

Title:

ROLES OF MARINE CADASTRE TOWARDS NATION DEVELOPMENT:

Potential, Requirements and Challenges

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Presentation Outline

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The Needs for Sustainable Marine Administration and Development

2



Understanding of Marine Cadastre

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Potential of Marine Cadastre Towards Nation Development

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Marine Cadastre Requirements

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Challenges

Introduction: The Needs for Sustainable Marine Administration and Development

- Marine spaces are not managed by single public institution but it was managed by several stakeholders
- It create complex, uncertain and conflict situations in determining the resolution of authority area of true governance.
- Proper standards of marine space are needed for sustainable development as stated by United Nation Sustainable Development Goals



The Major Issues in Administering the Rights, Restrictions and Responsibilities in the Marine Space Environment



Coastal Zone

- When marine boundaries are not demarcated, there is no physical evidence of the boundary, resulting disagreement, confusion and conflicting versions of marine boundaries.
- Line of low tide is difficult to determine.
- Natural feature like the coastline change over time, so thus the marine boundaries



Territorial Sea

- The determination of base points and baselines in accordance to UNCLOS 1982.
- Enforcement agencies operating in the two maritime zones – the 12 nautical mile of territorial sea and the exclusive economic zone. Some enforcement agencies have found it difficult to operate in grey areas i.e. in areas where the territorial waters and EEZ meet at which the demarcation of the boundaries is distinguishable.
- The publication of a chart at a scale adequate for ascertaining the baselines for measuring the breadth of the territorial sea or listing geographical coordinates of these points.



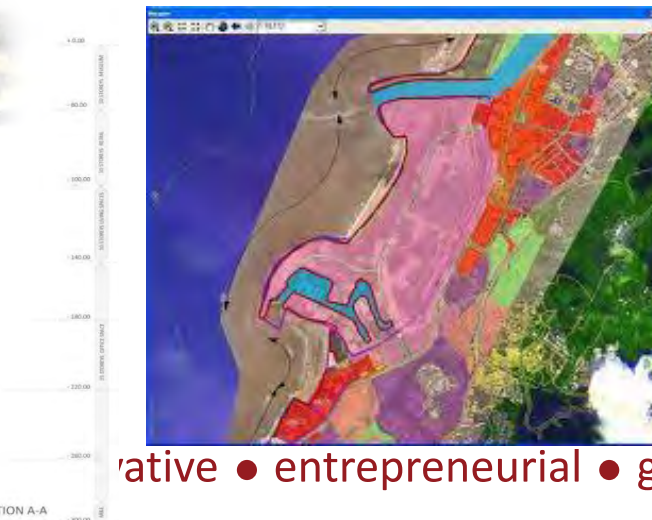
Exclusive Economic Zone

- The determination of the outer limits of the continental shelf based on Article 76, UNCLOS 1982, in which coastal states are allowed to claim outer limits of the continental shelf beyond 200 nautical miles, up to a maximum of 350 nautical miles or 2500 metre isobaths plus 100 nautical miles but must submit relevant scientific data to the Commission on the Limits of the Continental Shelf.
- Redelimitation of internal waters, territorial sea, EEZ and continental shelf.

Introduction: The Needs for Sustainable Marine Administration and Development

Current Situation

- Lack of clearly articulated vision for the use of marine areas
- Lack of plan-driven approach to the management of marine areas
- The diversity of marine environments requires effective economic, social, and environmental management that is just as comprehensive as land management.
- The interests of a nation do not stop at the land – sea interface but continue into the marine environment. Therefore, the responsibilities and opportunities of governments to provide infrastructure for land and resource management shall extend to marine areas
- Human activities can be managed through effective marine administration and development (Marine cadastre and marine spatial planning)



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The need to implement the UNCLOS thus guaranteeing and securing sovereign state rights in the sea area

The need of publicity and legal certainty in the marine environment to reduce conflicts on the overlapping rights, interests and responsibilities

The information contained in a Marine Cadastre relating to the patrimonial rights that exist in the territorial sea, EEZ waters, soil and subsoil of these areas, will also prove very useful in that it will inform the authorities and all other stakeholders about the legal holders (owners, lessors, users, license holders, etc.) and exact content and location of these rights.

Registration is the recording of deeds relating to

- a) the creation or transfer of rights in immovable goods*
- b) to charges or restrictions encumbering immovable goods on specific registers kept at public land or ship registries.*
- c) Registration is a legally acknowledged proof that the rights of the registered owner, beneficiary, transferee, mortgagee are protected against third parties (deed system) or that the registered person is really legally entitled to the right (title system).*
- d) Publicity and legal certainty resulting from registration are importance for a real estate market and a performing credit sector, and ultimately for a thriving economy*
- e) The establishment of a marine cadastre that identifies and describes the physical parcel and its boundaries, should have to be flanked by registration in the registers of the deed creating or transferring the rights, charges or restrictions with respect to the marine cadastral parcel.*

The need to enhance public revenues deriving from the taxation of marine patrimonial rights and exploitation of marine resources

The need to implement binding legal provisions for maritime spatial planning

A marine cadastre would lay the foundation for a fair taxation system allowing to tax both sea-related property and sea-generated incomes

A marine cadastre that records general marine spatial planning restrictions, such as shipping routes, fishing and aquaculture zones, disposal sites, energy atolls, corridors for cables and pipelines, nature reserves, will inform all persons concerned and will certainly contribute to the enforcement of the maritime spatial plans.

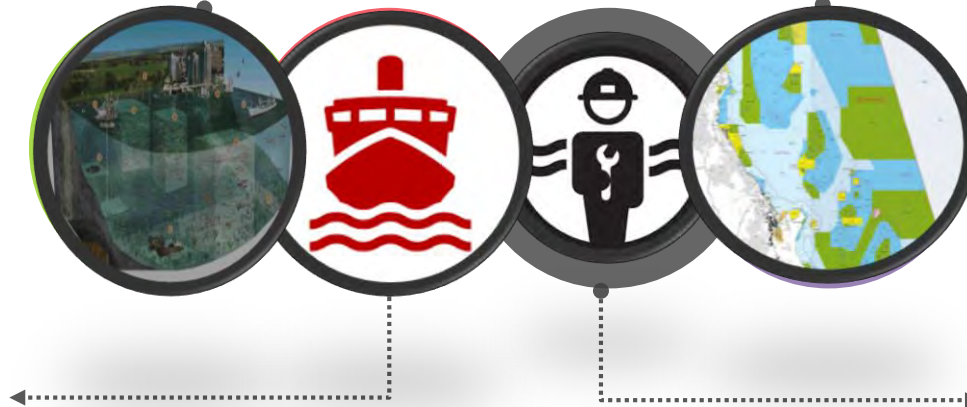
Terminology

Marine Administration

general term for the processes of marine rights' recognition, marine use planning, taxation, and developing marine information. It is central to the effective management of marine area

Marine Spatial Planning

a process that brings together multiple users of the ocean – including energy, industry, government, conservation and recreation – to make informed and coordinated decisions about how to use marine resources sustainably.



Marine Development

conversion of marine area for the purpose of residential, commercial, industrial, or other activities.

Marine Management

participatory process for decision making to prevent, control, or mitigate adverse impacts from human activities in the marine and coastal environment, and to contribute to the restoration of degraded coastal and marine areas.”

a 3D marine parcel administration system with respect to the legal and systematic technical arrangement of marine spatial rights, restrictions and responsibilities for marine space activities

A marine cadastre is a marine information system, encompassing both the nature and spatial extent of the interests and property rights, with respect to ownership and various rights and responsibilities in the marine jurisdiction

an information system, encompassing both nature and spatial extent of interests in property, value and use of marine areas

**Nichols et,al,
2006**

Robertson,1999

A system to enable the boundaries of maritime rights and interests to be recorded, spatially managed, and physically defined in relationship to the boundaries of other neighboring or underlying rights and interests

3. US DoC,2002

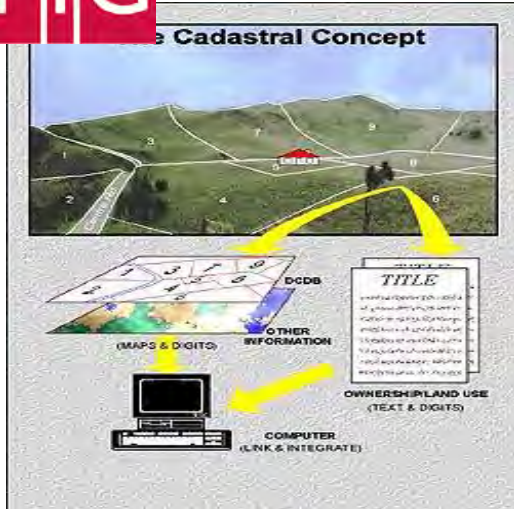
Jacob Rais, 2002

A marine cadastre is a system employing the principles of (land) cadastre in the sea regions through registering: the sea space uses by people and government activities, protected sea spaces, conserved sea regions, national sea parks, wildlife reserves and the use of sea space by the customary communities

**Abdullah et al,
2015**

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Land Cadastre. VS Marine Cadastre.

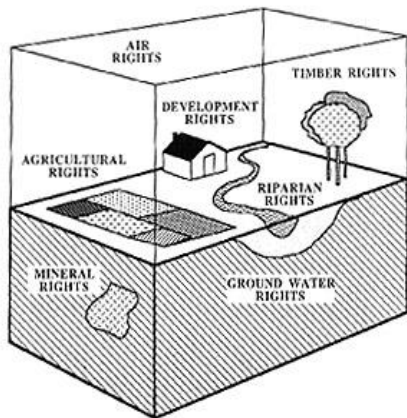


Land Cadastre

is normally a parcel based, and up-to-date land information system containing a record of interests in land (e.g. rights, restrictions and responsibilities).

It usually includes a geometric description of land parcels linked to other records describing the nature of the interests, the ownership or control of those interests, and often the value of the parcel and its improvements (FIG, 1995).

**2D
Stopped at HWM**

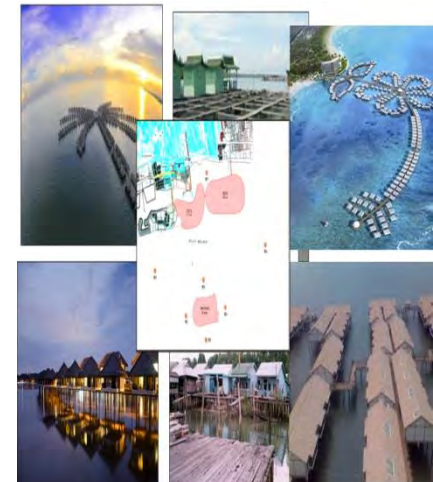
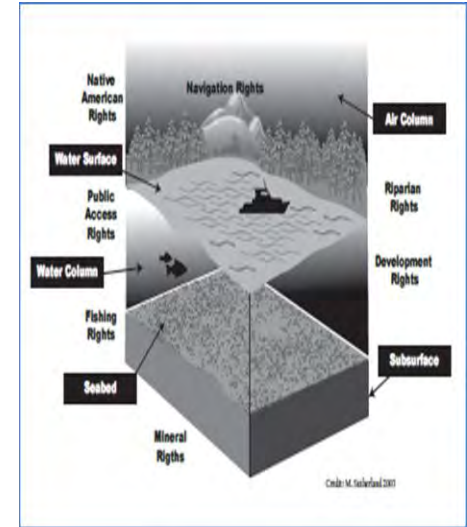


Marine Cadastre: (General)

3D marine parcel administration system with respect to the legal and systematic technical arrangement of marine spatial rights, restrictions and responsibilities for marine space activities

Marine Cadastre is particularly about how a country administer marine resource in the context of UNCLOS

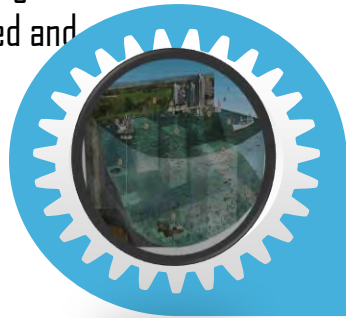
**3D = (4D) Time
Start at LWM until
3nm to EEZ**



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Relationship Between Marine Cadastre and Marine Spatial Planning

MC is defined as a management tool, which can be added as a data layer in a marine SDI, allowing them to be more effectively identified, administered and accessed



MSP is intended to regulate the use of the marine areas

MC is intended to describe and delimit distinct MC parcels and to indicate all relevant public and private rights, restrictions (including inter alia the restrictions resulting from MSP) and charges on those parcels.

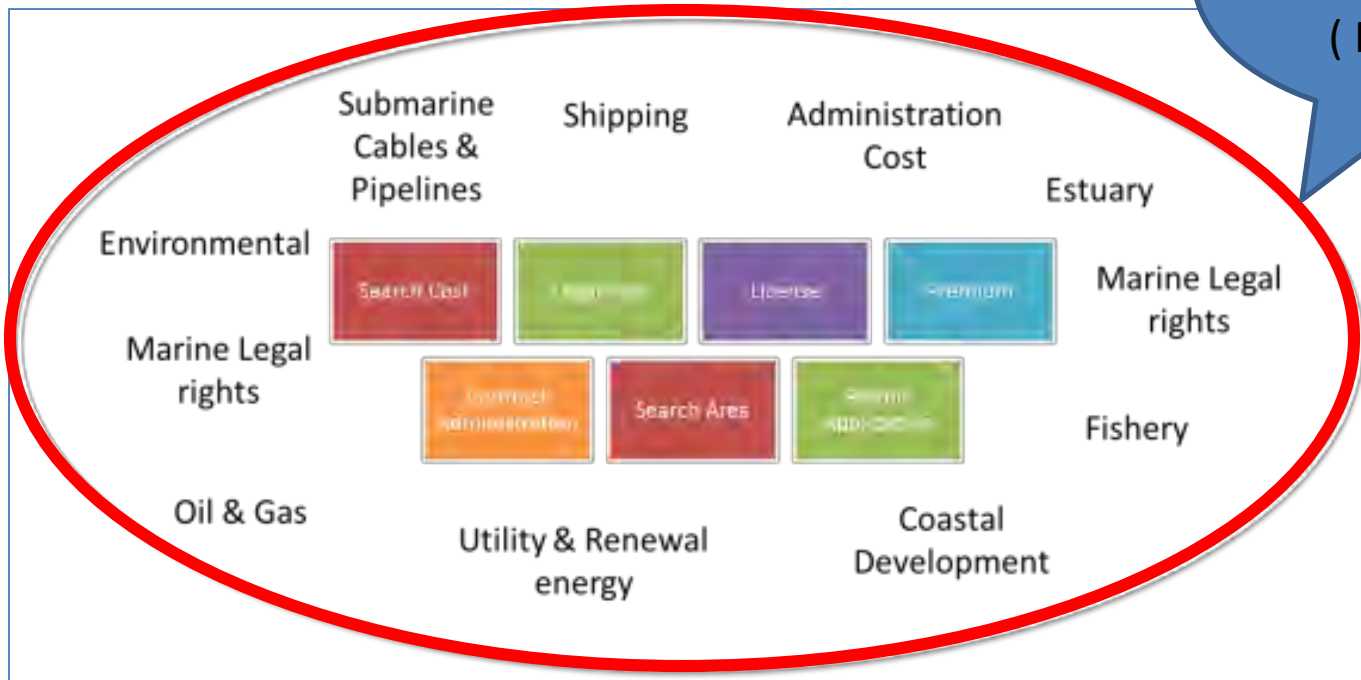


MSP is designed and implemented safely and at a lower cost if it utilizes data from MC and MC will register and control the different rights and licenses in marine areas based on ecological environment when defined zoning from MSP

Potential of Marine Cadastre Towards Nation Development

- Marine spaces are sources of wealth and environmental function that provide impacts and implications especially in economic

Opportunities to Geomatic Community (Professional Services)



Potential of Marine Cadastre Towards Nation Development

ACTIVITY	INCLUDES
Tourism and recreation	Diving • Boating • Fishing • Swimming
Marine protected areas	Marine national parks • Marine sanctuaries
Shipping	Commercial shipping • Freight haulage • Local transport
Cables and pipelines	Oil and gas pipelines • Telecommunications • Electricity cables
Human occupation	Housing over water • Houseboats • Permanent mooring of boats
Aquaculture leases	Mussel farms • Abalone farms • Spat gathering areas • Oyster farms
Minerals and energy	Mineral exploration • Oil and gas exploration • Resource extraction
Native title	Nonexclusive access to the sea and seabed.
Ocean waste disposal	Ammunition dumps • Chemical dumps • Jarosite dumps • Scuttled vessels • Land-based sources
Heritage	Shipwrecks • Indigenous artifacts

No	Data
1	Digital Cadastre Database
2	Cadastral Survey
3	Hydrographic Survey
4	High Resolution Satellite Image
5	Topographic Survey at Site Areas
6	Related Plans and Nautical Charts
7	Digital Data
8	Oceanographic data
9	Marine GIS Database

Services on Hydrographic Survey, Delineation survey, Marine Parcel Registration, Legal fee etc



(Modified from Fatih Yekeler,2018)

Potential of Marine Cadastre Towards Nation Development

ILLUSTRATION : MARINE RIGHTS REVENUE

Maritime Area for potential development= 40% of~ 574,000 sq. km 229,600 sq km

Sea Bed Area value (LEASE HOLD= 20-50 years) due to dynamic environment of the water body.

TOTAL REVENUE: xxxx

Sea Bed Area	Sea Bed Area (%)	Geomatic/ Hydrographic Fees (RM)	Revenue Government (RM)	to Stamp Duty Rates (RM)	Total Stamp Duty	Total Revenue (RM)
>RM30,000	11,480 sq km (5%)					
>RM50,000	11,480 sq km (5%)					
>RM100,000- RM 500000	45,920 sq km (20%)					
>RM 500000	22,960 sq km (10%)					

**BASED ON CURRENT
PROFESSIONAL PRACTICE
AND RATE**



TECH SUPPORT

TECHNICAL

- Densification of Permanent Tide Station
- Continuous computation of Tidal Datum Methodology
- Large Scale mapping of LAT/HAT (3 nm limitation) using topo-seabed topography/ bathymetry
- Seamless vertical datum for land and marine (marine cadastre)
- Marine Administrative boundaries map
- Multipurpose Marine Cadastre
- New feature in Data Dictionary related Standard (S-100, MS, TC211)
- Determination of Continental Shelf
- The use of satellite altimetry data
- Large scale national marine gravity map



INSTITUTIONAL

- Marine Related Institutional improvement
- Stakeholder framework for state, federal, Teritorial, EEZ, Contiguous Zone
- Marine Section in related Authorities
- 3R related Policies
- 3D Parcel
- Collaboration with various Authority
- Marine use Zoning

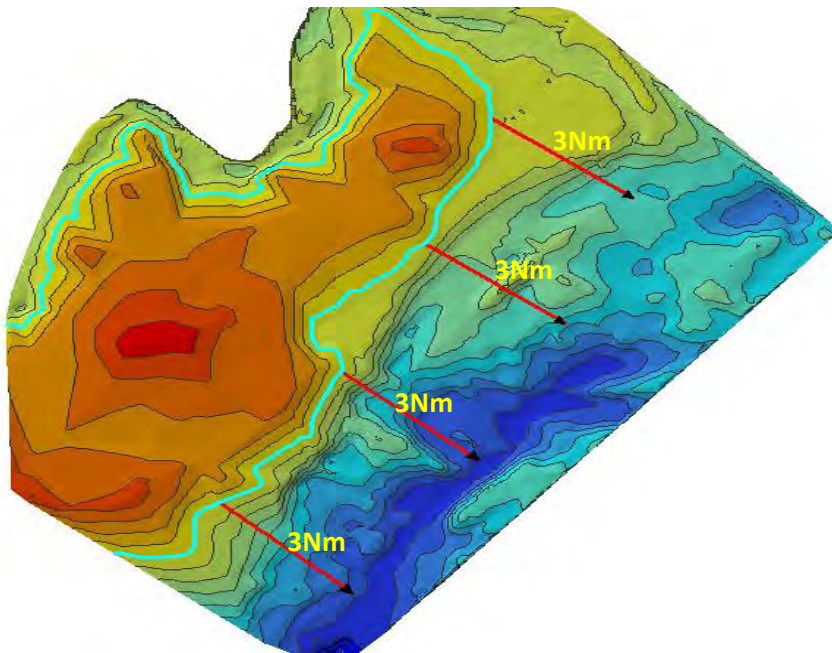


LEGAL

- New Suggestion/ Amendment to National Land Code
- 3R related Acts
- 3D Parcel

Seamless Vertical Height Datum

- The geoid based seamless vertical datum is suitable for the use in future marine cadastre development.
- This seamless vertical height would benefit in the determination of the shoreline profile and in the infrastructure development for future marine stratum in the marine cadastre environment



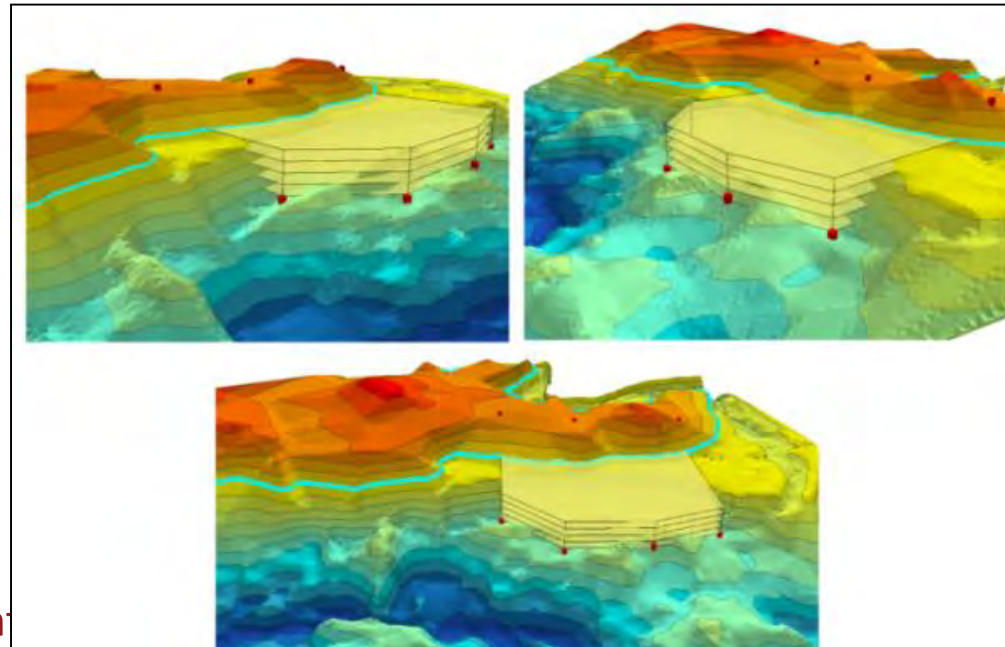
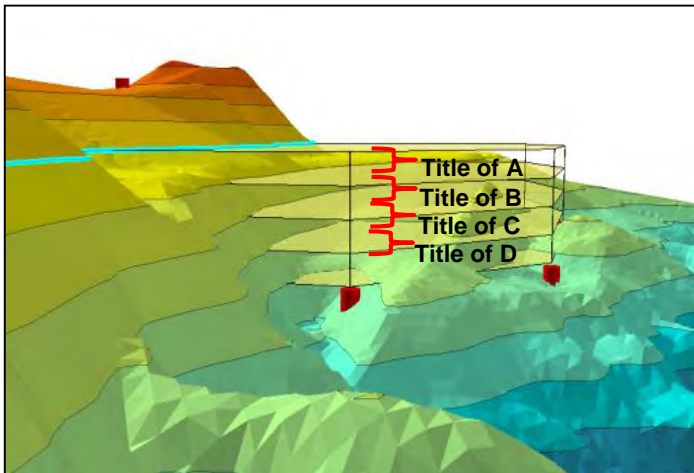
Highlighted contour as shoreline

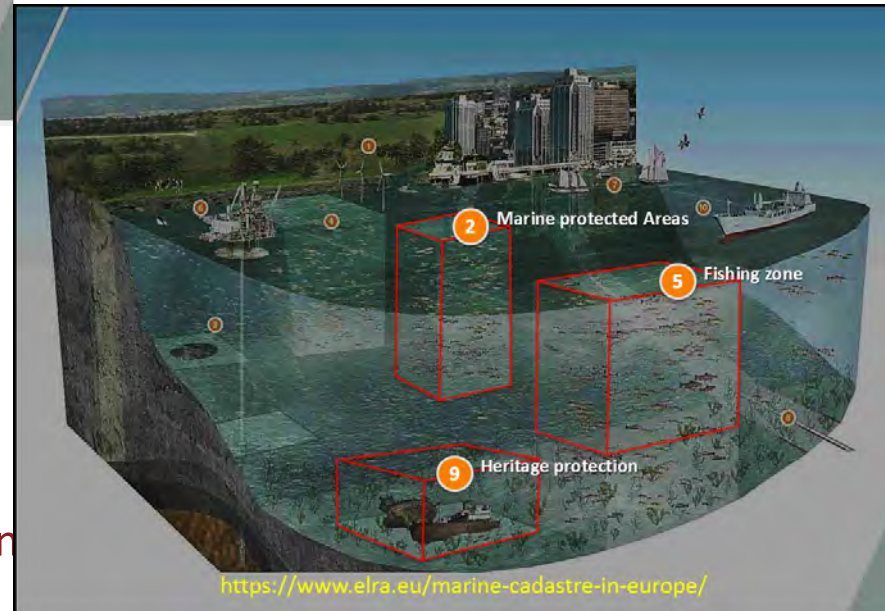
Shoreline approximation based on seamless vertical datum – zero level MSL

(3Nm from the LAT is the state/province rights to its marine areas. It will be used to distinguish the land and marine zone.)

Marine Stratum in Marine Cadastre

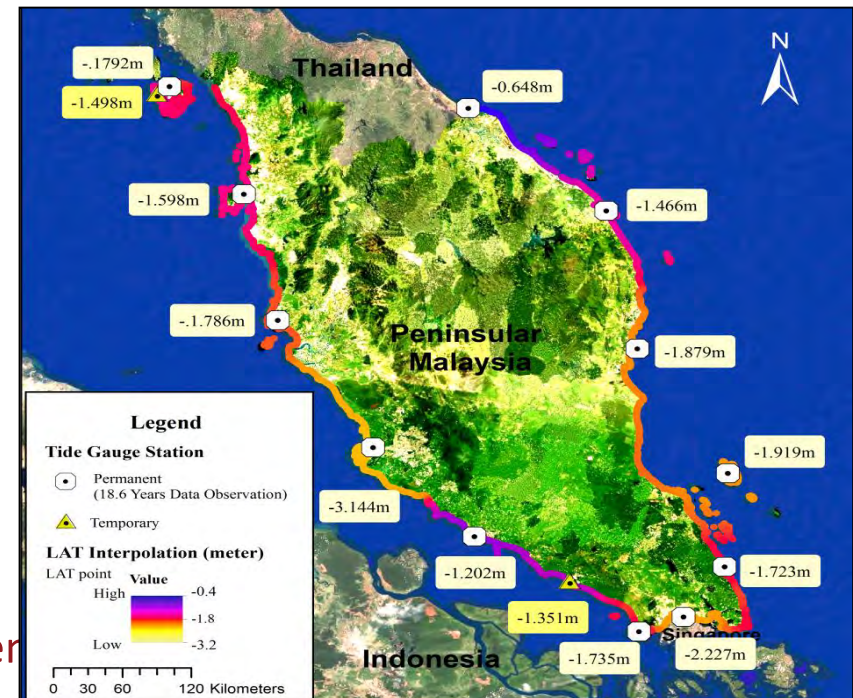
- Stratum title is one of the ways of land alienation and disposal held by the government of Malaysia to the public.
- In the marine cadastre environment, marine stratum alienation refers to the alienation of parcels that are below the sea level.
- The formation of seamless seabed and land topography is to facilitate the implementation of the stratum title in marine cadastre environment
- The formation of a 3D model of seamless terrain is required to view the lots and parcels of land and the space involved in the area of sea which cannot be displayed in the form of 2D





Tidal Datum Consistency for Marine Cadastre Littoral Zone Commencement

- A tidal datum is a standard elevation defined by a certain phase of the tide. Tidal datum is also the basis for establishing privately owned land, state owned land, territorial sea, exclusive economic zone, and high seas boundaries
- LWM/LAT is a reference datum for realization of implementation of marine cadastre due to the availability of commencement point for parcel right
- LWM /LAT can potentially be used as marine parcel commencement – in terms of starting point/line



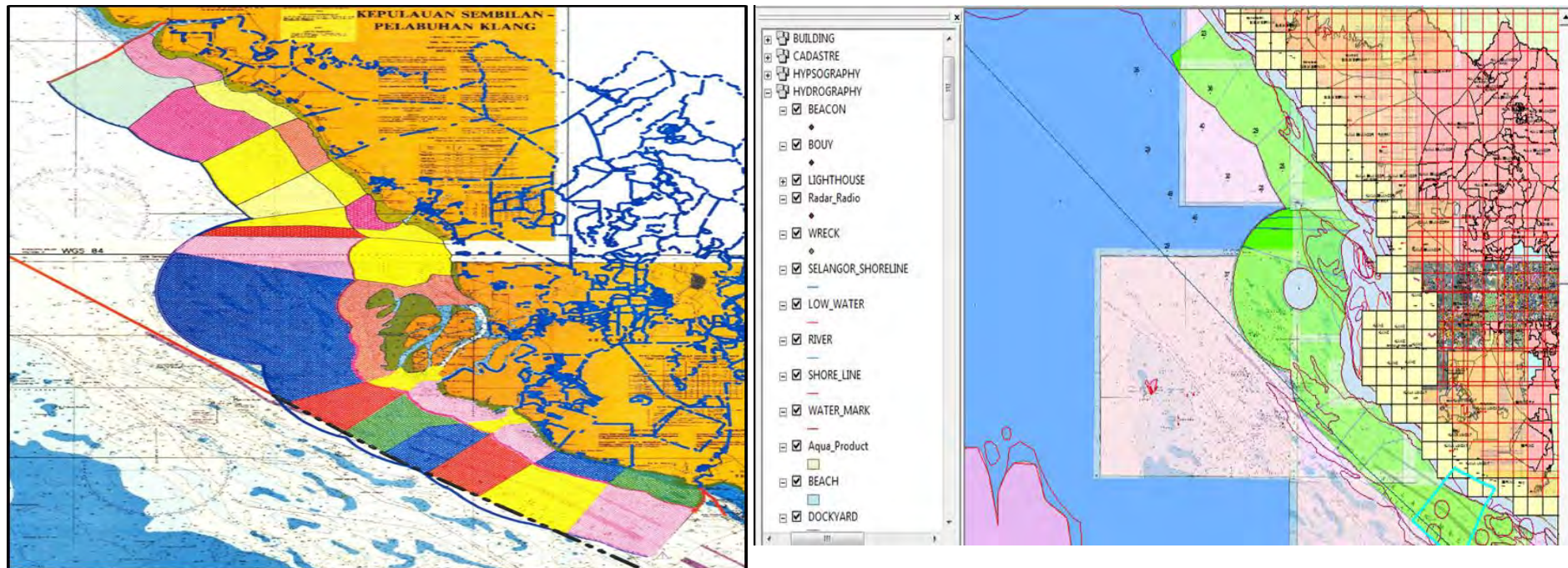
LAT Value from Tidal model Interpolation Method (Rasheila, 2015)

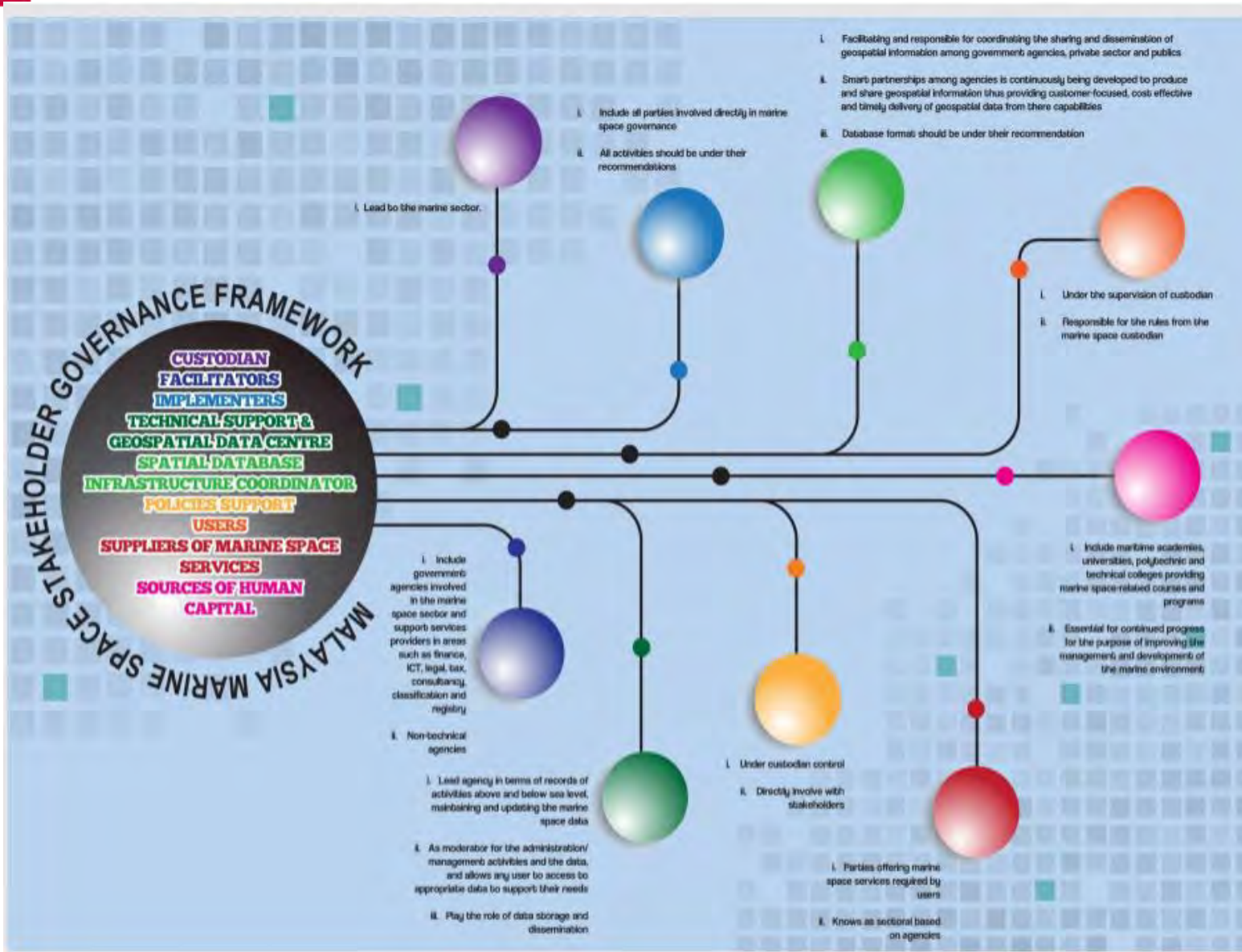
Littoral Zone Modelling

- National Land Code (NLC) of Malaysia stated that the limit of foreshore is measure from the land lying between the shore line and the low-water mark of ordinary spring tides. That is mean Malaysia has chosen Mean Low Water Spring as its low-water datum to determine its local states territorial waters. Meanwhile, the federal has used LAT as the baseline for the marine area.
- The topography data (LIDAR) provide a means for accurately delineating the line of MHWS and the bathymetry data provide an accurate means for delineating the line of LAT.
- The LWM is used as the baseline of starting line for the marine cadastre and MHWS is used as the limitation of the land cadastre (respective to NLC and Article 13 of UNCLOS III Part II)

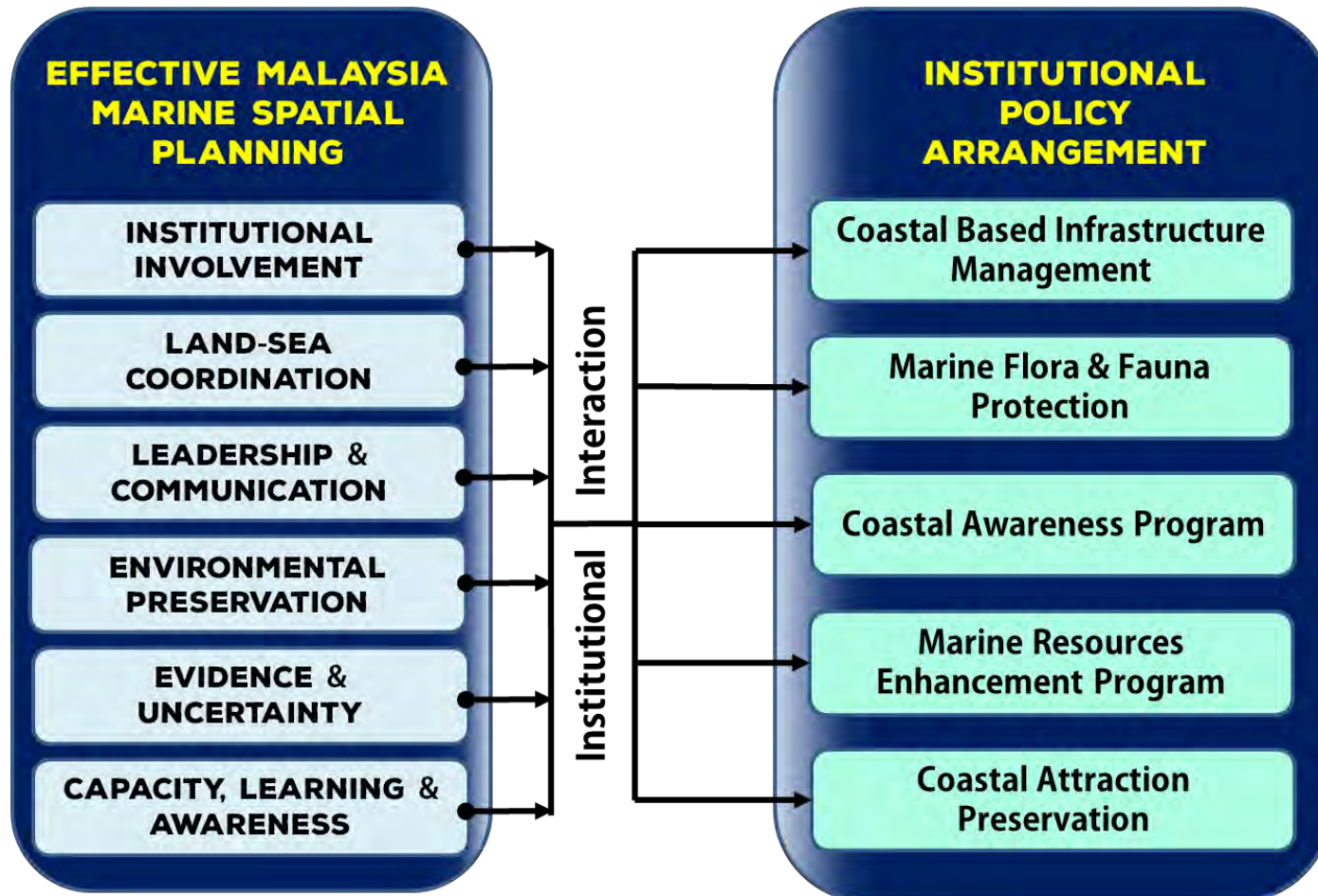


- Marine administration system which comprises cadastral marine components to form a National Geospatial Data Infrastructure that includes land, beaches and marine environment which allows access and common usage.
- Geospatial data sources like the map, nautical chart and aerial photograph whilst technical aspects like the usage of coordinate system, datum and projection in constructing Geospatial Marine Cadastre Database.





INTEGRATED FRAMEWORK OF INSTITUTIONAL ANALYSIS ON EFFECTIVE MARINE SPATIAL PLANNING IN MALAYSIA

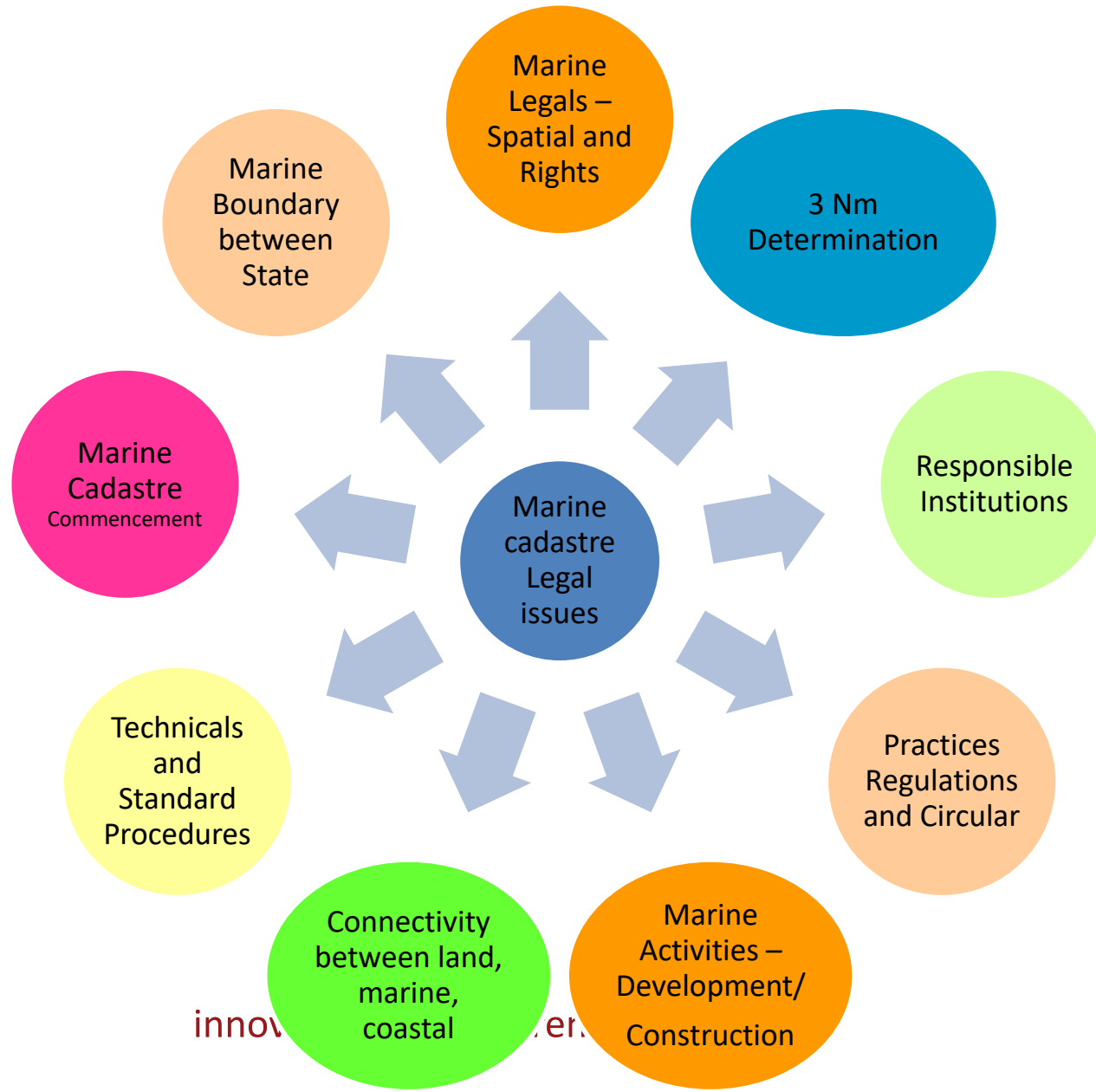


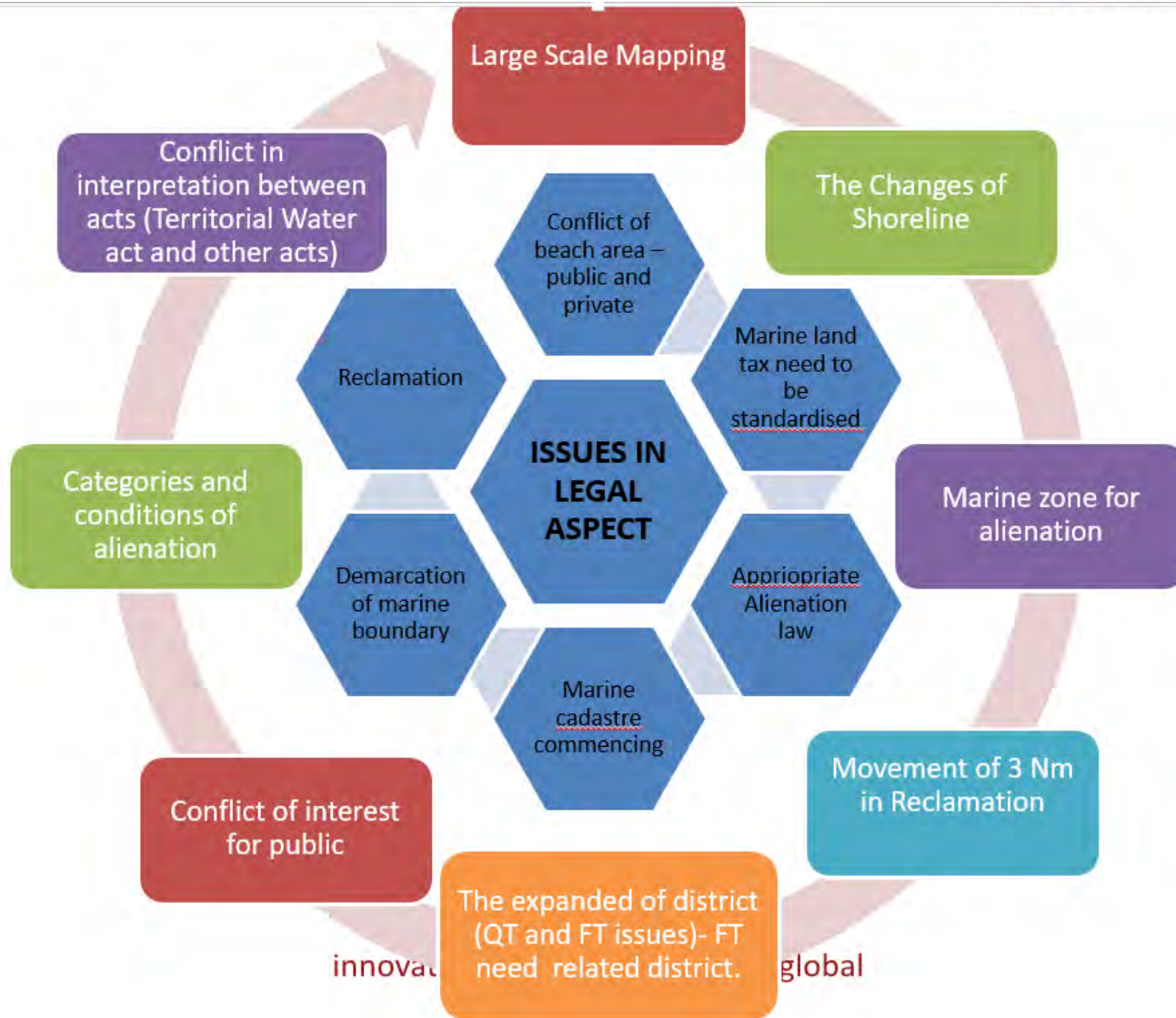
Legal Framework: Development of Marine Cadastre Definition and Conceptual Model

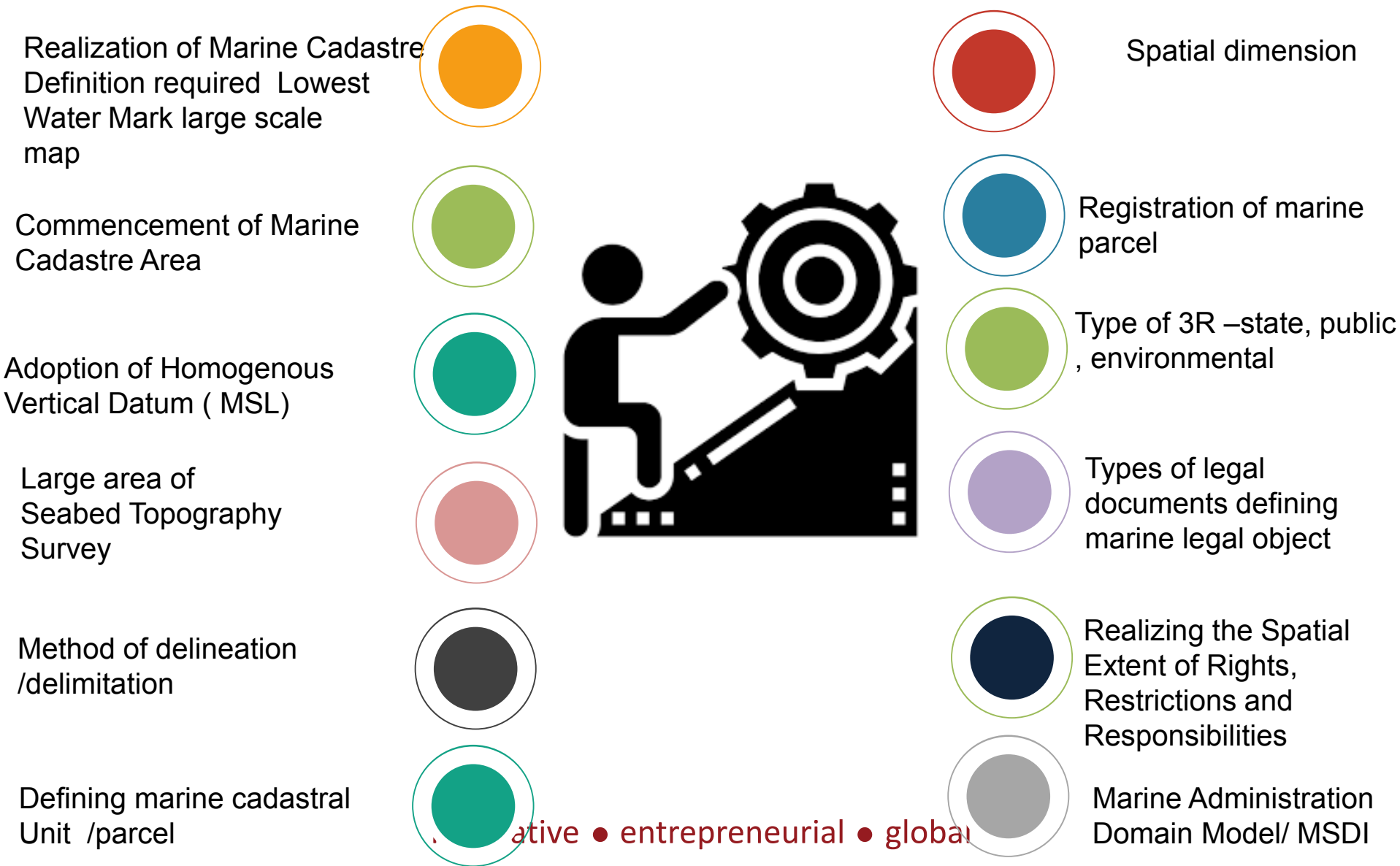
- Marine cadastre definition shall include the agenda of integrated coastal and marine resources management within the land policy and ocean policy framework.
- The justifications for the definition represents the current requirements and the gist of cadastre.
- The conceptual model needs to be developed in order to implement the marine cadastre exclusively.
- This model consists of entities and attributes that required in order to commence the structure of marine cadastre system until the execution phase

Marine Cadastre Requirements

Marine cadastre Legal Framework







Thank You

