

Embedded Systems



Industrial IT



Management Consulting



Prevas *In brief*



References *Chosen*



Tirsdag

November 2015

17

NI Days

**From analogue measurements
- to digital action**

Ocean Harvesting

Controller system

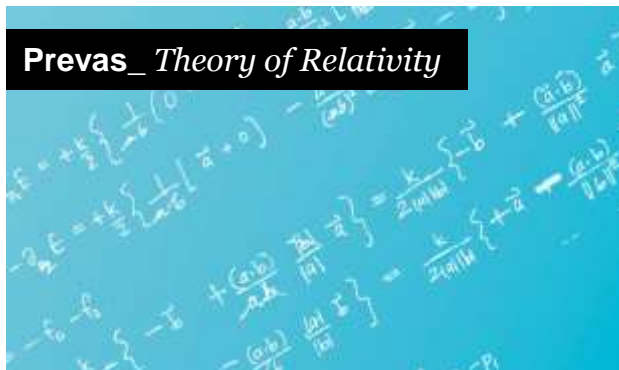
Simulation system

Henrik Thomsen, Project Sales Manager, Prevas

Excellence in Delivery *_9/10*



Prevas *Theory of Relativity*





Prevas



- Founded in 1985
- Nordic leader in Embedded Systems
- Nordic leader within MES, EMI and Automation
- 650+ employees – Sweden, Norway, Denmark and India.
- 1000+ freelancers across Scandinavia in catalogue
- Listed on NASDAQ OMX
- ISO 9001:2008 Certification





Prevas Test Systems competencies

- **Production test systems**
 - Electronics production test
 - Product development test
- **Development (R&D) test systems**
 - Hardware in the loop (HIL)
 - Measurement systems
- **Industrial measurement systems**
 - Pre-made data acquisition systems
 - Specialized instruments based on National Instruments products
- **TSD, Prevas Centre of Excellence**





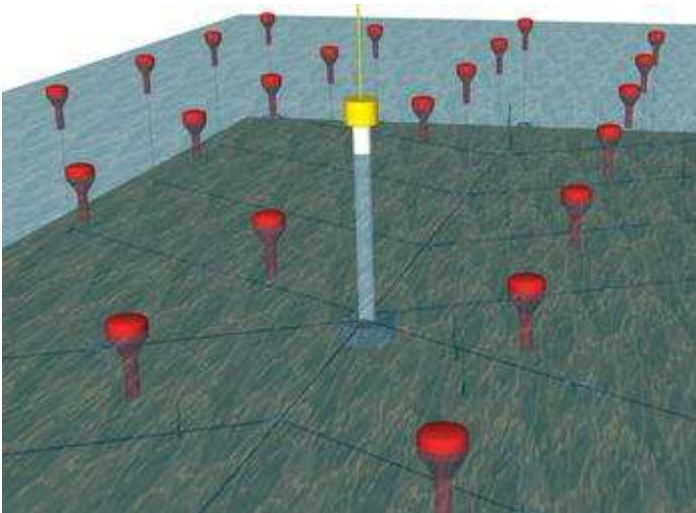
Customer case

– from analog measurement to digital action



Ocean Harvesting Technologies AB

- Founded in September 2007 in Karlskrona
- Developing technologies for smoothing the power output in the drive train of wave energy converters (WEC).
- Small company specializing mechanical technology development – not having electronics as a core competence
- Selling technology, not products
 - Needing fast developed demonstration systems
 - Needing rugged, reliable generator controller system
 - Std components
 - Std software





Ocean Harvesting – The challenge

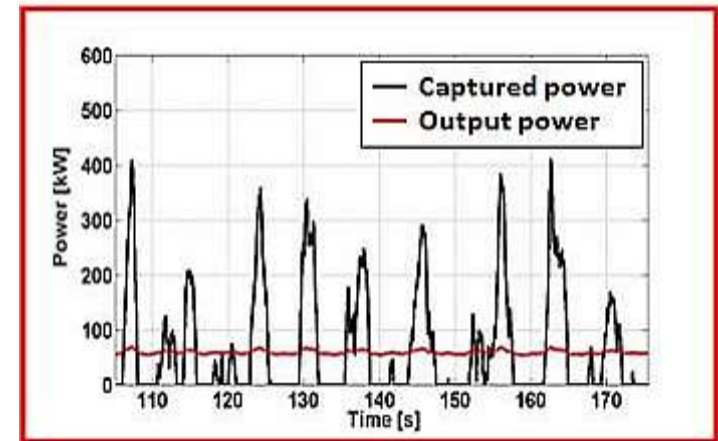


Gold
Alliance
Partner



Wave motion

- is slow, powerful and highly fluctuating in the short term,
- is making wave energy devices inherently large and costly.
- is either causing generators and power electronics to be dimensioned up 10 times above average output yielding less efficiency.
- or requires a power accumulation device in the power train for storing/reuse of power spikes.



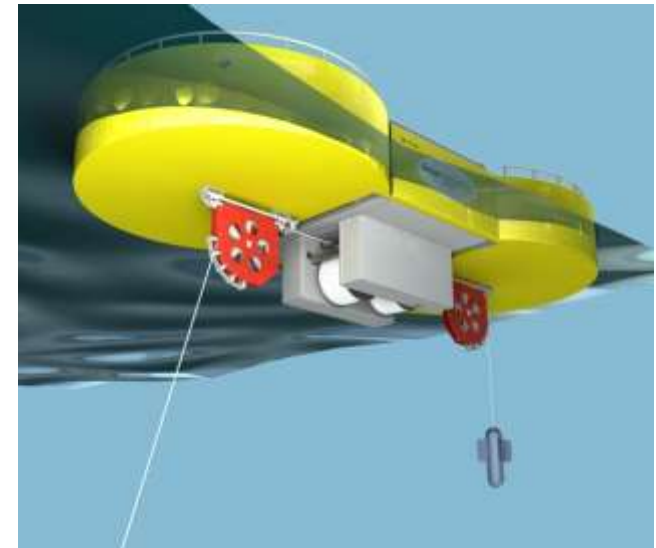
Name of the game is

- Smooth the power input as close to average power output as possible.
- Do it as early in the power train as possible.

Ocean Harvesting – The solution

A mechanical gear/weight system

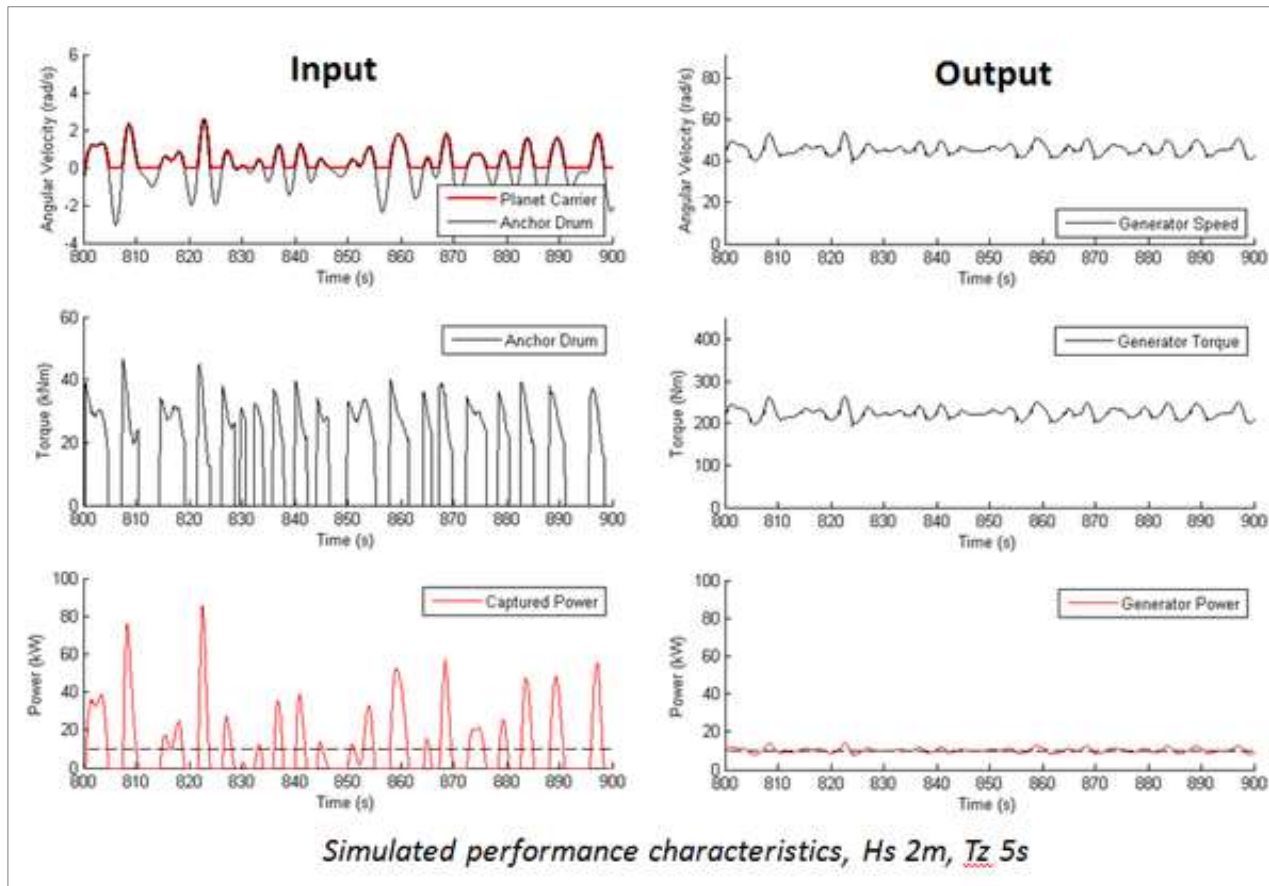
- that allows smoothing the harvested power to within 1,3 to 1,7 times average power output – compared to a range of 10-20 times in a direct drive system.
- That immediately stores excess energy-peaks in a weight system
 - allowing the system to capture and utilize peak power more than 10 times greater than the maximum average (rated power) for the WEC system.
 - That allows a 30 ton weight with 10 meter span will maintain 100 kW continuous power output for a duration of 30 seconds without any input power.
- Average damping force can be tuned to improve the overall power capture in mild sea states and to limit power capture to the device rating (maximum average power output) in stronger sea states.



Ocean Harvesting – the solution



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Key technology advantages

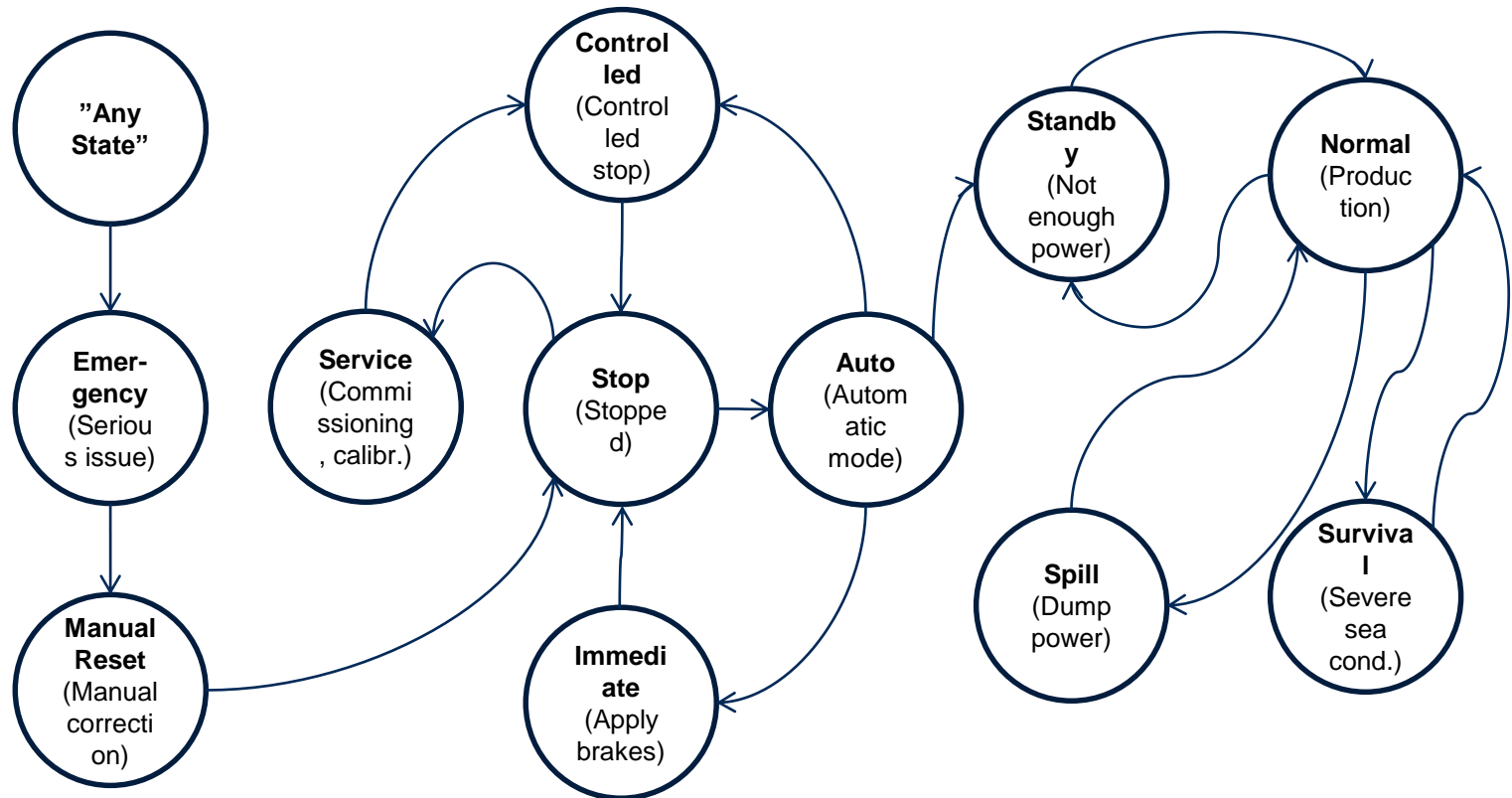
- Allows energy capture of peaks up to 10 times greater than the rated capacity of the power components.
- Increase of average damping force.
- Reduces the size and cost of wave energy converter components.

[Demo test bench](#)

Building a control system for Ocean Harvesting

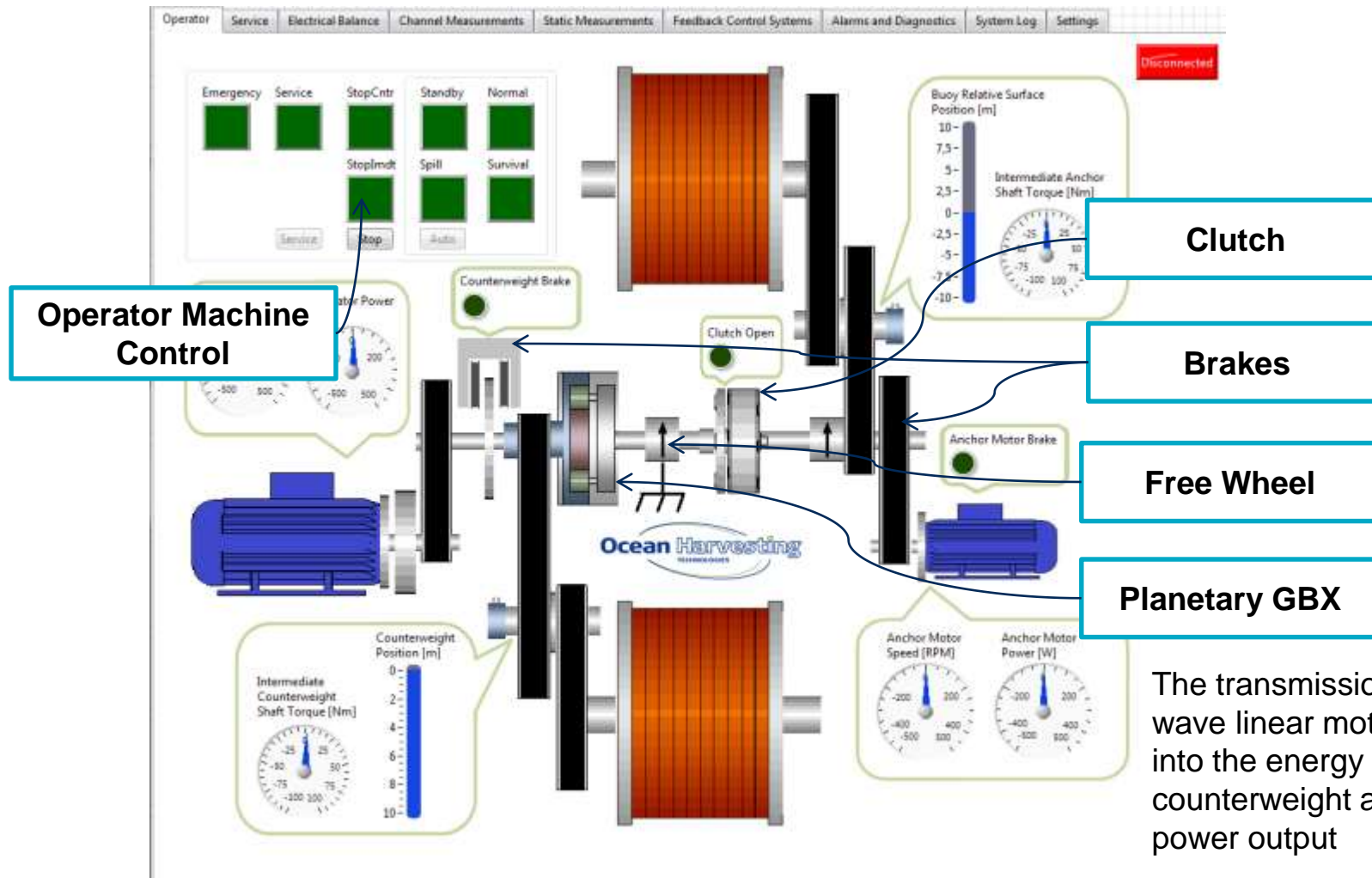


The machine state transition depends on the sea and operational status

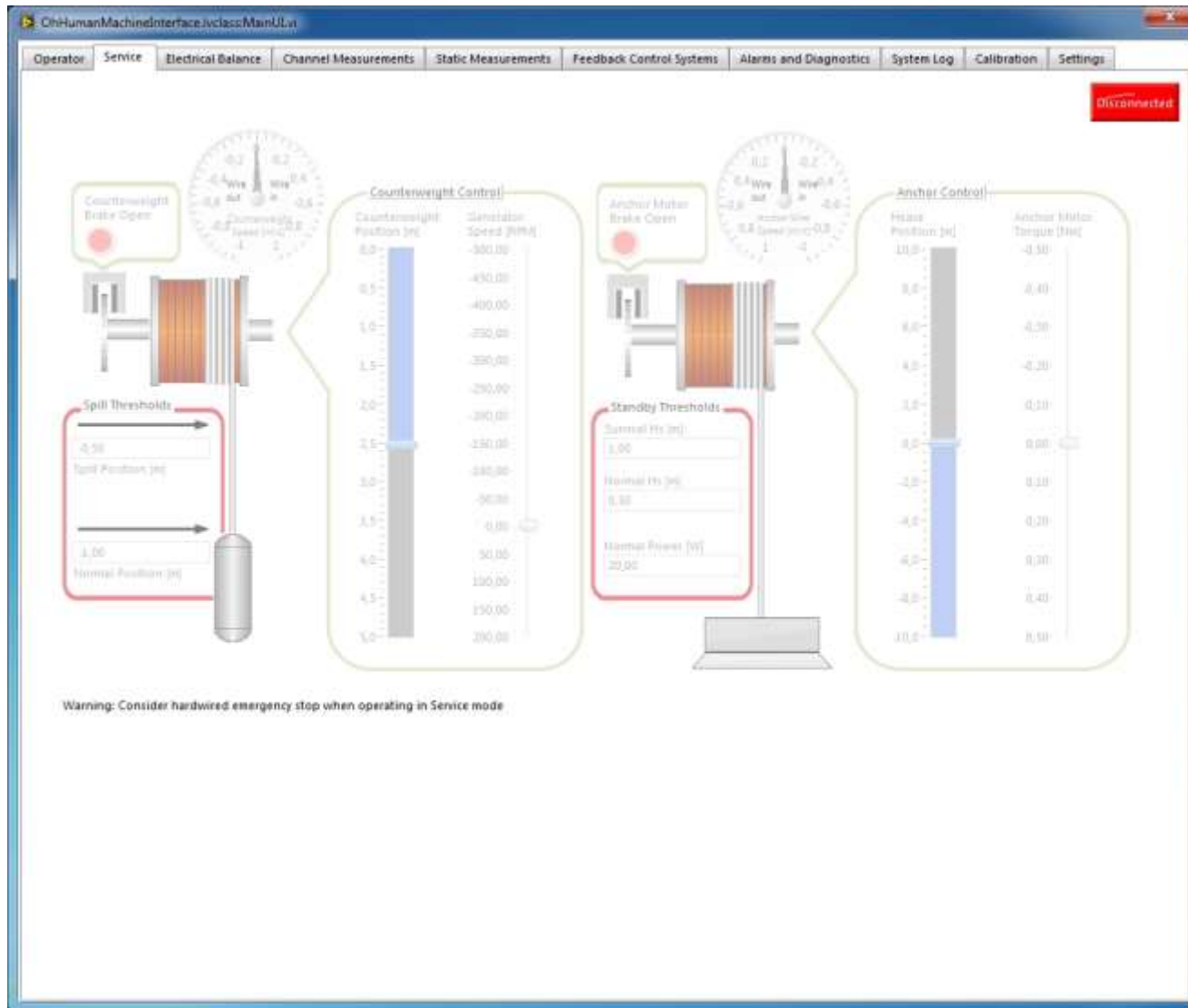


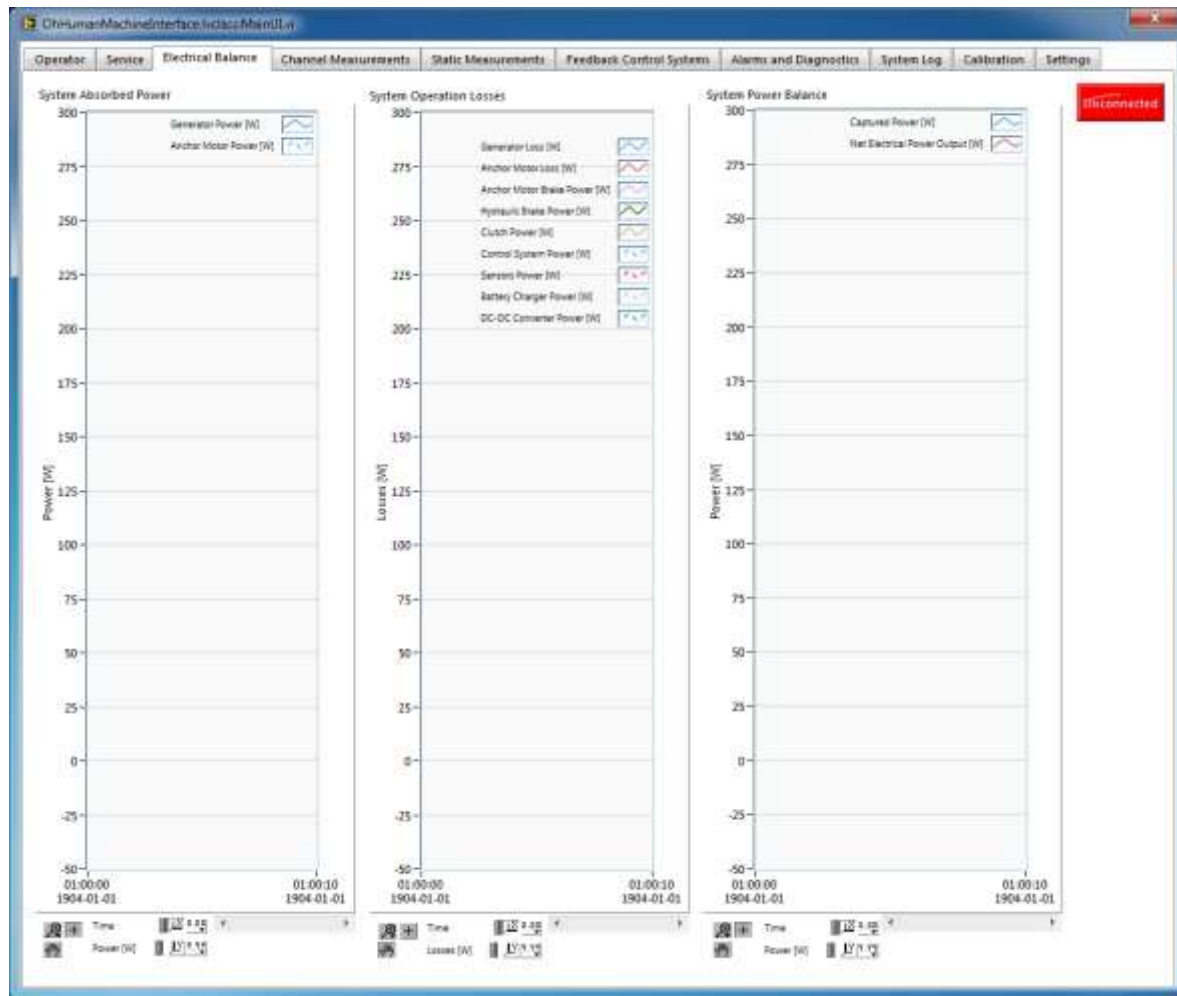
The Feedback Controller regulates the counterweight position by altering power output by revving up the generator speed at constant torque.

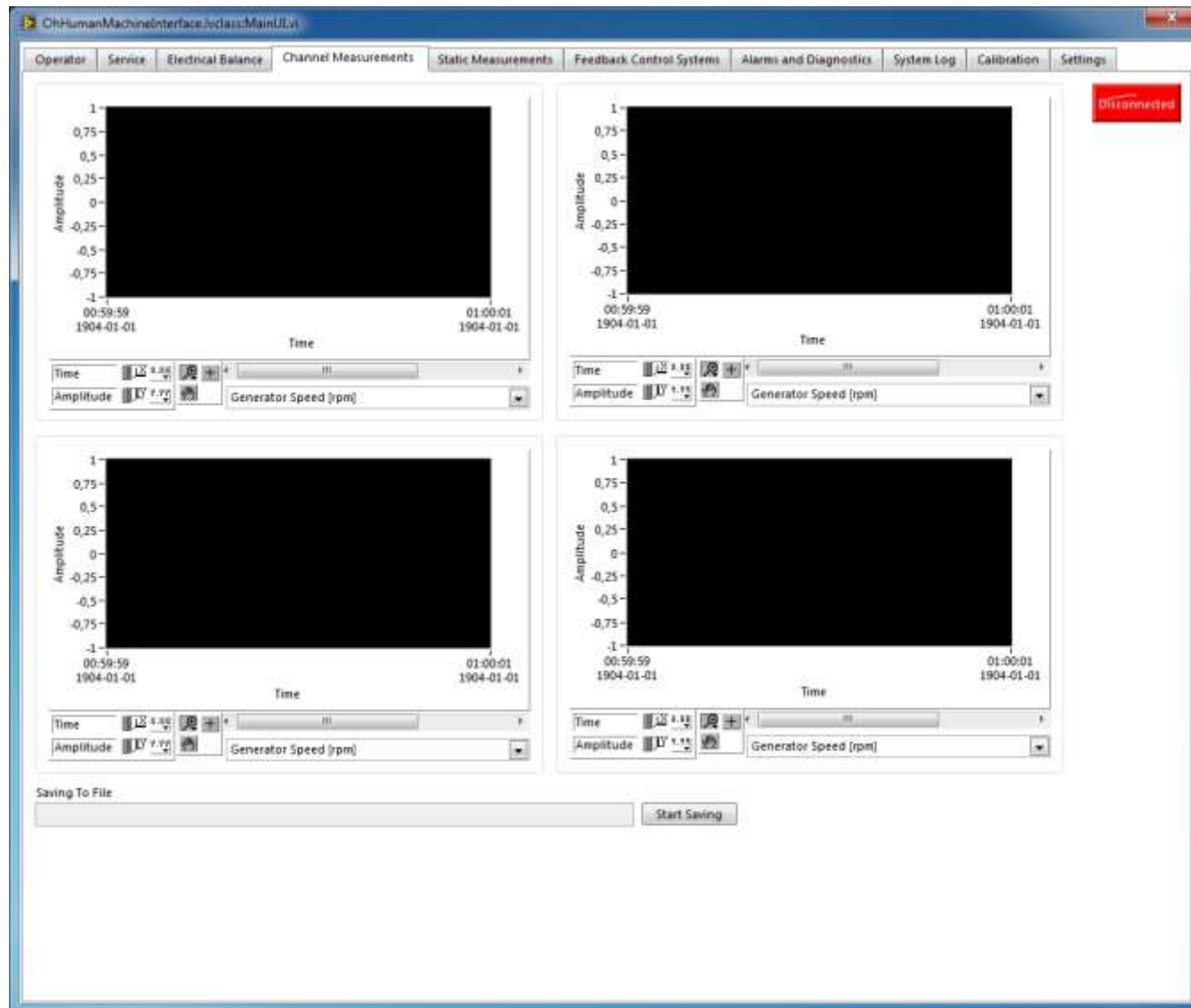
Building a control system for Ocean Harvesting

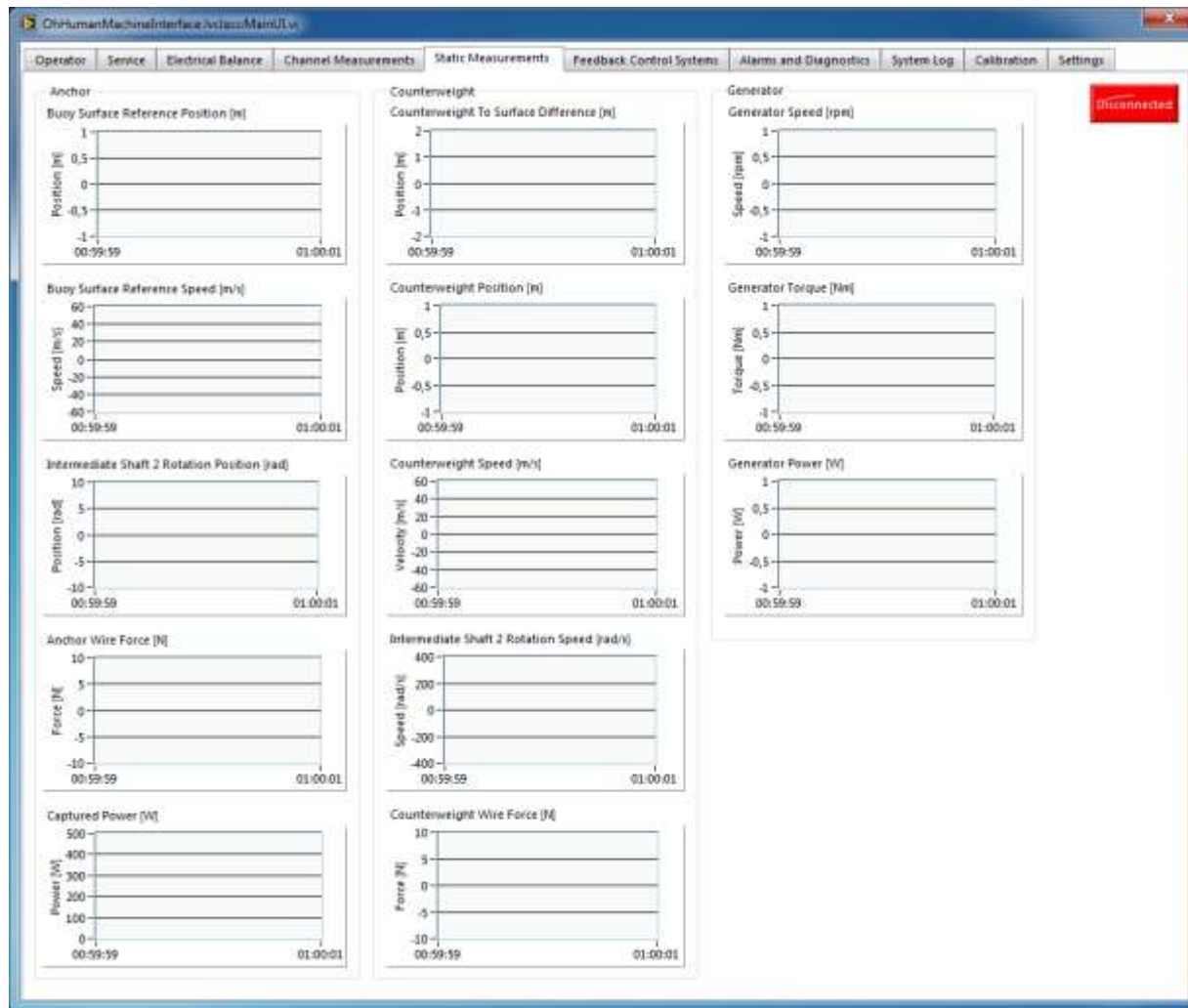


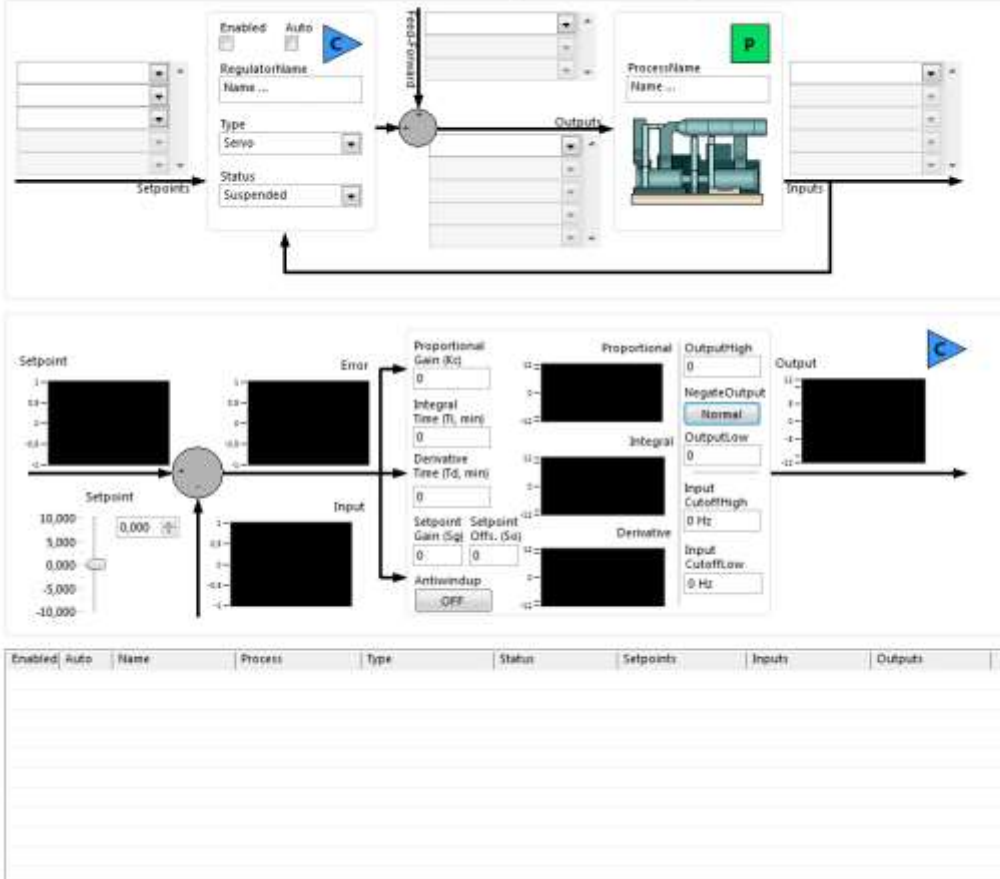
The transmission converts wave linear motion power into the energy storage counterweight and generator power output













[illegible]

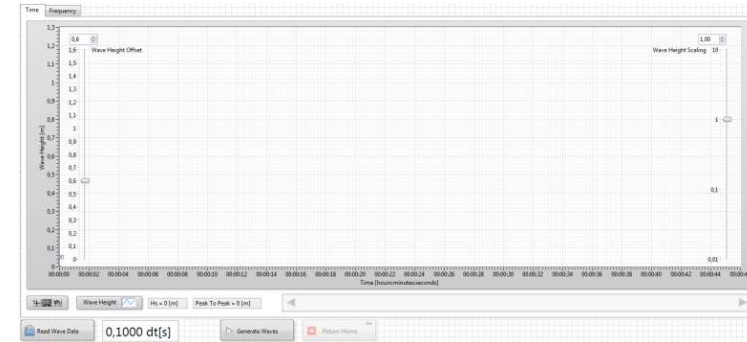
A Compact RIO based wave simulator/generator

Main challenge

Develop a wave generator to realistically drive servo motors according to a prerecorded wave pattern.

Solution in brief

- Software platform based upon LabVIEW RT and NI Soft Motion.
- C RIO Stepper motor control hardware and RT software
- Simple client GUI for initiating simulation and parameterizing the execution



Wave Generator Client Main GUI

A Compact RIO based wave simulator/generator

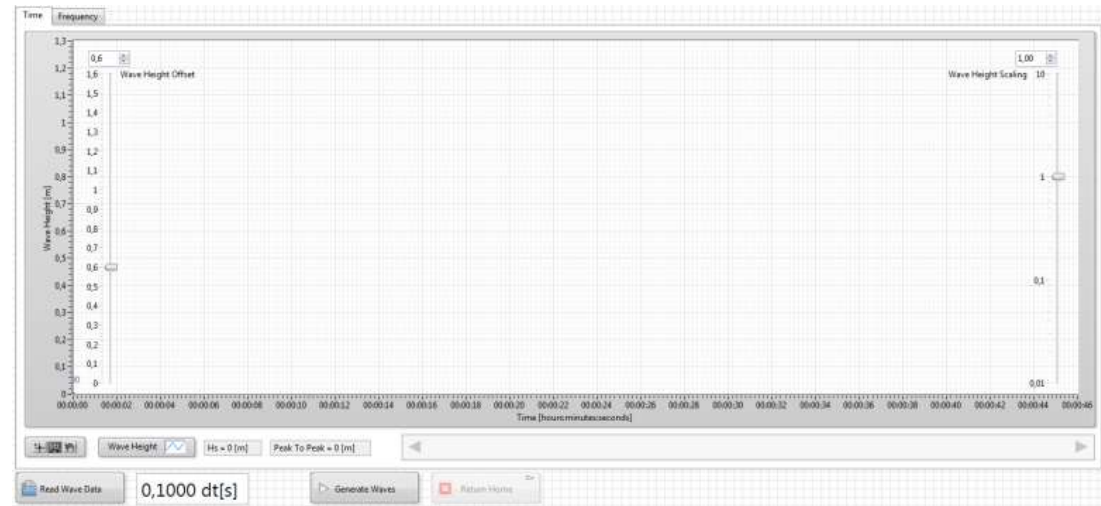


Price

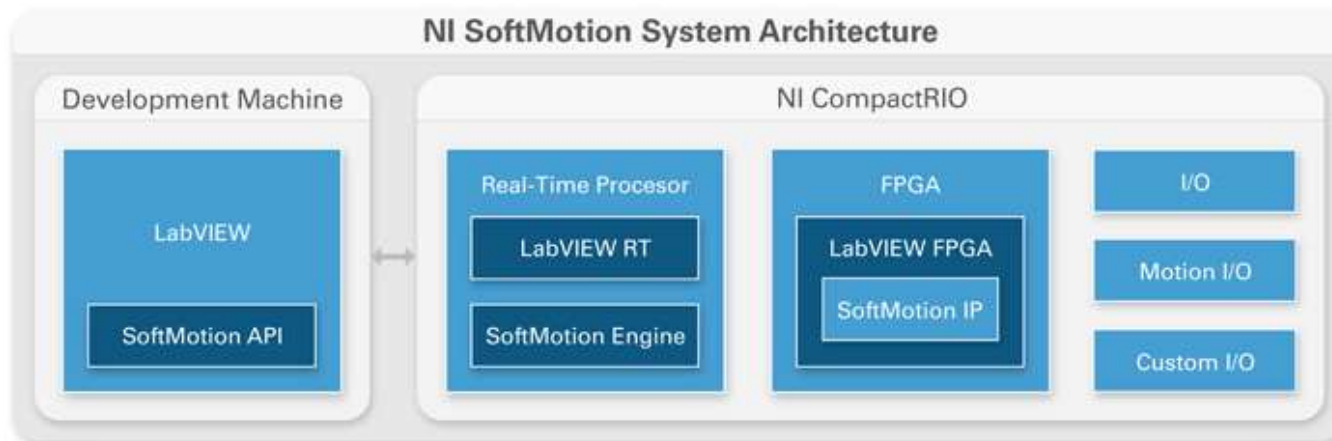
- Split between Prevas development and standard COTS modules.

Deployment

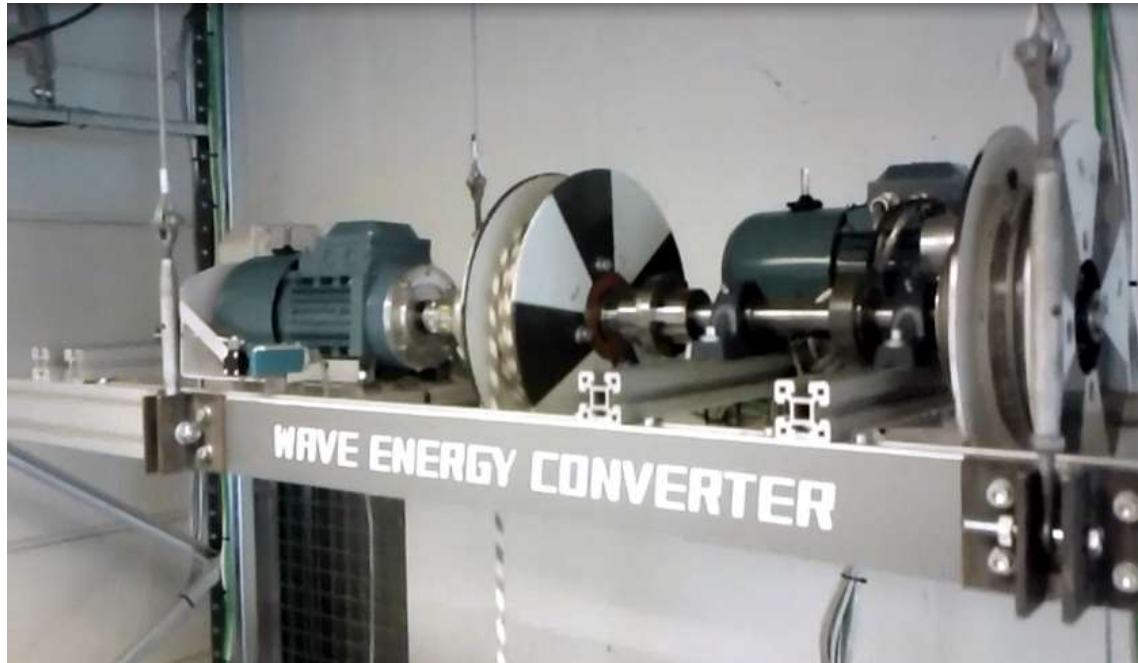
- 1.5 week system deployment using COTS components



Wave Generator Client Main GUI



A Compact RIO based wave simulator/generator



Power Takeoff test rig

[Demonstration](#)

[Demonstration - local](#)



Our Value Proposition



We add value across the product life cycle by improving our customers

- Innovation pace
- Time to market
- Productivity
- Quality

We deliver Excellence in Technology through

- Consulting services
- System delivery
- Outsourcing
- Products and Platforms

Innovation

Development

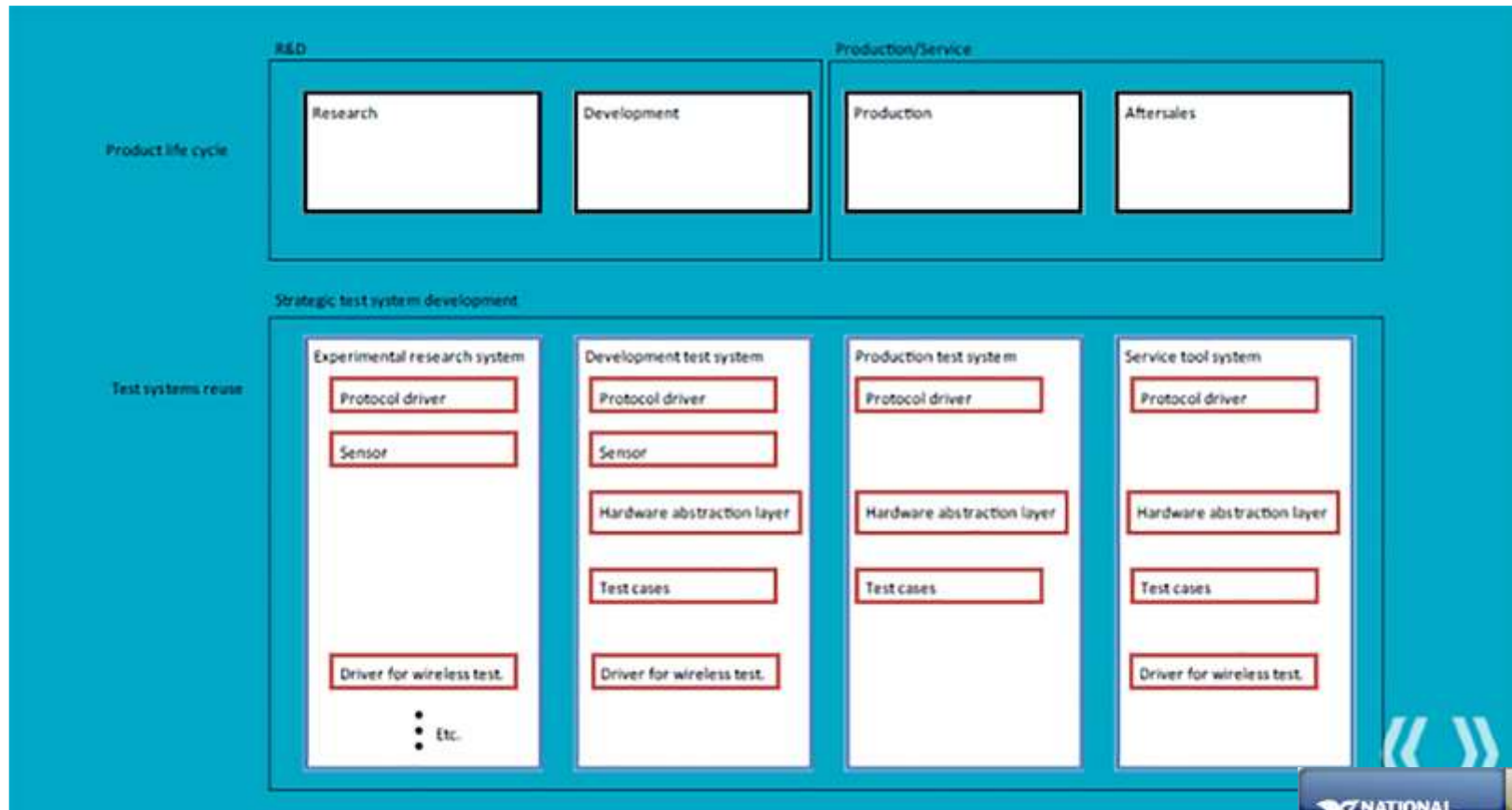
Manufacturing

**Support &
Sustaining**



Prevas Test Systems

Working across the product life cycle





Prevas

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Thanks for your time

