The Mayflower Autonomous Ship Demystifying the Ultimate AI Edge
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with help of
- the Submergence/Msubs/MarineAI team (Brett Phaneuf, Don Scott...)
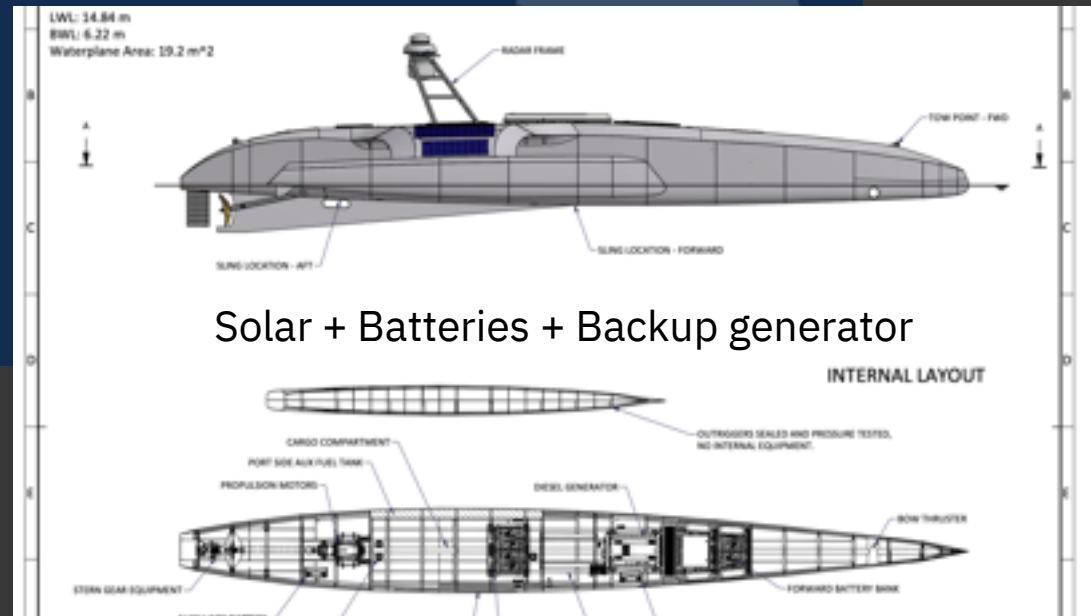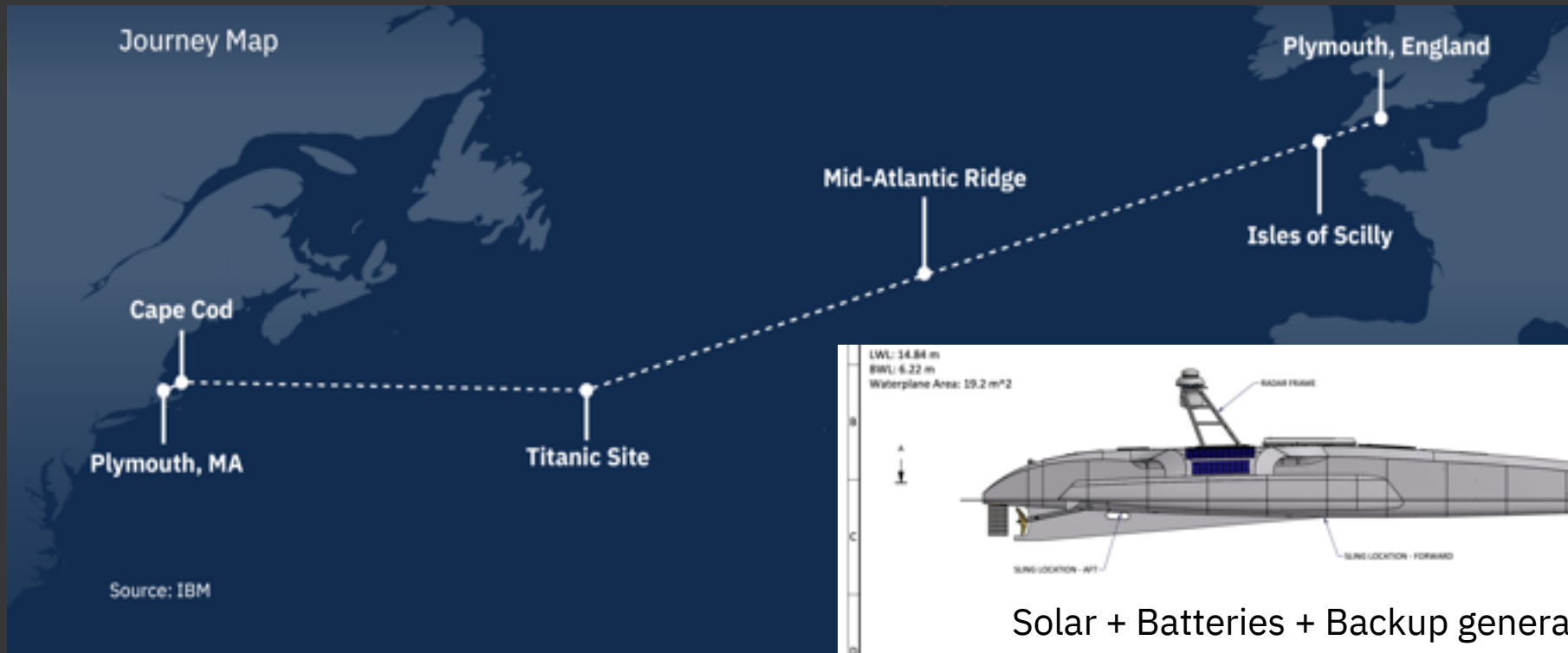- Guilhem Molines + many IBMers

October 1st, 2020

PROMARE

MARINE AI

IBM

Mission1: North Atlantic / Science

Journey Map

Plymouth, England

Mid-Atlantic Ridge

Isles of Scilly

Cape Cod

Plymouth, MA

Titanic Site

Source: IBM

LWL: 14.84 m
BWL: 6.22 m
Waterplane Area: 19.2 m^2

RADAR FRAME

TOW POINT - FWD

SLING LOCATION - AFT

SLING LOCATION - FORWARD

Solar + Batteries + Backup generator

INTERNAL LAYOUT

OUTRIGGERS SEALED AND PRESSURE TESTED.
NO INTERNAL EQUIPMENT.

CARGO COMPARTMENT

PORT SIDE AUX FUEL TANK

DIESEL GENERATOR

PROPULSION MOTORS

BOW THRUSTER

Mission2: Technology Proof

STERN GEAR EQUIPMENT

FORWARD BATTERY BANK
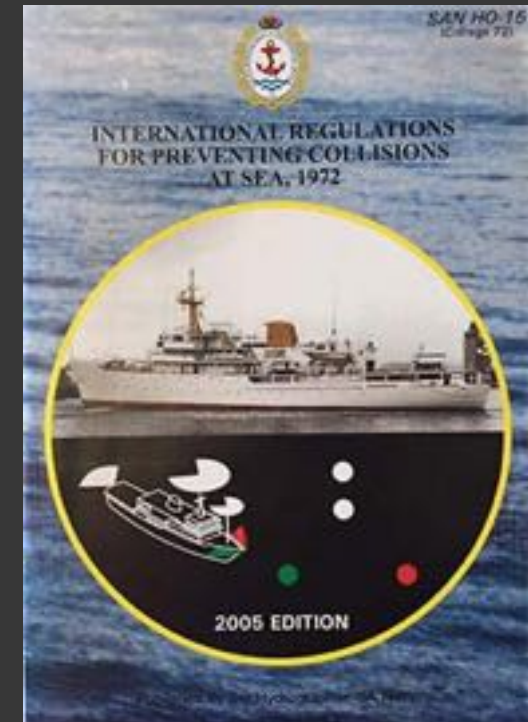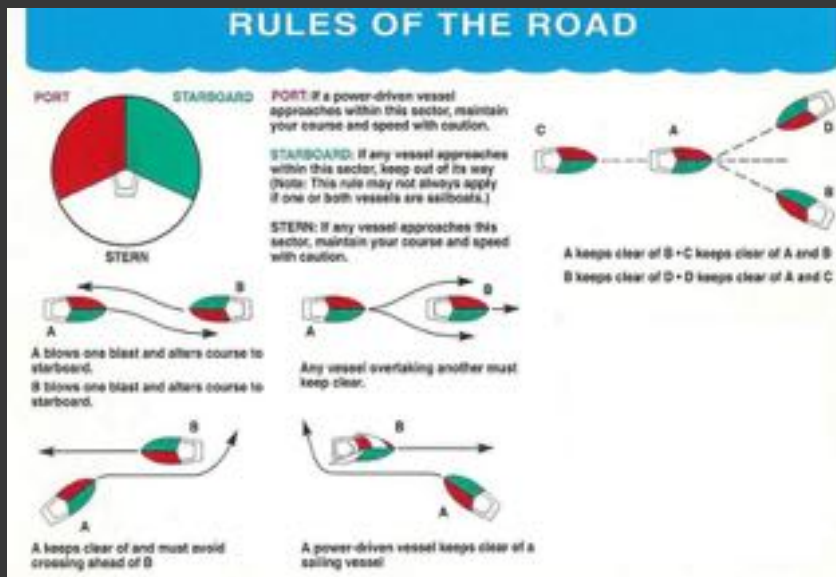
The Maker

20+ years designing submarines with autonomous functions

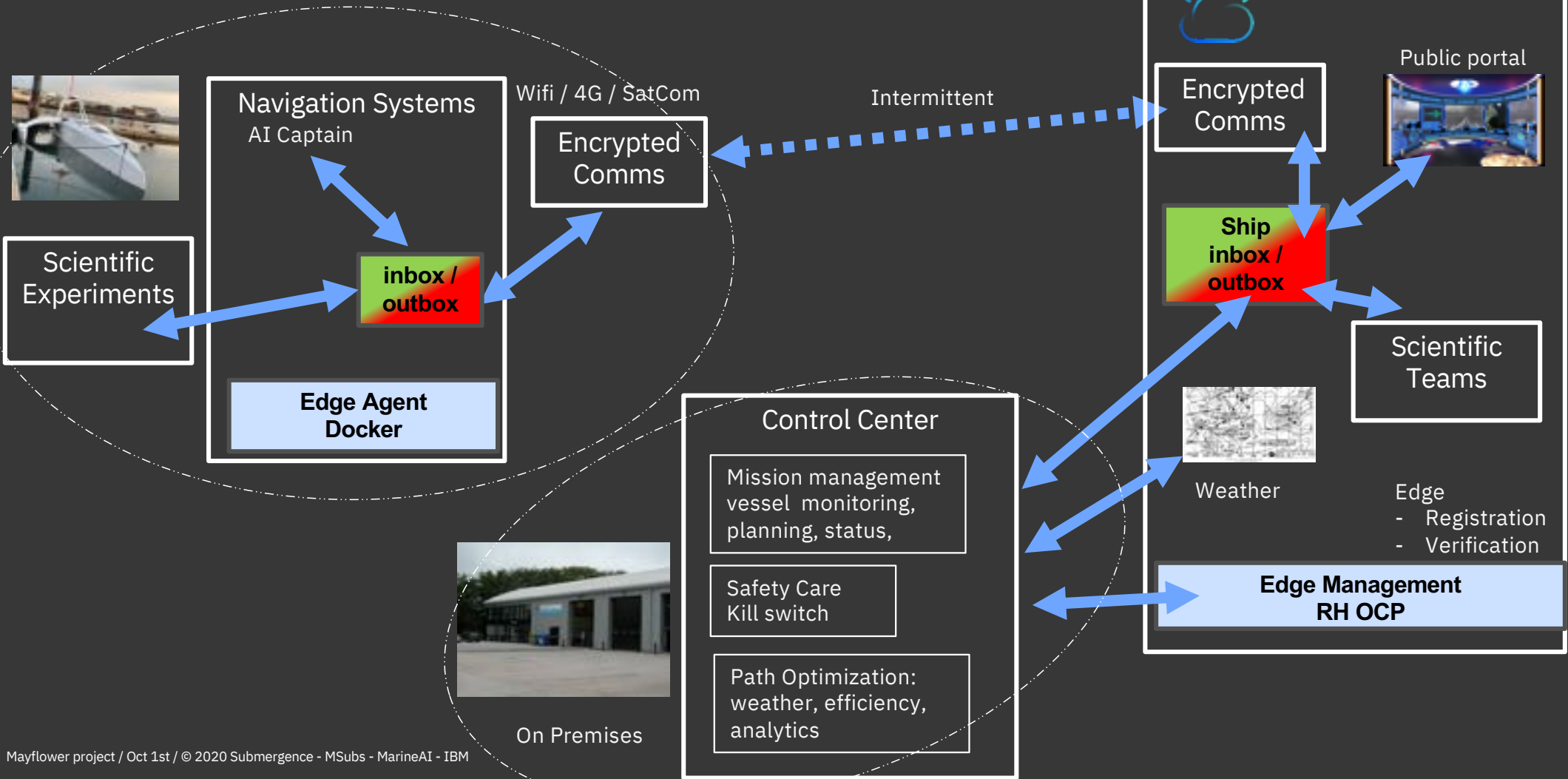## all sea-men

What are the Challenges ?
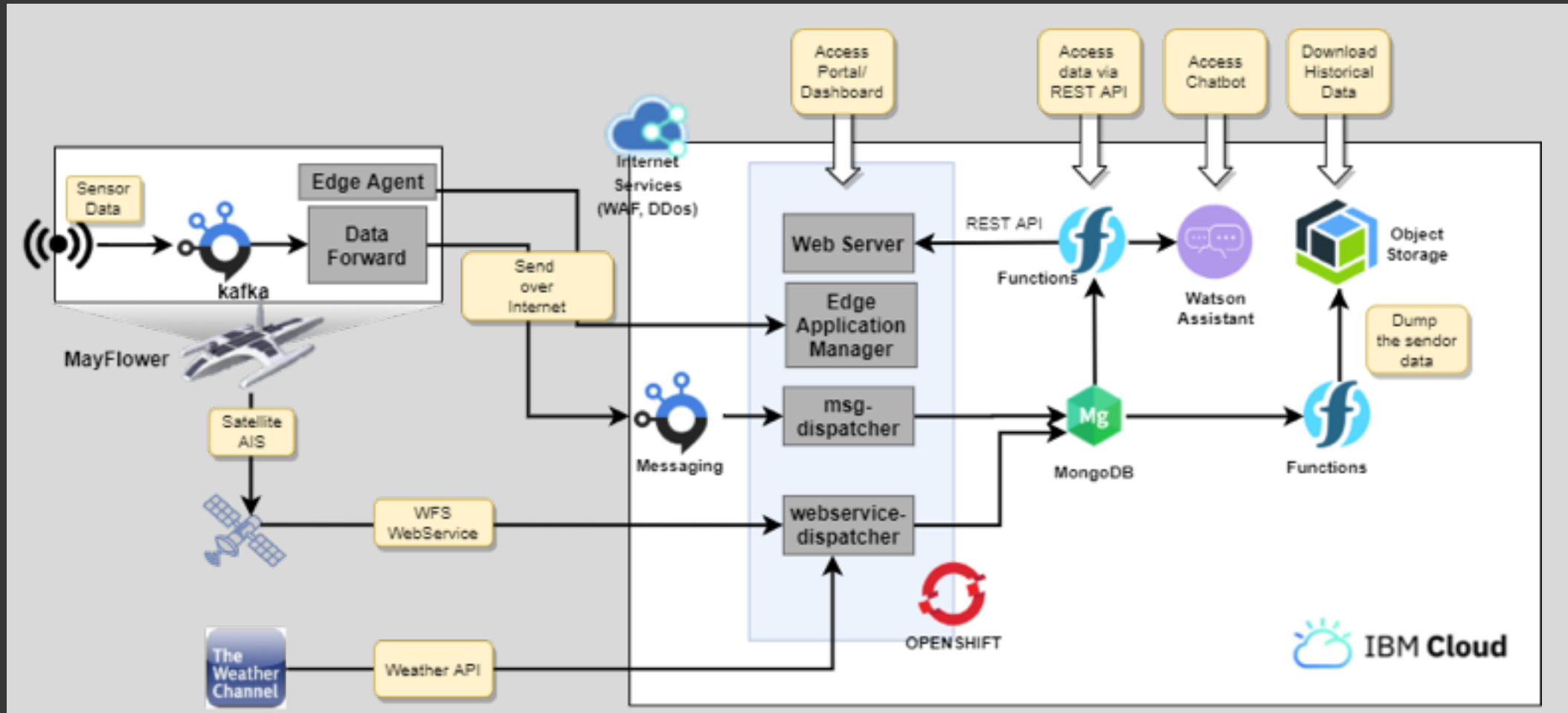
- Regulations : IMO/COLREGS/SOLAS

Ultimate Rule: do not hit anything !

- Explain decisions taken (no man on loop)
- Security
- Management with / No or Little connectivity

How is this Edge managed ?

Navigation Systems
AI Captain

Wifi / 4G / SatCom

Intermittent

Cloud

Encrypted Comms

Public portal

Encrypted Comms

inbox / outbox

Scientific Experiments

Edge Agent Docker

Ship inbox / outbox

Scientific Teams

Control Center

Mission management vessel monitoring, planning, status,

Safety Care Kill switch

Path Optimization: weather, efficiency, analytics

On Premises

Weather

Edge
- Registration
- Verification

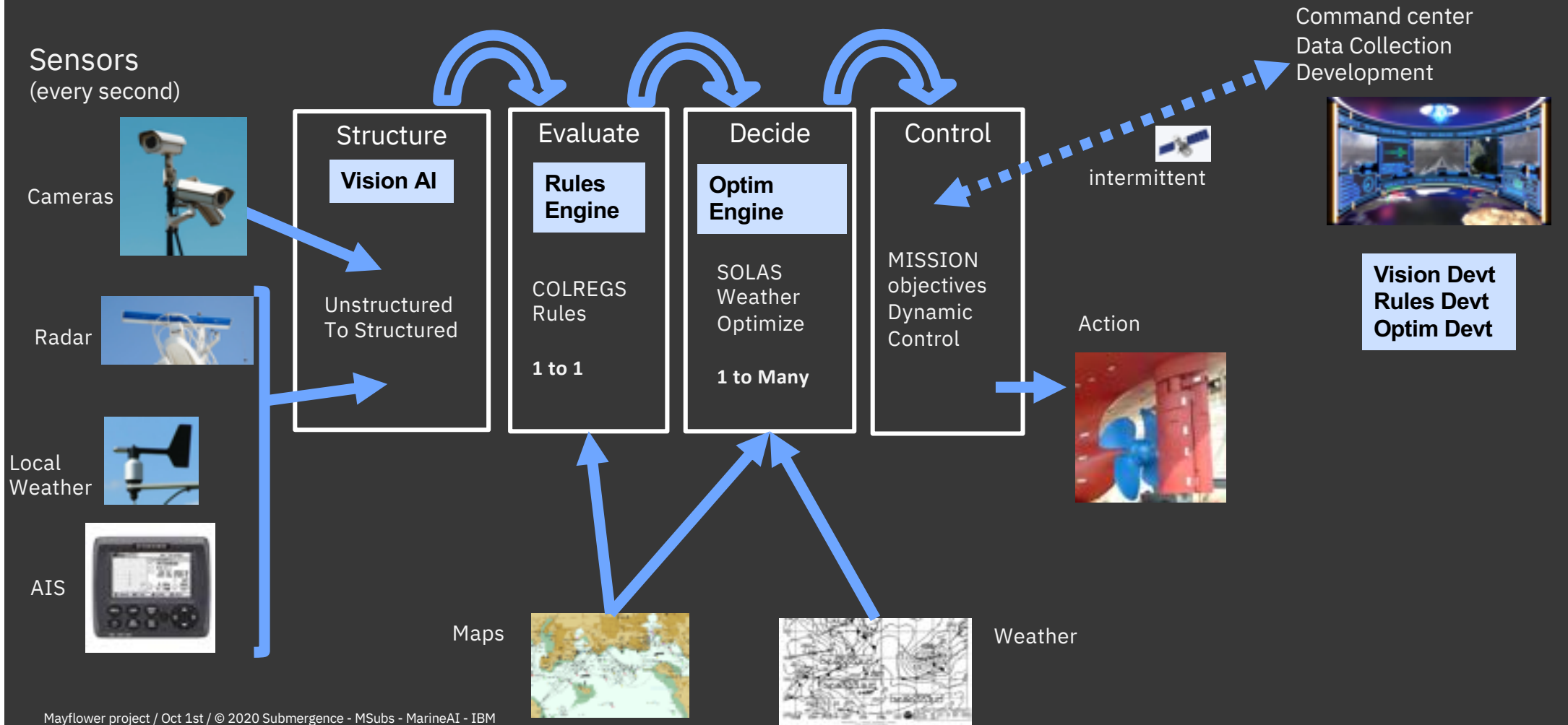**Edge Management RH OCP**

Solution Architecture Details

What Decisions ?

- Is this image an Iceberg or a Fishing ship ?

- Should I give way or keep going ?

- What is the fastest route to this waypoint ?

- What speed to use with the current batteries level ?

- What is the safest route –weather- to destination ?

Navigation system AI:

Sensors
(every second)

Cameras

Radar

Local
Weather

AIS

Structure

Vision AI

Unstructured
To Structured

Evaluate

**Rules
Engine**

COLREGS
Rules

1 to 1

Decide

**Optim
Engine**

SOLAS
Weather
Optimize

1 to Many

Control

MISSION
objectives
Dynamic
Control

intermittent

Command center
Data Collection
Development

**Vision Devt
Rules Devt
Optim Devt**

Action

Maps

Weather

Complex AI testing : Serious Game

Coming Next:
- Navigability tests
- Systems integration
- Autonomy tests
- Science experiments integration

- Spring 2021: crossing
- June return via HMS Challenger route

Then 10 years round the planet doing Science

QUESTIONS ?

MAS400.com