Simulation-based Testing: Inspection of Offshore Assets

Matt Webster
Liverpool John Moores University

Workshop on Verification and Regulatory Issues for Remote Robotic Inspection

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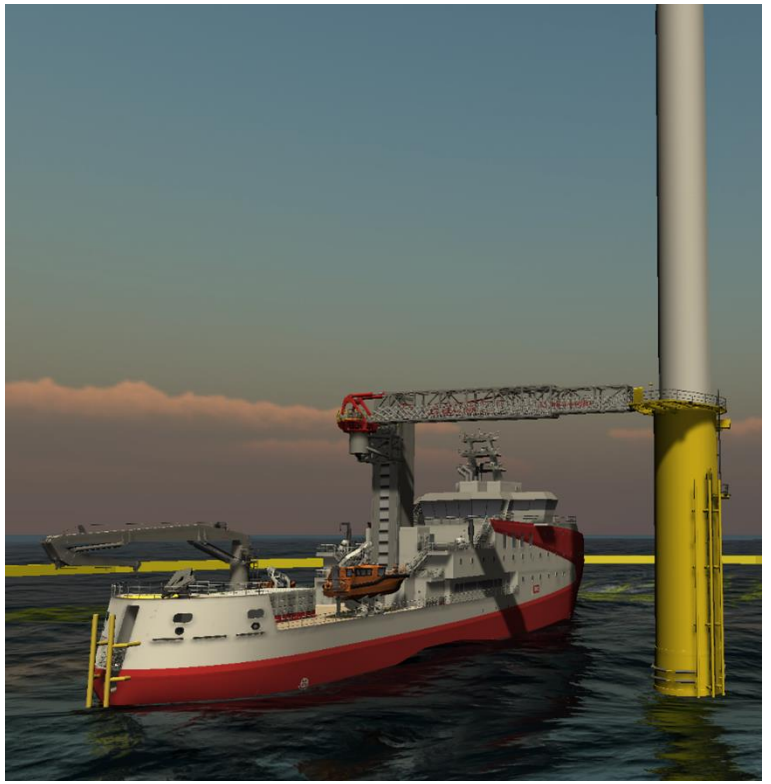
Credit: (NHD-INFO, Flickr).

Simulation-based Testing

- Simulation lets us model real systems computationally
  - As computing power increases, so does simulation fidelity
- Sophisticated *virtual prototypes* and *virtual environments* enable *virtual engineering* of systems
- Simulation is very useful during verification, validation, and certification
  - Particularly useful for new technologies like robotics and autonomous systems

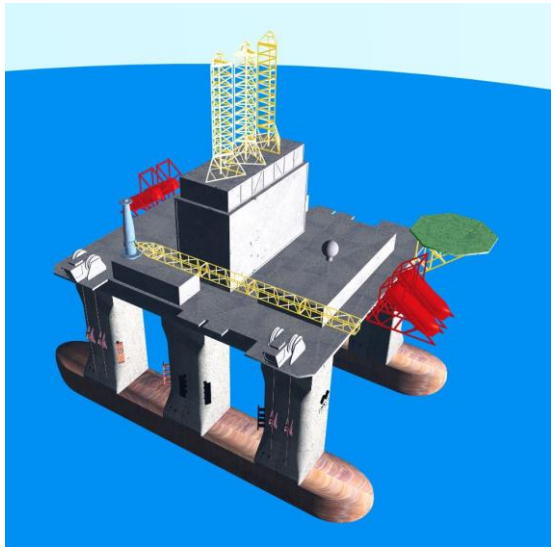


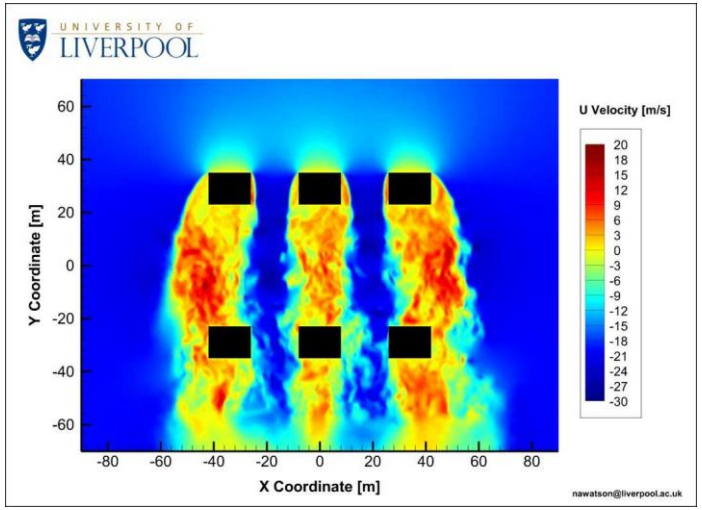
Credit: Royal IHC

Simulation-based Testing in Action

With thanks to Jeroen van Stappen, Jacco Osnabrugge, and Royal IHC

Simulation-based Testing

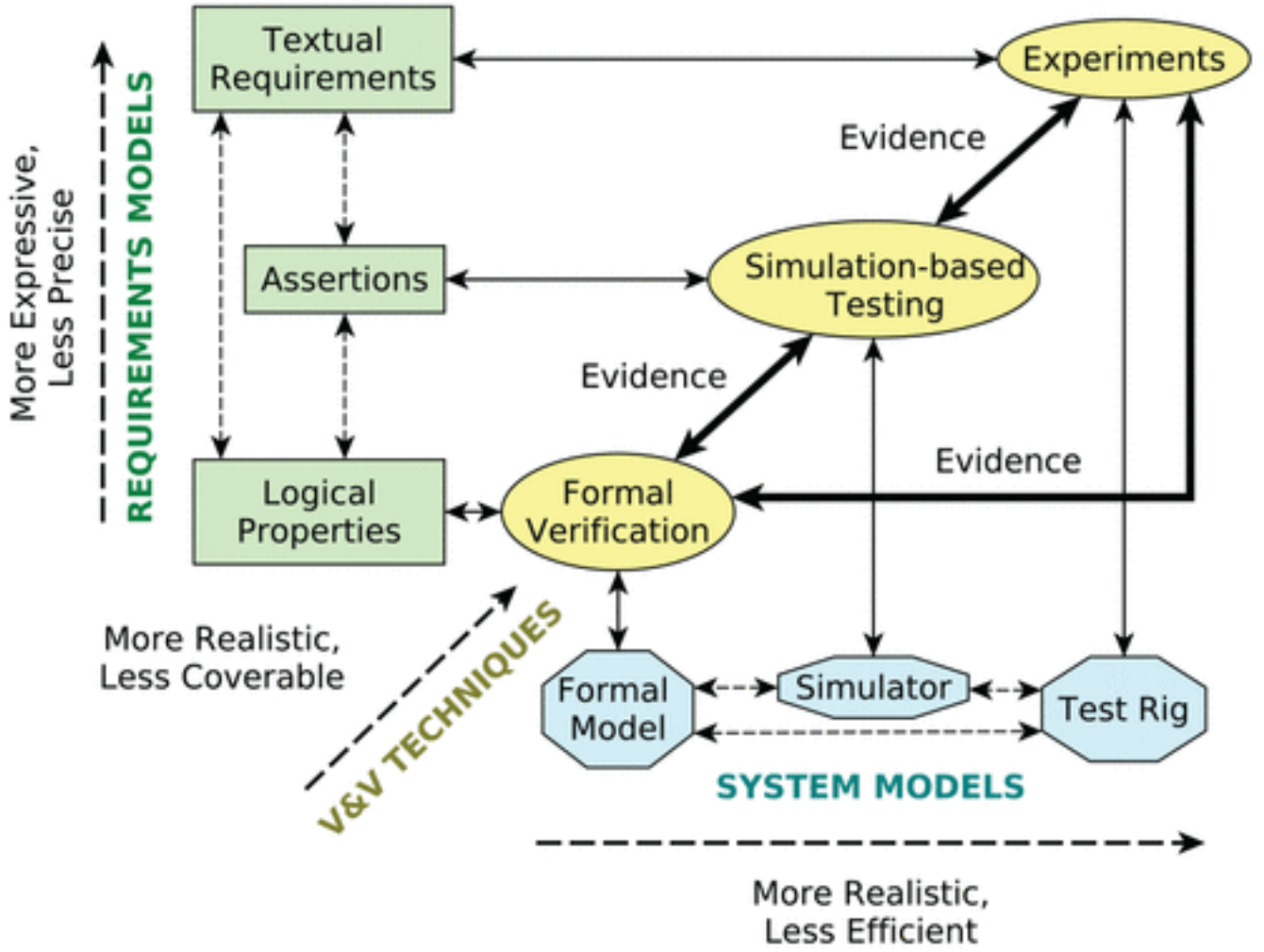




Credit: N. Watson, M. Jump, U. Liverpool / ORCA

- Simulation-based testing is safer, quicker, and less expensive than traditional “real world” engineering
- Simulation can therefore be used to de-risk the development of new technologies
  - Of course, simulation-based testing is complementary to traditional engineering approaches and not a replacement
- Simulation can be integrated with other verification and validation approaches…

Corroborative V&V



A Corroborative Approach to Verification and Validation of Human–Robot Teams. The International Journal of Robotics Research, 2019

Questions

- Are current [verification] approaches sufficient for remote inspection [for civil applications]?
  - Yes, with caveats
  - We are able to verify “simple” systems in “simple” environments
    - E.g., Remote-controlled UAV with auto-land/auto-return-to-base features
    - MQ-1 Predator used by the military since 1995!
  - “True” autonomous systems and more complex environments with are much more difficult to verify
    - Require new approaches and techniques, e.g., corroborative V&V

Credit: Wikipedia

Credit: Amazon

Thank you

ORCA HUB
Offshore Robotics for Certification of Assets
Remote Safety and Integrity

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