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National Biofilms
Innovation Centre

THE PREVENTION, DETECTION, MANAGEMENT AND
ENGINEERING OF BIOFILMS AND THE MICROBIOME TO
ACHIEVE BREAKTHROUGH INNOVATIONS IN HEALTHCARE

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10.03.20

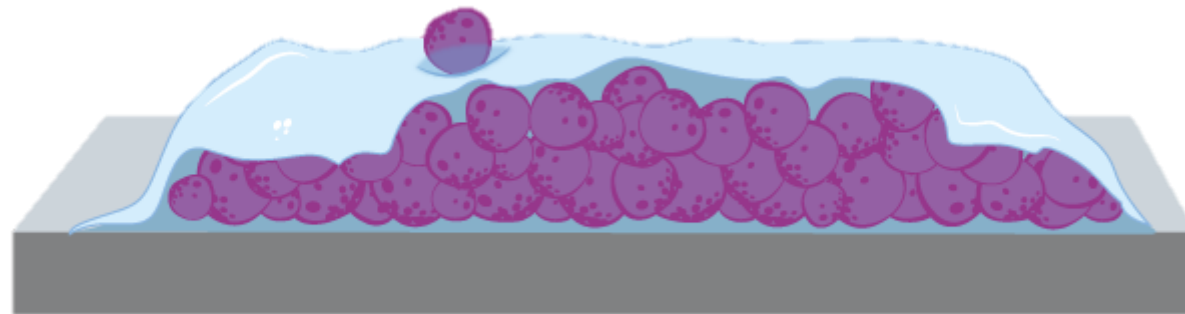
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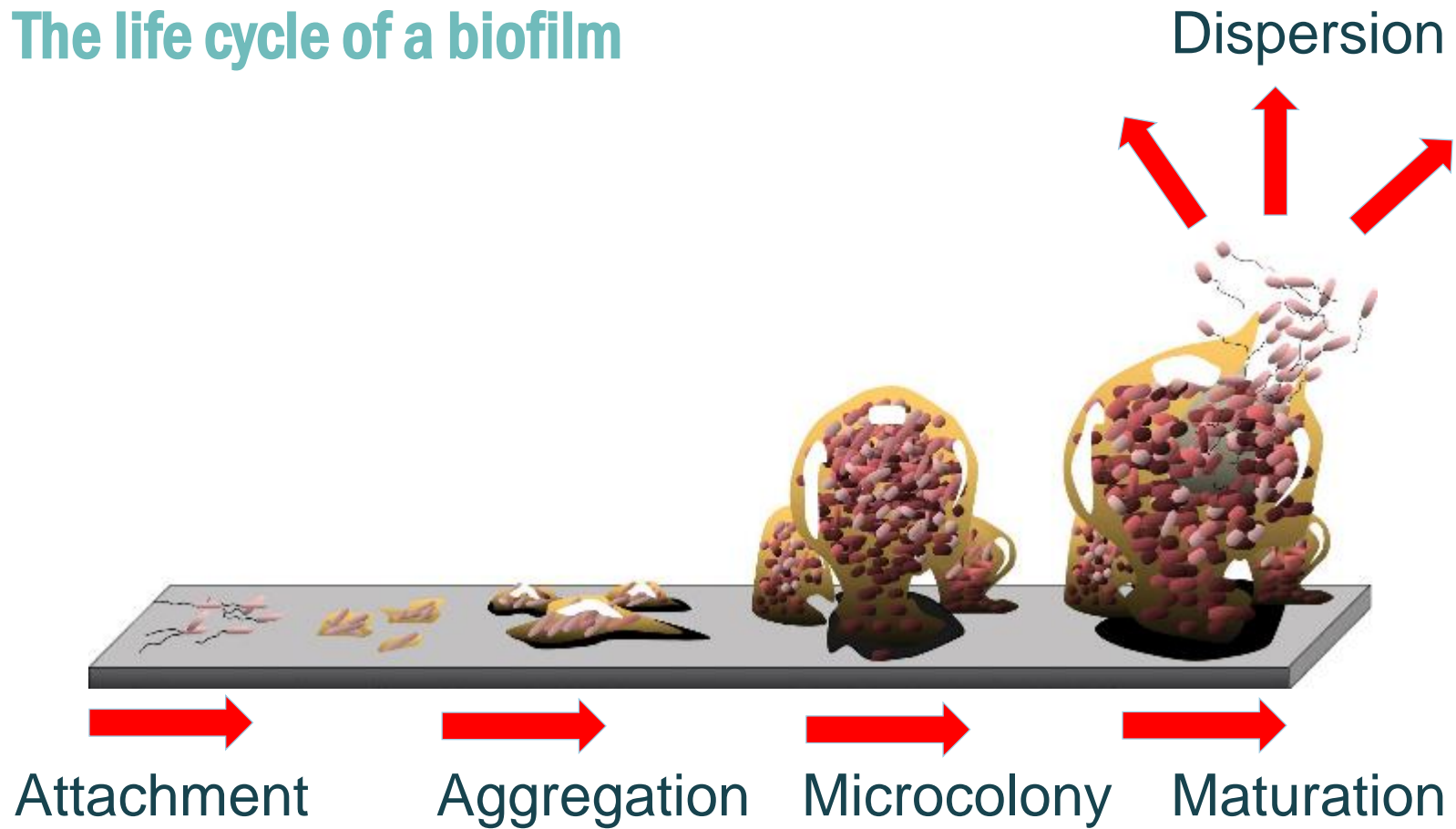


What is a biofilm?

- a group of microorganisms in which cells stick to each other and often also to a surface. This also involves an extracellular matrix of some type
- this community is a highly sophisticated entity, with highly evolved survival, propagation and communication capabilities.

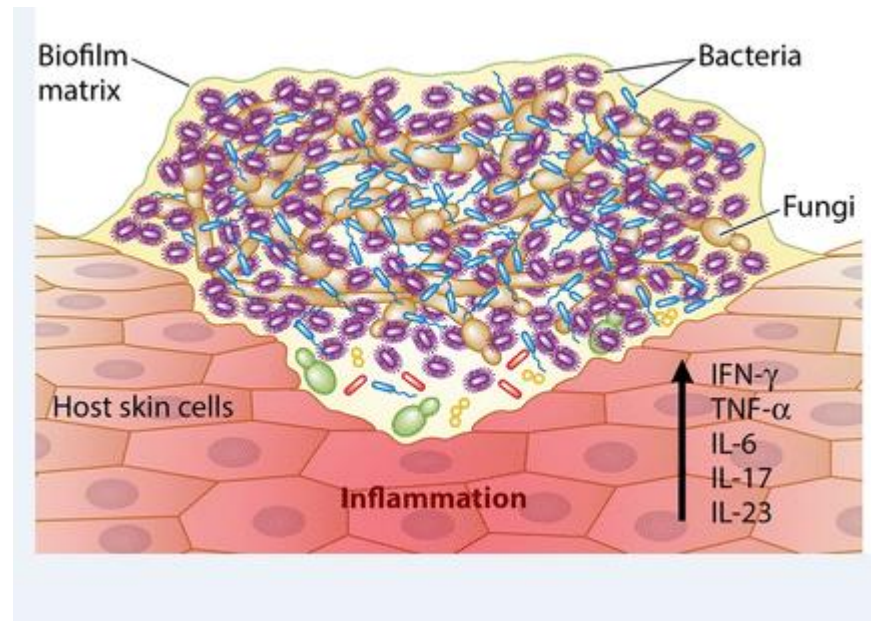


The life cycle of a biofilm

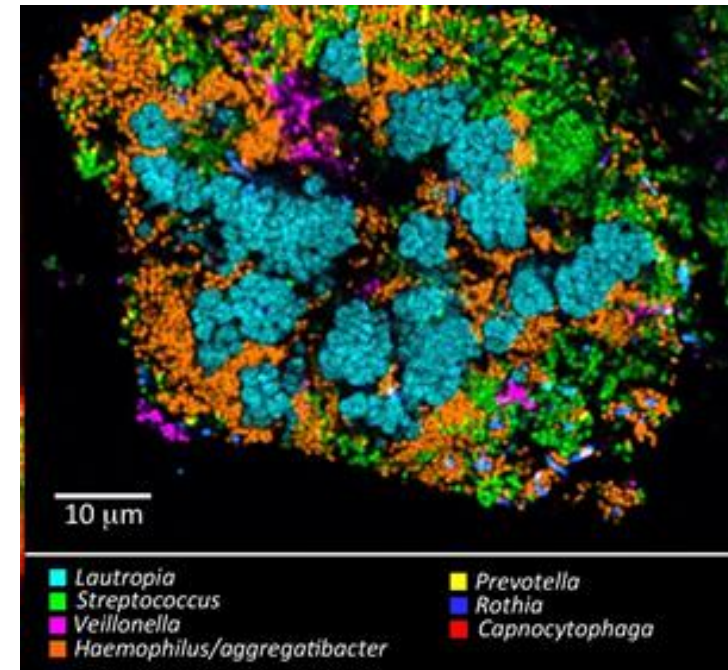


Real biofilms are complex

- shrouded by matrix and altered metabolism
- They evade antimicrobials and immune system



Wound biofilm



Dental biofilm

Ghannoum. (2016) *mBio*. 7. e01951-16. 10.1128
Bowen et al (2017) *Trends in Micro* (in press)

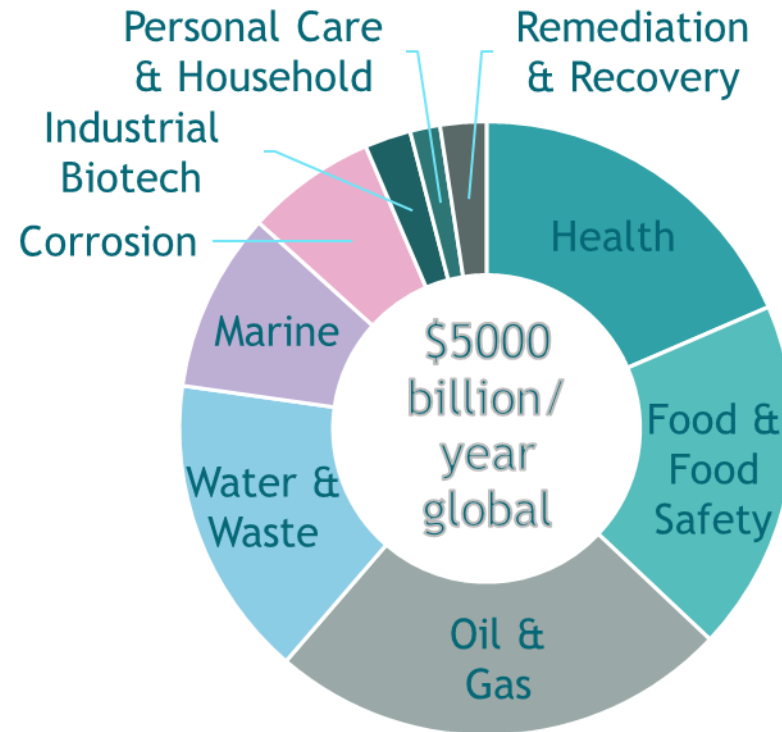


Biofilms impact significant areas of the global economy – health and beyond

MARKET ANALYSIS

- **CF respiratory biofilm infections:** biofilm burden: \$3.99bn/p.a. globally (UK £330m)
- **Marine shipping:** biofilm fouling burden global \$5.7bn/p.a.
- **Biorefining** e.g. bioethanol, global \$38bn, UK £390m
- **UTI infections:** biofilms cause an estimated global cost of \$3.9bn/p.a.
- **Food poisoning:** estimated global burden due to biofilms \$315bn/p.a.

“The National Institutes of Health (NIH) state that among all chronic infections, 80% are associated with biofilm formation” Jamal et al 2018



Market analysis, global overview.
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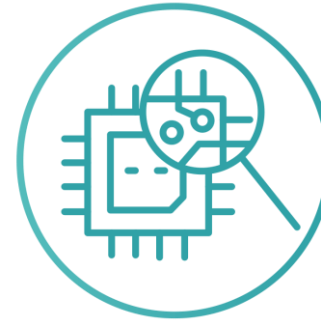
“Biofilm-associated cutaneous and wound infections annual incidence is 1.96 million cases in the United States, causing an estimated 268,000 deaths, and an estimated annual direct cost of \$18 billion” Woolcot et al 2008

4 Interventional Approaches



Prevent

Knowledge-based design of surfaces and materials



Detect

Accurate, quantitative, actionable detection or sensing of biofilms



Manage

Kill, remove or control established biofilms from exploiting their life cycle dynamics

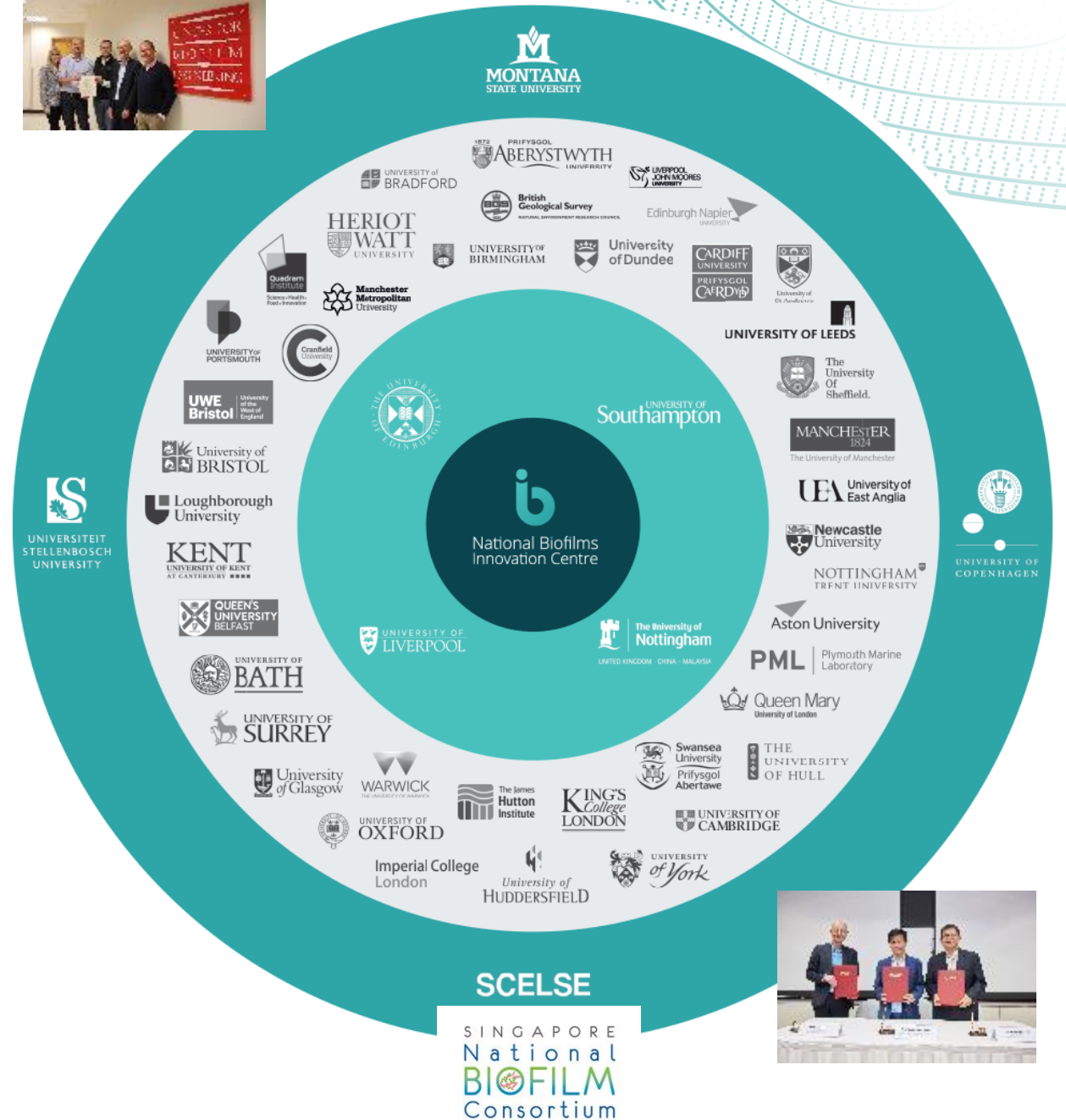


Engineer

Control and direct complex microbial community processes in process applications

National Biofilm Innovation Centre a UK community engaged in controlling or exploiting biofilms

- >50 UK Research Institutions
- >100 companies
- Multiple sectors



NBIC Vision

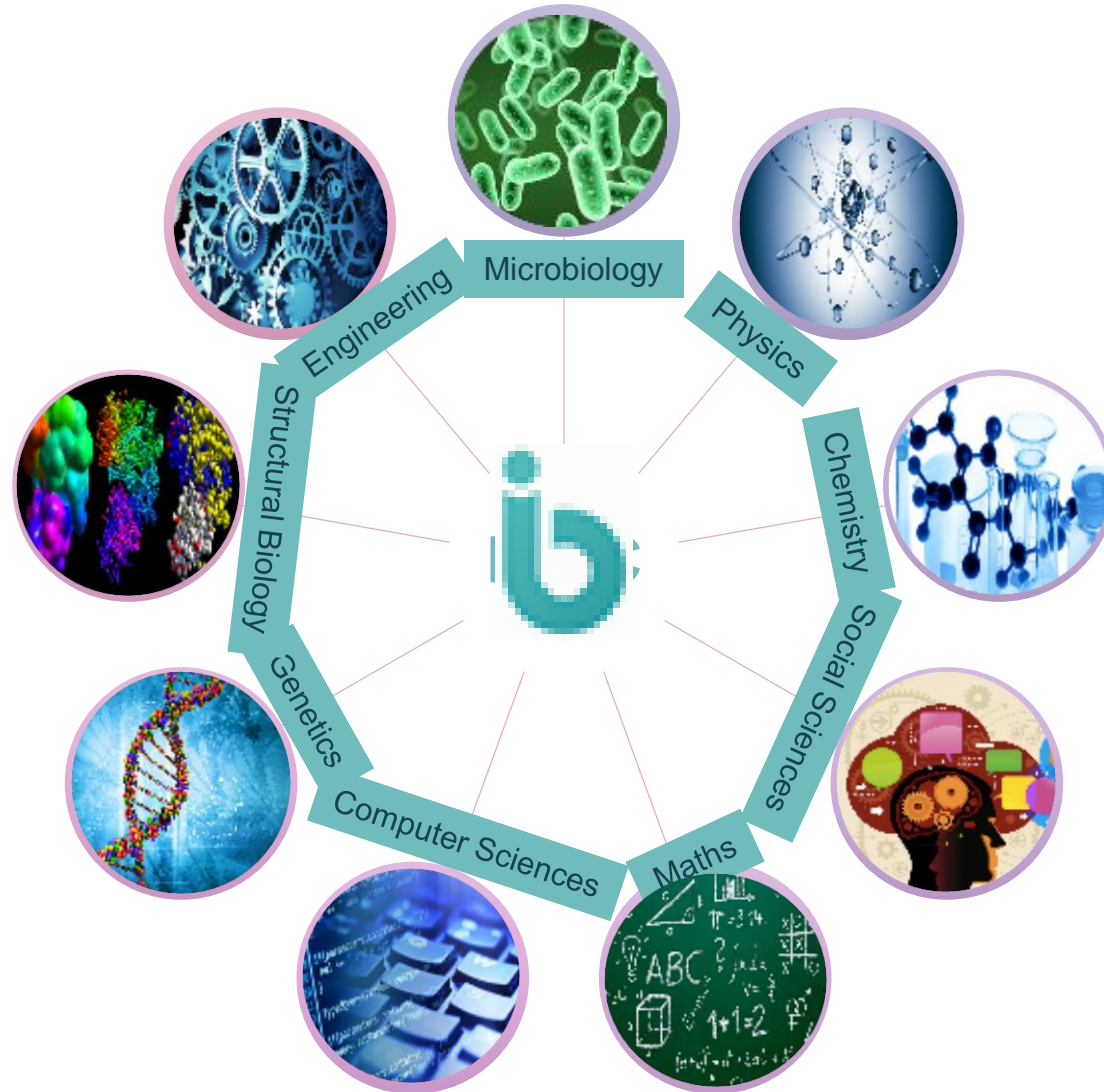
Create a fusion of world-class interdisciplinary research and industry partnerships

Deliver breakthrough science and technologies to control and exploit biofilms.

Grow the next generation of research leaders and entrepreneurs delivering growth, wealth creation and societal value.



This requires a multidisciplinary and international approach



NBIC role at this meeting

- Infections & particularly chronic ones usually involve biofilms and add complexity to the problem
- We can connect with the leading researchers and companies in the UK focussed on the prevention detection management and engineering of biofilms
- We want to harness all our skills and address unmet needs in collaboration with others



Thank you!

WE ARE NBIC

Harnessing the UK's Academic &
Industrial Strength in Biofilms

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