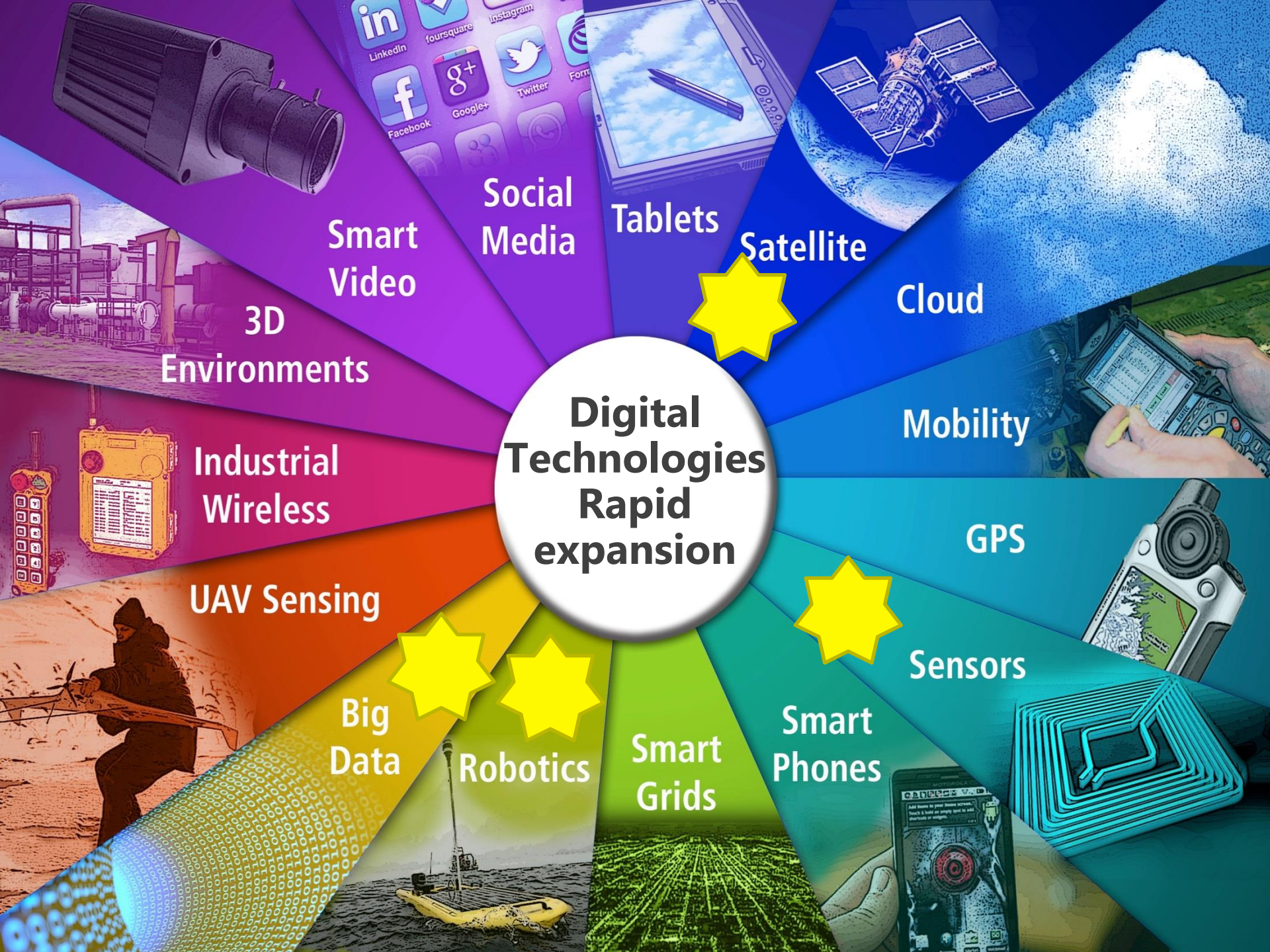
Marine Autonomous Systems (MAS) and their use in post spill environmental monitoring – BP's experience

Dr. Peter Collinson
Safety & Operational Risk Function
BP

Oil & Gas trends

- **Lower**
- **Lower for longer**
- **Lower for longer, but not forever…..**


Digital Technologies Rapid expansion
Smart Video
Social Media
Tablets
Satellite
Cloud
3D Environments
Mobility
Industrial Wireless
GPS
UAV Sensing
Sensors
Big Data
Robotics
Smart Grids
Smart Phones
LinkedIn
foursquare
Instagram
Facebook
Google+
Twitter

Marine Autonomous Systems – The Next Step

Transition from ROVs to MAS can be compared with Diver transition to ROVs – driven by technology and resources

- Advantages
  - Little or no dependence on crewed vessels hence lower OPEX
  - More efficient/persistent than ROV's
  - Current models have
    - Excellent Inspection capability
    - Limited capability for Maintenance/Repair in near term
    - Safety
    - Data Quality and risk management insight

AUV

ASV

Glider

Rapid strike oil spill/dispersant monitoring
May 2015- North Sea Crisis Exercise

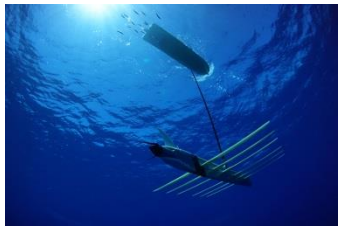
- Subsea oil spill scenario
- Near real time data from the incident source
- Rapid strike concept- helo/vessel deployable
- Marine Scotland deployed from MRV ‘Scotia’

- SAMS Seaglider buoyancy-driven vehicle
  - 1.8m long, 52kg
  - Depth rating: 1000m
  - Speed: 25 cm/s
  - Endurance: up to 6 months, >3000km

- Equipped with:
  - CTD
  - Dissolved Oxygen
  - 3 optical wavelengths:
    - Backscatter-660nm
    - CDOM-460nm
    - Chloro / hydrocarbon
  - GPS + iridium antenna

- Data management
  - ESRI Common Operating Picture integration

Other efforts….



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Scientists work with BP to use robots for oil-spill monitoring

Underwater robotic technology could play a key role in oil-spill response planning, according to new research by the Scottish Association for Marine Science (SAMS).

Scientists at SAMS have been working with oil and gas company BP to use robots known as Seagliders to remotely monitor oceanographic conditions up to a kilometre beneath the surface. They aim to enable better situational awareness during oil spills in order to improve response time and minimise environmental damage.

Earlier this year they tested a Seaglider as part of a major emergency response exercise coordinated by BP from its North Sea headquarters in Aberdeen. It involved more than 150 participants from BP and partner agencies responding to a simulated incident in the Clair oilfield west of Shetland.

During the exercise, SAMS launched a Seaglider from the research vessel *MRV Scotia* in the Faroe-Shetland Channel. It was then directed towards the Clair field, providing real-time oceanographic data to aid decision-making by role-playing responders onshore.

The gliders are energy-efficient autonomous vehicles that can continuously measure water properties for months on end, sending the data back to base over a satellite link.

Fraser Macdonald, a knowledge exchange fellow in marine physics and autonomous systems at SAMS, has been working with members of BP's global response team to look at how to apply scientific knowledge to oil and gas operations. 'The use of autonomous systems has brought about a paradigm shift in how we measure the marine environment,' he says. 'Working with BP, SAMS is starting to push the boundaries in developing how we integrate this cutting-edge science into the oil and gas sector.'

'Recent developments in autonomous technologies have provided an opportunity to establish rapid 3D situational awareness which is critical to aid science-based response decision-making for any potential major incident,' adds Peter Collinson, an expert in global environmental response at BP.

SAMS has been developing the use of gliders in oceanography research since the North Atlantic Glider Base (NAGB) was established in 2012. This is part of the wider NERC Marine Autonomous Robotic Systems group, based at the National Oceanography Centre (NOC).

Macdonald now aims to explore how autonomous technology could help minimise the harm done to marine environments during the removal of offshore oil and gas installations.

Mapping deep-water canyons

NOC marine robots have also helped survey fascinating and unusual habitats in the Whittard Canyon, deep beneath the waters of the Bay of Biscay. Ocean canyons host a huge variety of living things because of the complex landscape they provide, creating a wide range of conditions that suit different plants and animals.

The Autosub 6000 autonomous submersible worked alongside sensors aboard the *RRS James Cook* to create a nested set of maps of the area, ranging in scale from one covering the whole 200km-long canyon down to one that includes individual cold-water polyps. This will inform the management of England's only deep-water Marine Conservation Zone.

PLANET EARTH Winter 2015 11

Next steps…

- Benefits of MAS will continue to be seen through crisis exercises and operational deployments
  - Rapid strike
  - Persistence
  - Data Management
  - Swarming and situational awareness
  - Safety
  - Cost
- Ongoing efforts focus on
  - Where does MAS fit in the wider monitoring programme?
  - Integration of data- surface, underwater, satellites…
  - Launch and recovery
  - Confidence!

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