Centre for Marine Biofouling and Corrosion

Marine Matters



TIGER – Biofouling Prevention in High Energy Environments

Dr Tom Vance

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Plymouth Marine Laboratory

- Independent
- Research Charity
- Recognised globally for scientific research

Our Mission:

To undertake cutting-edge, interdisciplinary research to promote stewardship of marine ecosystems.

Our Ethos:

- Sustainability
- Quality & Excellence
- Innovation

Centre for Marine Biofouling & Corrosion

- Commercial division of:

  Plymouth Marine Laboratory

- <u>Providers of:</u>

  Independent biofouling & corrosion control: R&D, testing, applications.

- <u>Serving:</u>

  Shipping, Defense, Renewable Energy, Oil & Gas and Aquaculture.

CMBC: Diverse Customer Base

- Novel antifouling concepts
- Coating R&D – existing manufactures
- Bespoke biofouling management packages for end-users

Coatings – Selection & Testing

Case study:
MRED Wet-Mate Subsea Connectors

Atlantis Resources Ltd

Challenge

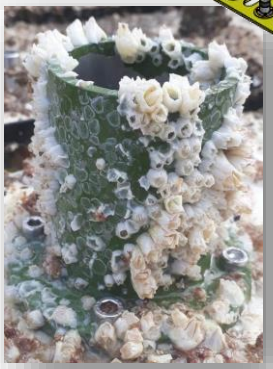
- Unique Engineering Situation
- Significant Fouling Pressure
- Significant Time/Tidal Limitations

Approach

- Bespoke Test Rig Deployed
- Shipboard and Lab Assessments

Result

- Conclusions & Recommendations: Cap Design, Gap Size, Material & AFC choice



PML Applications - Case study - ReDAPT

ReDAPT – Reliable Data Acquisition Platform for Tidal

- PML testing coating performance
- Characterising coating abrasion / scour
- Producing protocol for optimum coating selection

Optimum coating choice and biofouling severity likely to vary between devices and sites

Seabed Pods

18 months ROV survey

Pod 1.

Pod 2.

Results: Seabed pod panels May 2014 - 24 months

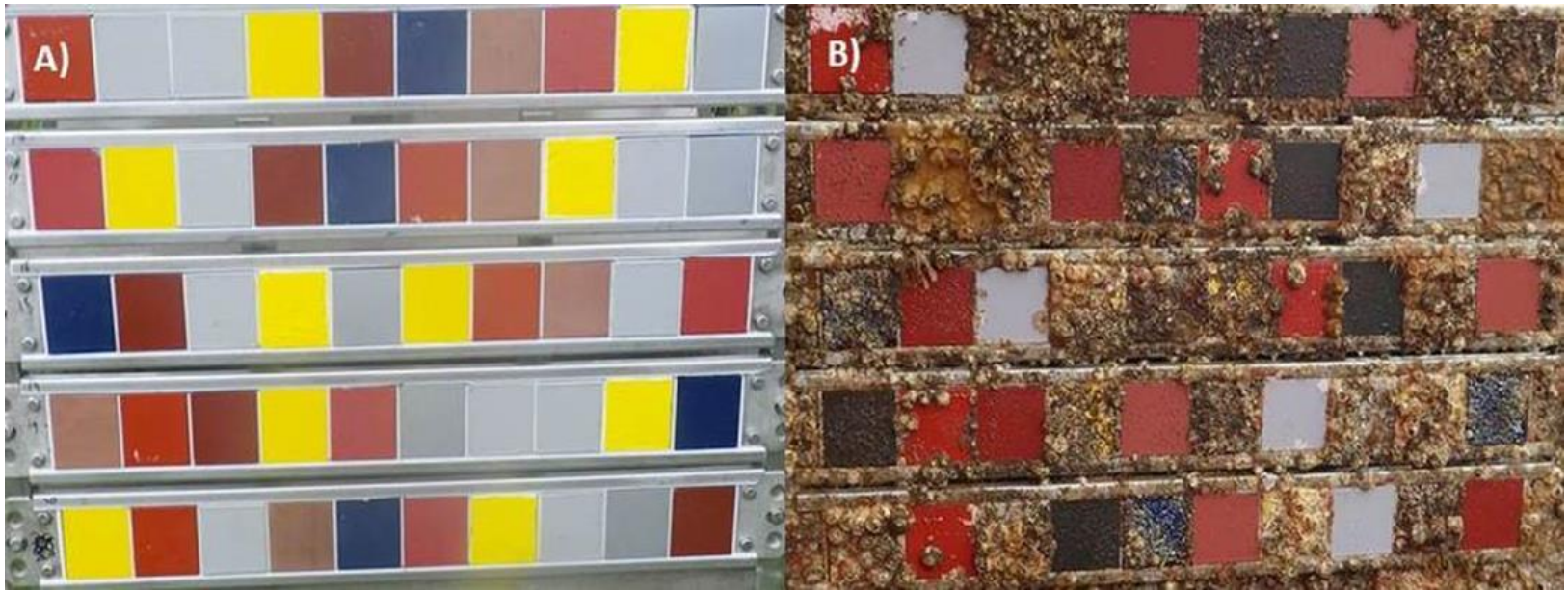


Image of a test panel array on one of the benthic pods taken A) pre-deployment and B) the same set of panels imaged after a 24 month period of continuous deployment in a high energy tidal stream.

- Rig intact and all panels recovered
- Clear difference in performance
- Consistent pattern between replicates

Results: Seabed pod panels May 2014 - 24 months

- Fouling assemblage dominated by calcareous species, notably *Chirona hameri*
- Significant damage to coatings caused by growth of individuals

Chirona hameri on FRC coating after 24 months

Results: Seabed pod panels 24 months - FRCs

Low surface energy or Foul Release Coatings (FRCs) work …….

…….until they become damaged

Results: Seabed pod panels 24 months - FRCs

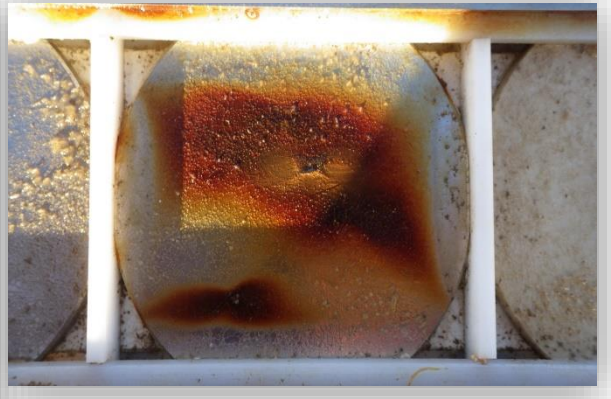
Coating damage from growing barnacles is severe – possibly exposing mild steel

Real World Testing Works

ReDAPT – Reliable Data Acquisition Platform for Tidal

- Characterised fouling potential at the site.
- Informed biofouling management strategies.
- Consideration from design stage
- Highlighted coating selection requirement
- Indicated optimum coating choice
- Niche areas awareness - instrument susceptibility
- **Big step forward to de-risk and improve reliability of renewable energy devices.**

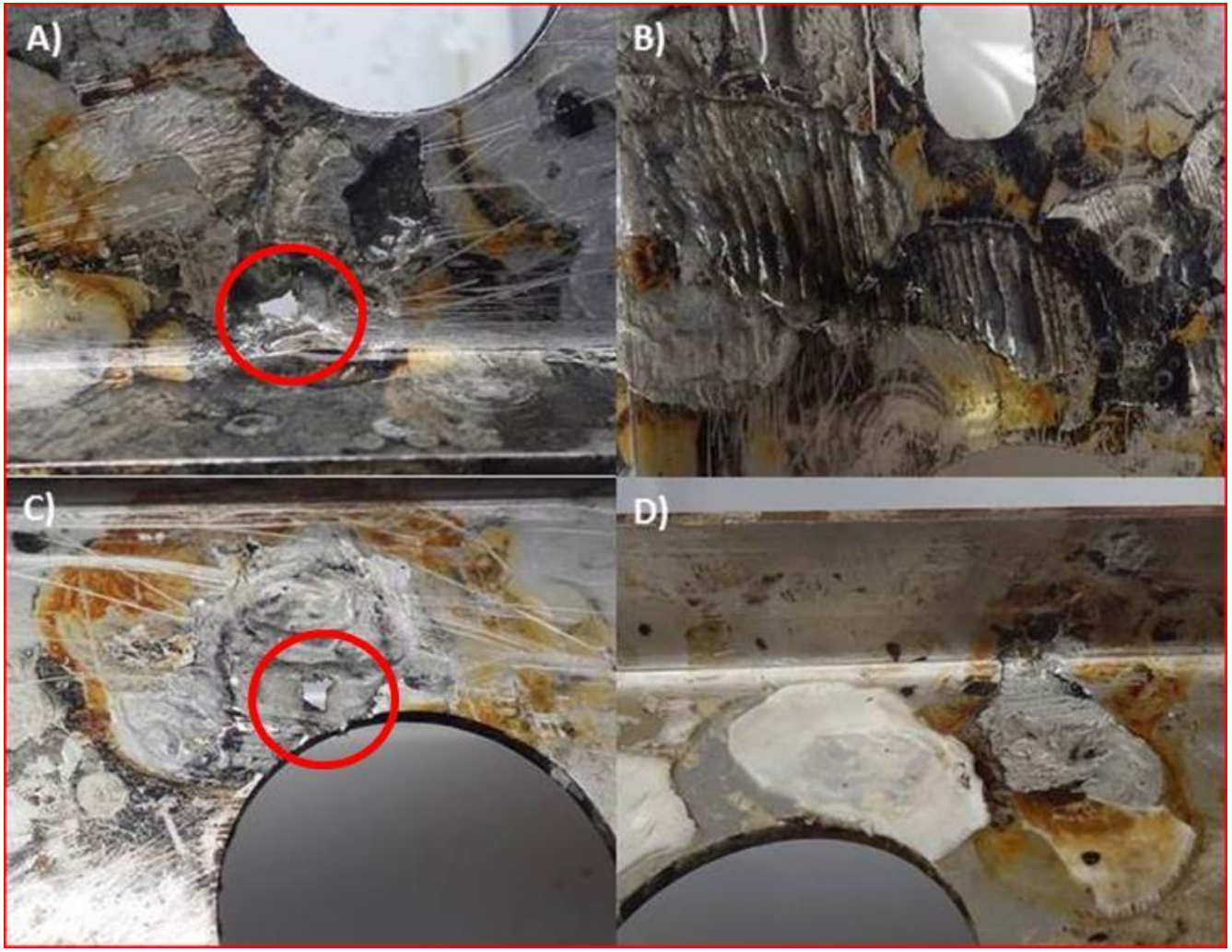
Lessons from the Field



Niche areas

- Cameras
- Heat exchangers
- Sensors
- Sub-sea connectors
- ROV deployment & connection points

Bio - Corrosion

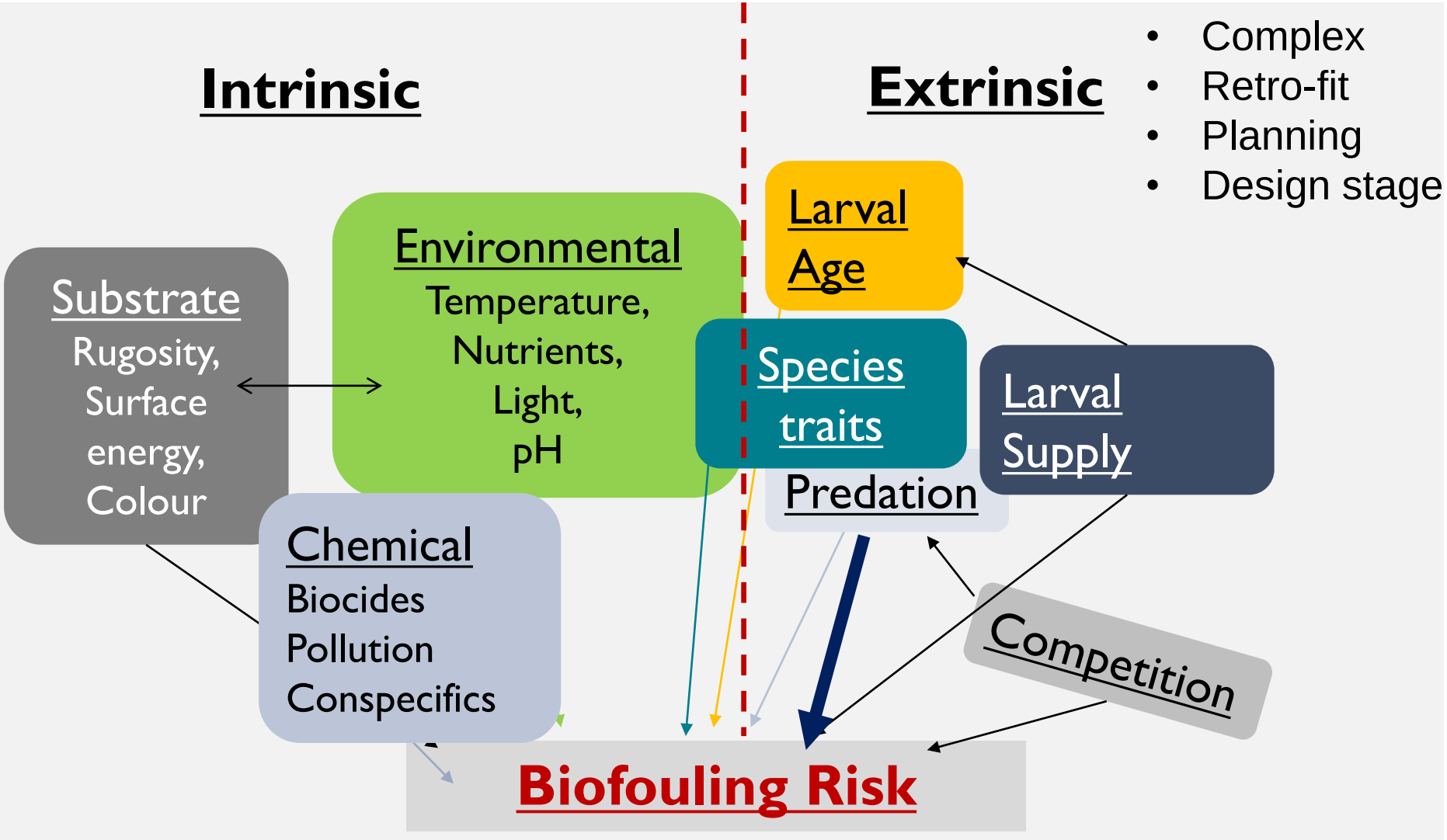


Failure of 5mm thick 316 marine grade stainless steel after a 24 months.

Antifouling and Protective Coatings
Renewables Summary

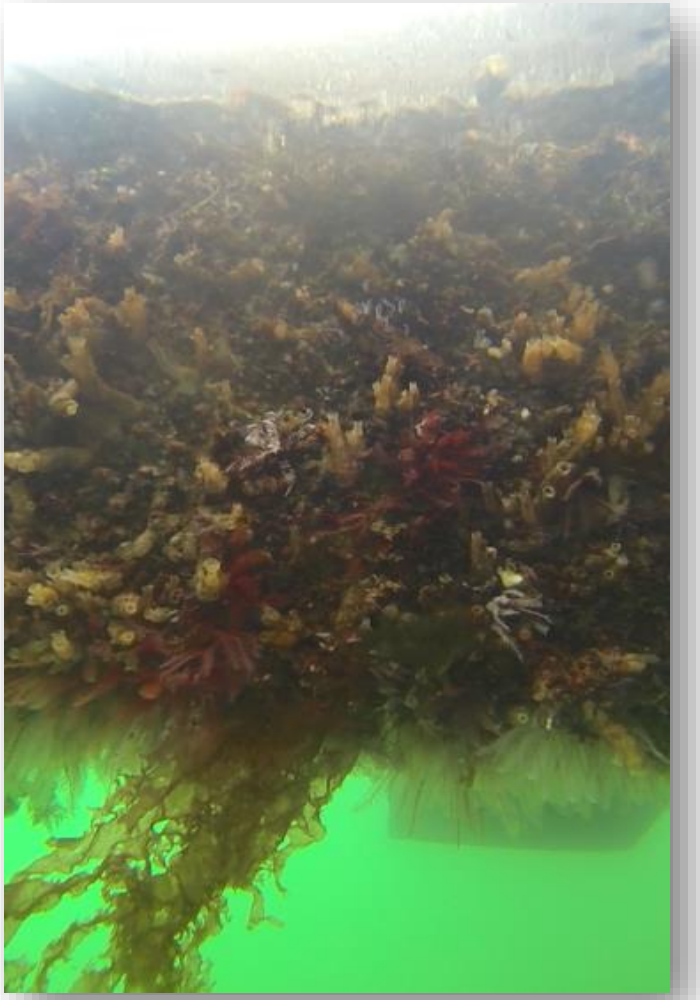
- Coating selection frequently based on many factors;
- *impartial efficacy data can be low down on the list*!
- Coatings and biofouling can be an Achilles heel on MRDs.
- Lots of lessons to be learned from other marine industries, but new data are required.
- Increasing scrutiny of biosecurity risks and infrastructure movements.
- As industry moves from prototype to arrays, device reliability, asset maintenance and biofouling protection become critical.

Biofouling – Drivers & Risk

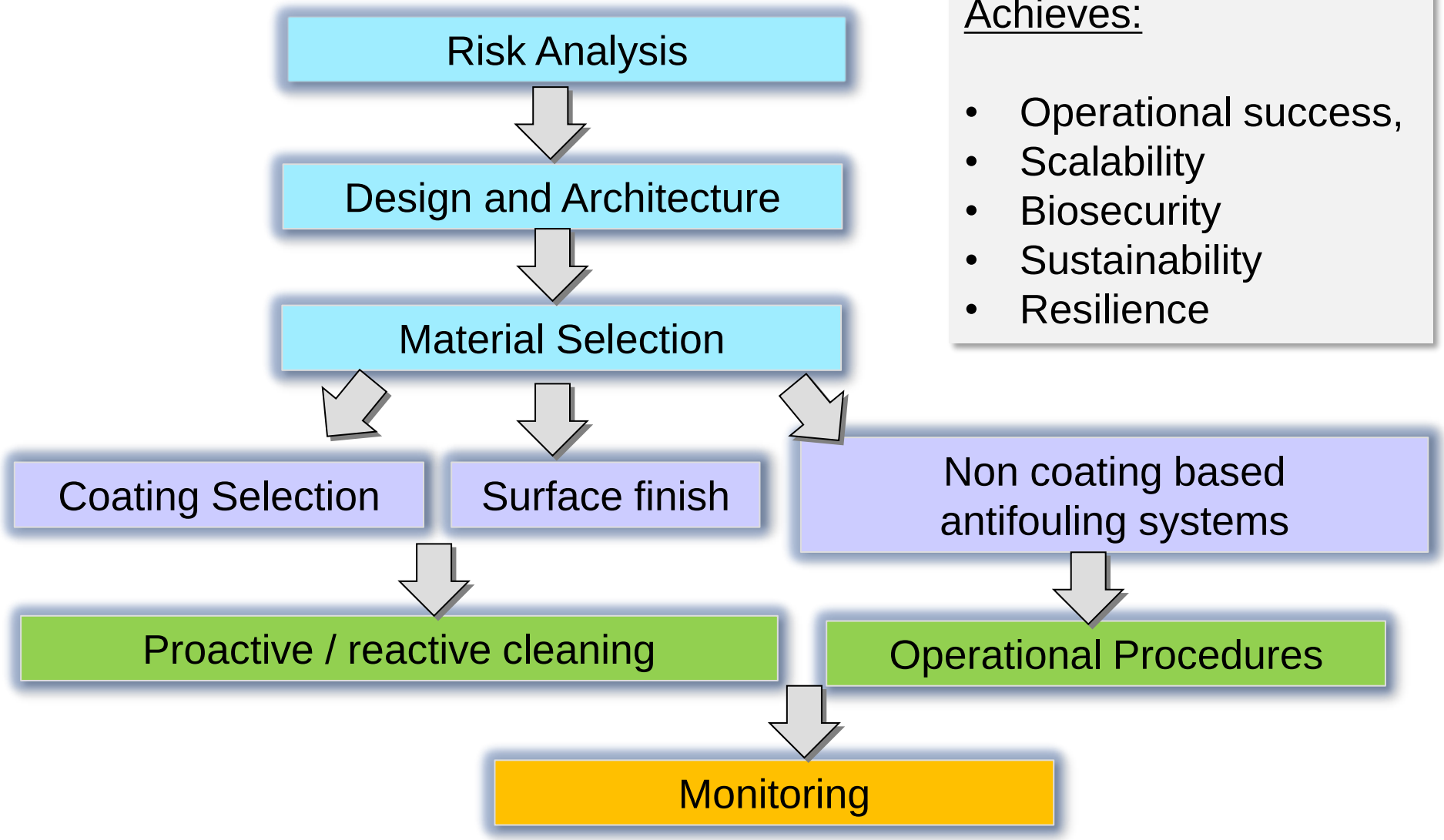


Biofouling Management Approach - BMA

- Function of item / infrastructure
- Design and shape
- Material Selection
- Coatings
- Operation Procedures
- Pro-active and Re-active cleaning
- Non-coating based approaches
- Monitoring Schemes
- Biosecurity
- Training – for best effect



Biofouling Management Approach – BMA



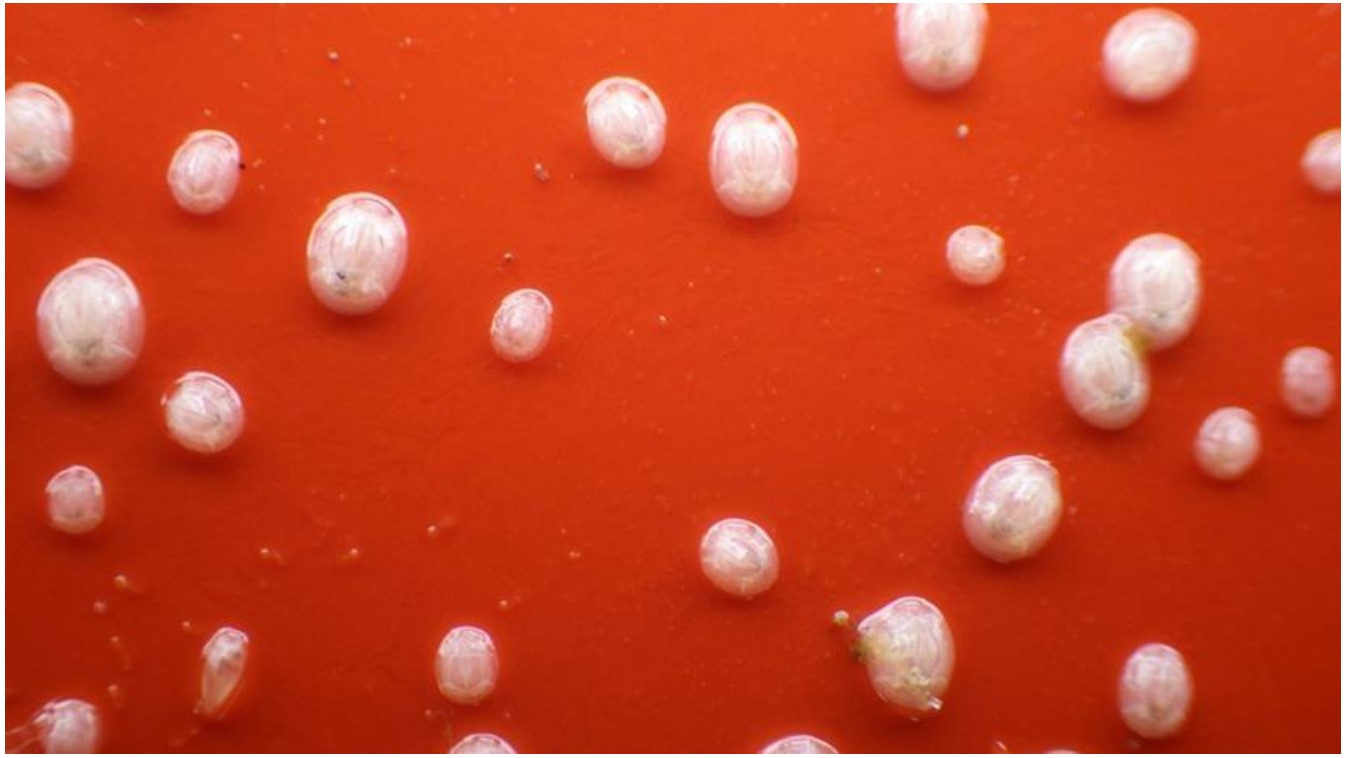
Achieves:

- Operational success,
- Scalability
- Biosecurity
- Sustainability
- Resilience

Take Home Messages

- Consider biofouling and corrosion from the design phase
- Understand your operational environment
- Conduct a desk based review to identify high components and processes at high risk from biofouling
- Its not all about coatings!
- Select suitable antifouling technology based on informed and independent testing
- Consider biofouling management costs & scheduling

Questions?



Contact: thva@pml.ac.uk