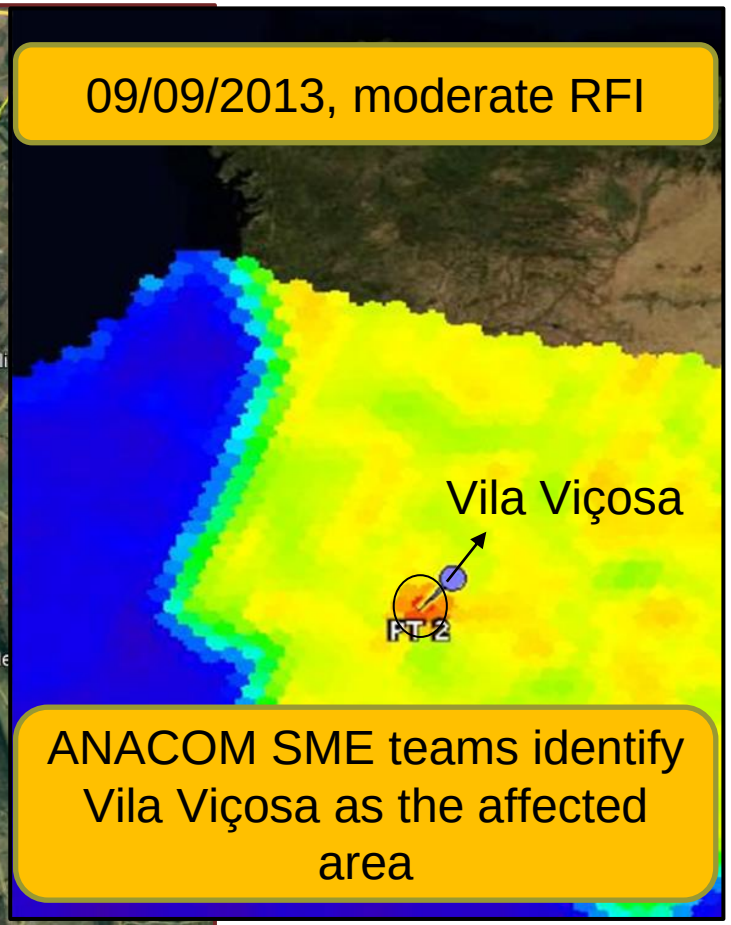
ANACOM SME teams detect, localize and identify a source #1 – TV receiving system



09/09/2013, moderate RFI

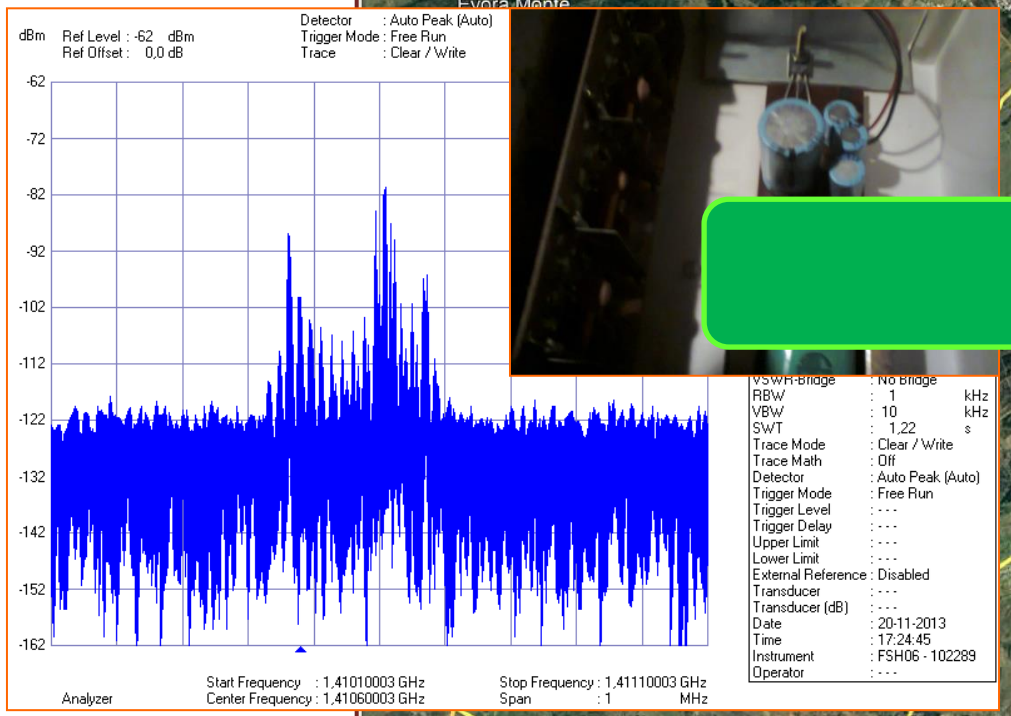


ANACOM SME teams identify Vila Viçosa as the affected area

Harmful-interference case-studies in ESA SMOS mission – #2

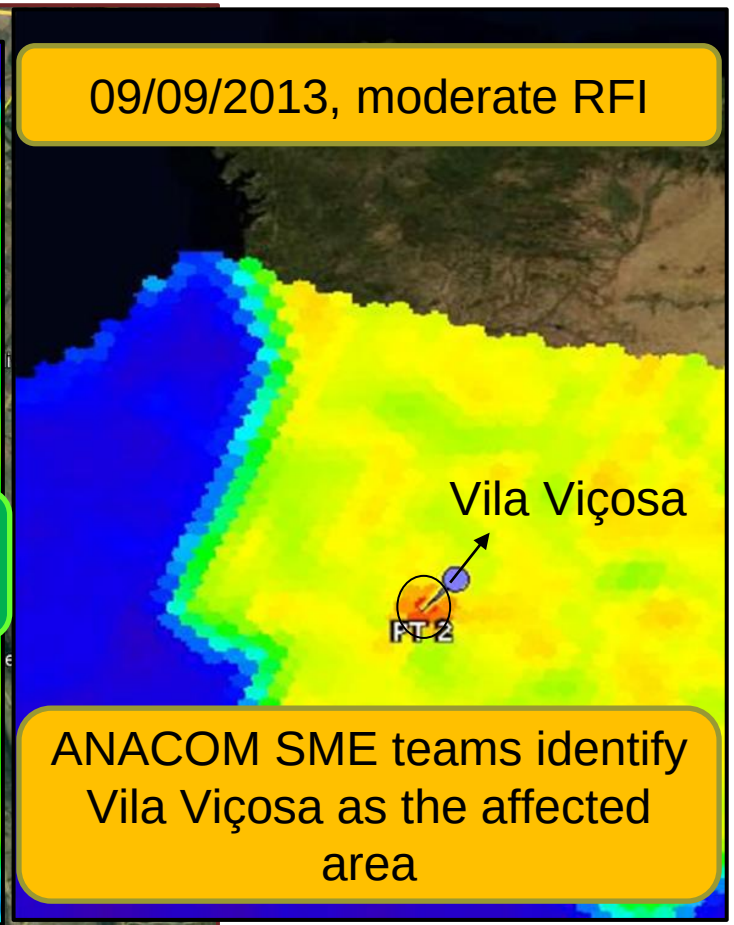
ANACOM AUTORIDADE NACIONAL DE COMUNICAÇÕES

ANACOM SME teams detect, localize and identify a source #2 – TV receiving system



CASE SOLVED

09/09/2013, moderate RFI



ANACOM SME teams identify Vila Viçosa as the affected area

4. Conclusions

Conclusions

- **Science radiocommunication services are unique** and the benefits they deliver cannot be provided by any other service;
- As radiocommunication services, **they are subject to the regulatory and supervisory provisions of ANACOM in Portugal** and their assigned spectrum is duly monitored so to ensure their harmful-interference-free operation;
- **Whenever harmful interference has been reported**, ANACOM took prompt action in investigating the case, adopting the required remedial actions so to ensure the efficient and effective spectrum use as is right;
  - **100% success rate achieved** as evidence of ANACOM commitment to science services;
  - **Harmful-interference-free spectrum use is possible**!
- **ANACOM encourages** science services operators **to continue operating** their systems **in good compliance with the in-force regulatory framework and** to **report** any instances of **harmful interference**;
  - Respectful **spectrum users**, not only can, as they also **should always report** any instances of **interference**, which shall be duly investigated. **Even in** case of **bands shared with active services**, **there is a** place and a role in that **sharing scenario to be monitored, enforced and respected**;

Conclusions

- SME actions require extreme technical and operational agility so to overcome complex scenarios and challenging (natural and human) environments;

- **In reporting harmful interference** affecting science services bear in mind:
  - the technical characterization of the interference has been very important in identifying the detected/reported anomaly:
    - ***improve RFI characterization****;*
  - the propagation characteristics response in frequency imposes the geolocation requirements to become tighter as the frequency increases so to enable the anomaly solving in a timely manner:
    - ***improve RFI geolocation if the frequency band increases***;
  - the design of regulations based on objective and measurable criteria is essential so to enable their enforceability
    - ***make sure the rules are objectively judgable***;
  - proportional and appropriate sanctioning provisions are important to discourage future law and regulatory transgressions:
    - ***make sure the rules are consequent***.

Thank You!
Questions?