ESA ARTES

Experience in ARTES 20

Testimonies of Space companies

INNOVATING SOLUTIONS

CONTENTS

WHO WE ARE

WHAT WE DO

ARTES PARTICIPATION

ARTES 20: ISSWIND CASE

WHO WE ARE

A GLOBAL TECHNOLOGY GROUP

Multinational technology group

Headquarters in Spain (Madrid)

Over 1,100 employees

Aeronautics, Space, Defense, Security, Transportation, Healthcare, Banking & finances, and ICT industries.

Private capital

Subsidiaries in 10 countries

Roots tied to the Space industry

Engineering, development and integration of systems, software, hardware, specialized products and services

Founded in

1984

WHO WE ARE

INTERNATIONAL TECHNOLOGY LEADERSHIP

#1 Worldwide Satellite Control Center provider to commercial telecom operators (+300 Satellite missions worldwide)

First ever **worldwide** intraoperative radiotherapy planning system

Responsible of safety critical systems of European GNSS systems (EGNOS and Galileo)

Leader of Intelligent Transportation Systems for the **public transport sector** (+100 cities in Europe, Asia and America)

GMV's ***checker ATM security*** is the **worldwide leader** as multivendor cyber security protection for **ATMs**

WHAT WE DO

INDUSTRIES

Aeronautics

Space

Defense & Security

Cybersecurity

Healthcare

Transport

Telecommunication

Public Sector and Corporate ICT

Banking & Finances

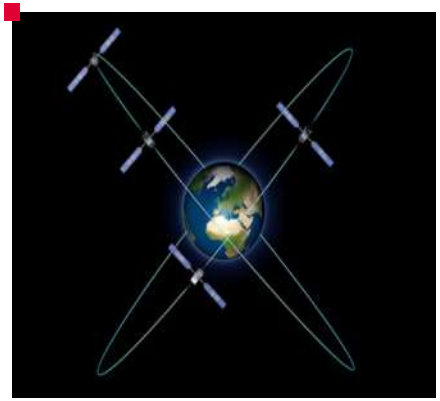
SPACE

- Satellite Control Centers
- Flight Dynamics Systems
- Mission Planning Systems
- Global Satellite Navigation Systems
- Earth Observation Satellite Data Processing Centers
- Scientific Operations Centers
- Guidance, Navigation and Control (GNC)
- Autonomy and robotics
- Mission analysis
- On-board software
- Simulators development
- Space applications

WHAT WE DO

SPACE

#1 Worldwide Satellite Control Center provider to commercial telecom operators (+300 Satellite missions worldwide).



Ranked **#3** as **Galileo system developer**.

Reference supplier for on-board **GNC/AOCS** subsystems.

Major provider of EO Services and Applications.

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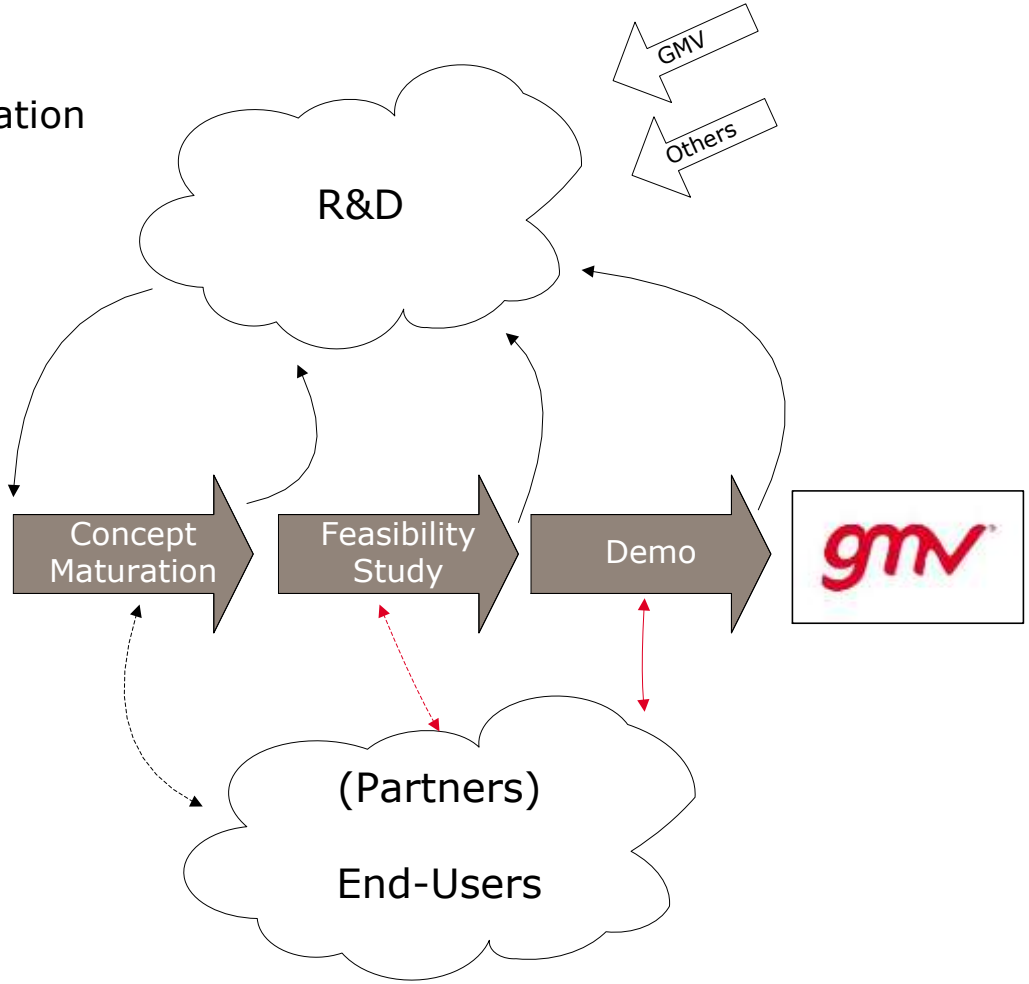
ARTES

ARTES

- Experience in ARTES:
  - As part of the product maturation process
  - Long/ wide history

- Case:
  - Active Road Management Assisted by Satellite

- ARTES 20 (ongoing):
  - EUROPORT
  - ISSWINDDEMO



ARTES 20

EUROPORT DEMO

EUROPORT

- EUROPORT is a product that supports the operational planning and the reaction capability of the end users involved in intermodal transport by
  - Optimising the accuracy of the forecast of arrival (ETA) and departures (ETD)of ships in ports;
  - Optimising the accuracy of the forecast of arrival and departures times of trucks to/from terminal and port gates;
  - Improving port gate-in and gate-out operations in order to reduce time consumed by these operations;
  - Improving the efficiency of pick-up and delivery operations in the yard.

EuroPORT
Intermodal Freight Transport

Inland Transport

- Improved operations planning
- Detailed tracking and tracing of vehicles and goods
- Better ETA/ETD at/from ports

Port Operations

- Improve gate-in and gate-out operations
- Improve pick-up and delivery operations in the yard
- Improved operations planning

Maritime Transport

- Optimal ship routes
- Better ETA/ETD at/from ports

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EUROPORT

- Space Technologies
  - **Satellite Communications**: to get current position when out of T-AIS range and to provide weather forecast and route information
  - **Satellite Navigation**: to get the position and tracking information from trucks and vessels
  - **Earth Observation**: to get information from meteo-oceanographic data providers and improve vessel route and ETA/ ETD algorithms

- EUROPORT Trials will involve key stakeholders:
  - Port Authority
  - Multi-use terminal
  - Logistics company
  - Transports company
  - Shipping Line
  - Train Operator

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ARTES 20

ISSWIND DEMO

ISSWIND

- Supporting Services for the Wind Power Industry Based on Space Technologies

  - EWEA in "Economics of the Wind Energy, 2008" identified economical risks in the development of wind power projects:
    - quality of wind resource assessments
    - penalties for missed power production estimates (reduction of subsidised markets)

- Provide information to the Wind Industry, on-shore & off-shore, for
  - **Resource assessment**: planning, power plant funding process, pre impact assessment.
  - **Set-up**: wind farm construction, design, technology selection.
  - **Maintenance and operations** of the wind farm, post impact assessment.

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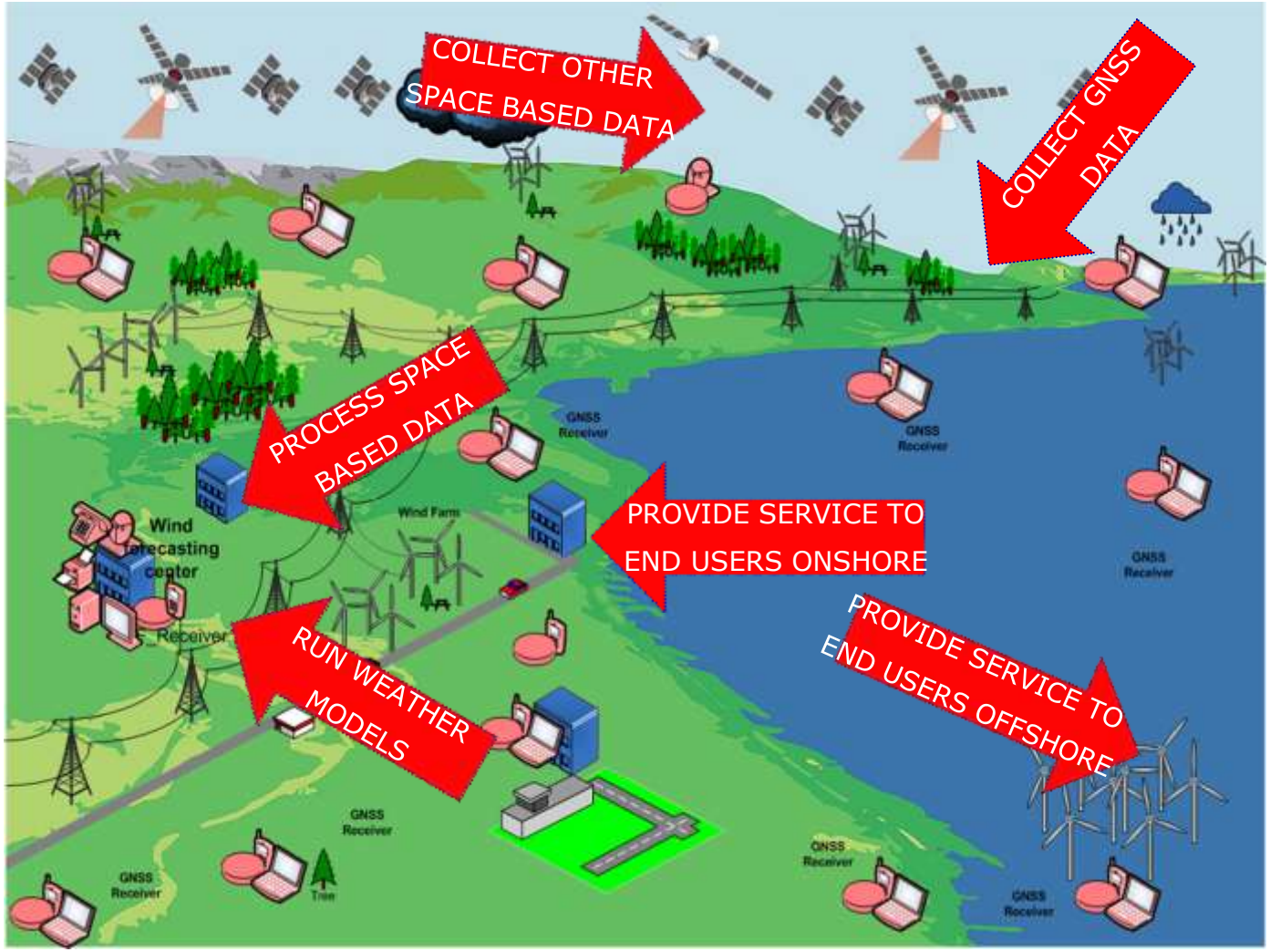
ISSWIND

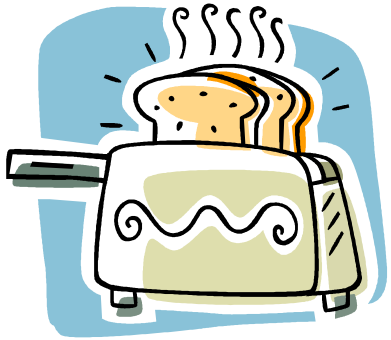
- Service Chain and Space Assets



ISSWIND

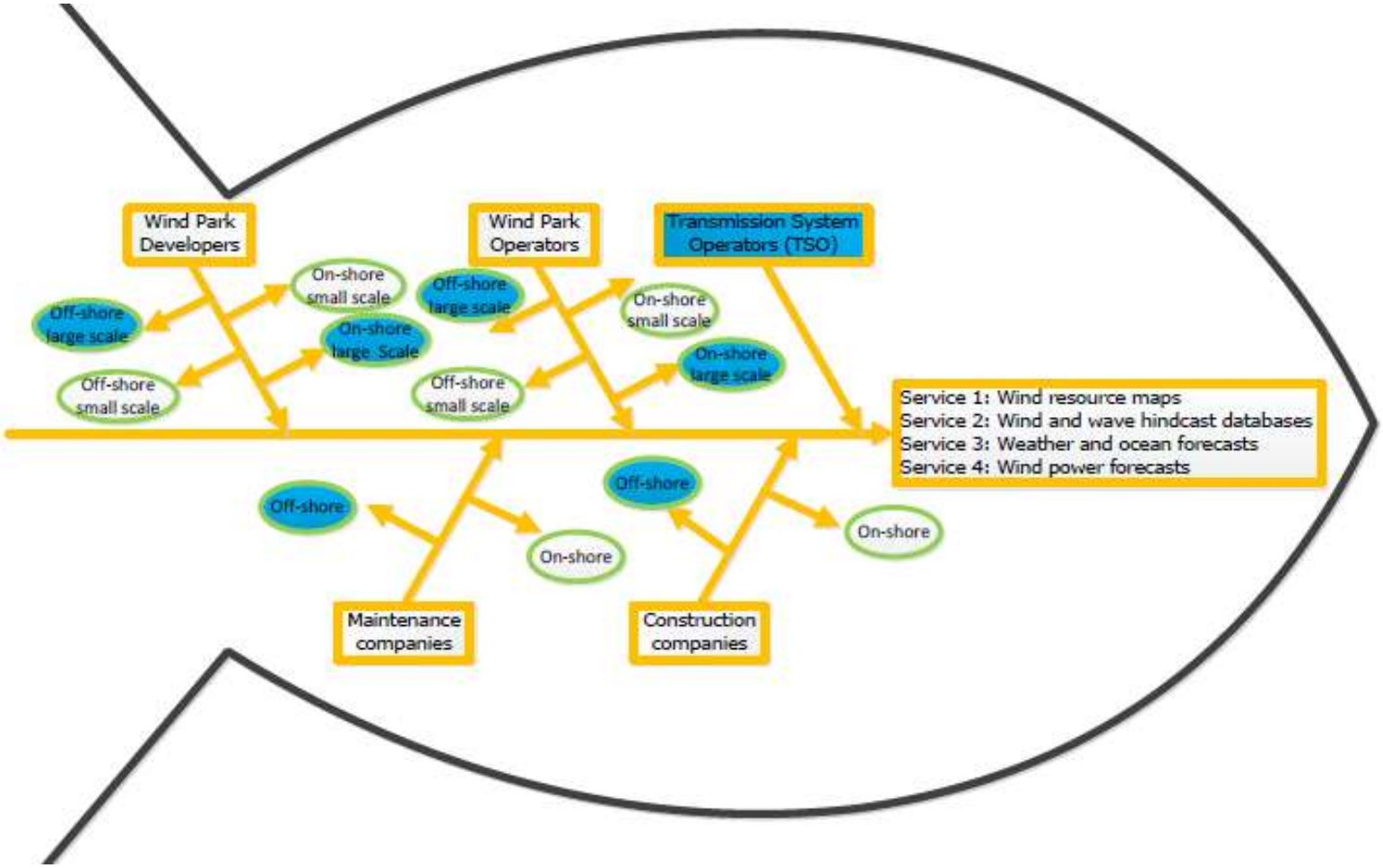
- ISSWIND feasibility study
  - Confirmed viability of an integrated system to provide services which can support the optimization of wind power predictions
  - based on new solutions enabled by space assets such as satellite navigation and earth observation.
  - Validated an integrated service chain in a Proof-of Concept, with real data
  - performance increase of 5% in error estimations when compared with the best currently used services.

- ISSWIND DEMO Objectives
  - Clarify stakeholders needs and requirements for services
  - Implement the processing chain upgrades to provide the services
  - Perform a series of near to operational pilot trial
  - Verify and validate the services operation and performance
  - Consolidate wind power market analysis
  - Implement the partnerships for the commercial provision of the services
  - Initiate commercial promotion of the services
  - Sell services



ISSWIND

- Market Segments Fishbone Diagram



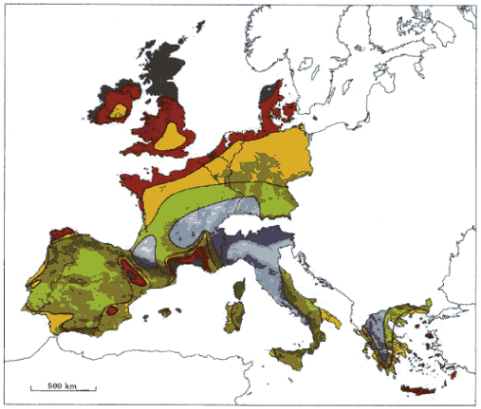
ISSWIND

- **Service 1: Wind Resource Maps**
  - map of average wind speed
  - Project Development and Design, for the assessment of local environmental criteria and expected potential revenues.

- **Service 2: Wind and wave hindcast databases**
  - production and analysis of a global or regional dataset
  - Site selection

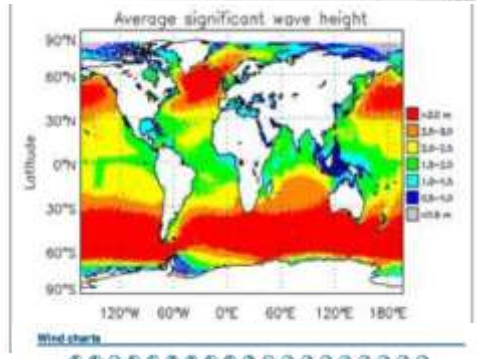
- **Service 3: Weather and Oceans Forecasts**
  - short term – typically 7 days ahead- weather forecasts (wind speed and direction as prime product)
  - Assist on planning of operations, such as, awareness of extreme conditions and planning of maintenance activities

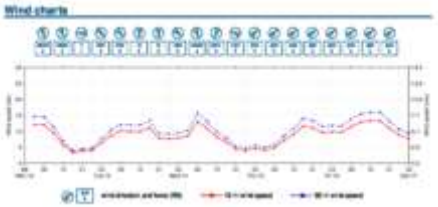
- **Service 4: Wind power forecasts**
  - Provides power production estimation in MW based on a weather forecast and wind farm model

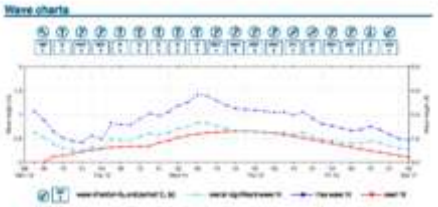


Wind resources[3] at 50 metres above ground level for five different topographic conditions

	Sheltered terrain[3]		Open plain[3]		At a sea coast[4]		Open sea[5]		Hills and ridges[6]	
	$m\,s^{-1}$	Wm^{-2}	$m\,s^{-1}$	Wm^{-2}	$m\,s^{-1}$	Wm^{-2}	$m\,s^{-1}$	Wm^{-2}	$m\,s^{-1}$	Wm^{-2}
	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0- 8.5	400- 700
	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400







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ISSWIND

- Services

Service	Users/customers
ISSWIND Service 1: Wind resource maps	• Developers offshore • Developers onshore • TSO
ISSWIND Service 2: Wind and wave hindcast databases	• Developers offshore • Developers onshore
ISSWIND Service 3: Weather and ocean forecasts	• Operator offshore • Operator onshore • Construction companies offshore • Maintenance companies offshore • Energy traders • TSO
ISSWIND Service 4: Wind power forecasts	• Operator offshore • Operator onshore • TSO • Energy traders

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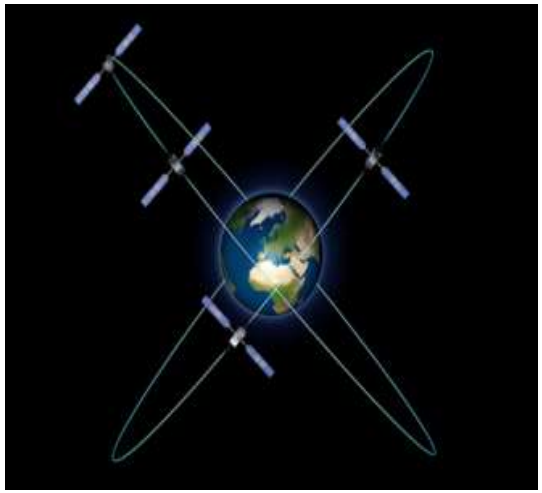
ISSWIND

- Supporting Services for the Wind Power Industry Based on Space Technologies
- Consolidated Business Plan
- Socio-Economic Benefits
  - **Reduction of development and operational costs**: TSO can save almost 100€/ MWh in reserve costs if a 1% error reduction is achieved.
  - **Reduction of Planning Costs:** increasing initial studies results reliability.
  - **Lower energy costs** making energy cheaper and Europe more competitive energy-wise.
  - **Reduction of green house gases emissions** by increasing profitability of renewable energy production



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