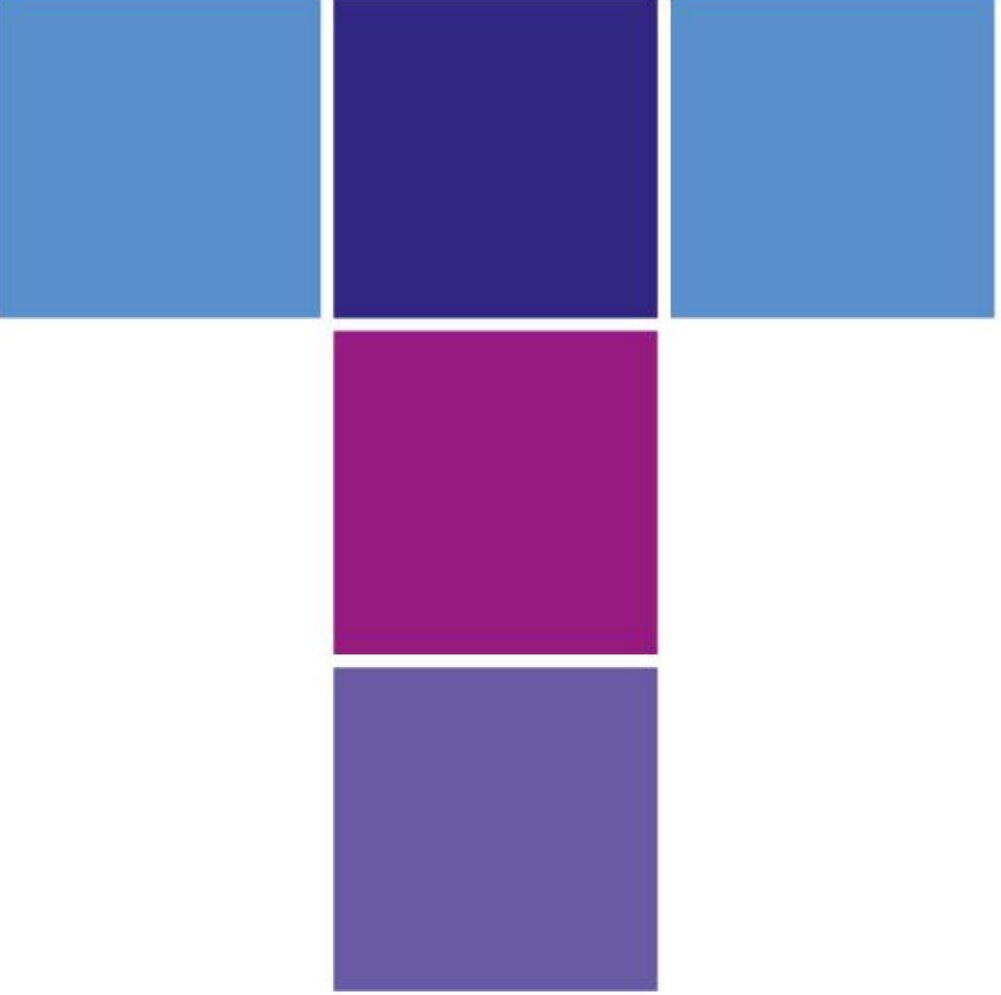

Teddington

IRIS for Military Applications

An Introduction to Teddington

- Established in 1928 as an engineering and innovation company
- Based in the Cornwall, UK
  - Sales representatives in USA, Sweden, Australia and Oman
  - Additional distribution facility in Chicago, USA
- Inventor of automated thermostats
- Specialist in sensing, control and system integration
  - Sectors include systems for homes, commercial products, military and healthcare
  - Activities include design, development, manufacture, distribution, training and support
- Military credentials go back to the Merlin and Griffin engines found in the Hurricane and Spitfire aircraft

TEDDINGTON

Defence Considerations

- Teddington has nearly 80 years of experience in the defence sector

- Any technology deployed in defence typically must adhere to a common set of principles:

  - **Robust:** All equipment must be designed to survive the harshest of environments

  - **Advanced:** A technical superiority is desired in any theatre to give an operational advantage against adversaries

  - **Operationally maintainable:** Critical systems must have a clear and simple path for repair or replacement in high pressure situations with minimal loss of operational capability

  - **Longevity:** Most equipment service life is measured in decades. Out of service dates are being continually pushed back

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Defence Considerations

- This combination of principles is not largely compatible. By trying to achieve all of the above, something usually suffers:
  - Obsolescence of components is common and procurement of replacement parts is an expensive and lengthy process – if indeed possible at all
  - Equipment remains in service beyond its design lifetime and the operational impact is not always known
  - The technology stagnates and the cost or effort to improve the base levels is prohibitively high. As time goes by, your operational advantage reduces

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Defence Considerations

- Typically, these issues are overcome through major upgrades throughout the life of the equipment.

- However, over the lifespan of critical military equipment, for example, the complete replacement of systems to satisfy parts or technical obsolescence issues is not economic and can lead to other unwanted side effects:

  - Changes to physical characteristics (weight, size etc) that can have unwanted effects

  - Changes to design can lead to further training requirements for staff, in their use, in their maintenance and in the safety characteristics

  - As more panels enter service, more complex supply chain requirements are required and larger stock holdings of spares to support a more diverse range of products

  - Expense. The service life of vessels is being increased and the obsolescence problem may be encountered for the same part more than once in its service life

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Our Solution

- Becoming a technical partner with Teddington gives you access to our inhouse modular development platform called **IRISmodular**.

- Designed for the most demanding of customers IRISmodular is a design mechanism that fully understands the rules.

  - It does not ignore or fight against them

  - It does not pretend that the problems have been “designed away”

  - IRISmodular recognises and embraces the difficulties

  - IRISmodular instead builds in the routes to solve the **future unforeseen** obsolescence and technical demands from day 1

IRISmodular – it might not know all of the answers to tomorrow’s questions, but it knows how to find them out!

IRIS MODULAR

TEDDINGTON

The IRISmodular Approach

- IRISmodular is a totally flexible and modular processing capability based around cortex microprocessor architecture.
- The processing and power requirements are separated into discrete modules that are utilised across the IRISmodular development suite.
- The only unique, bespoke and customised component is satisfying the IO requirements. This becomes a separate module dedicated for that application.
- The solution is designed to minimise the amount of bespoke development required

IRIS MODULAR

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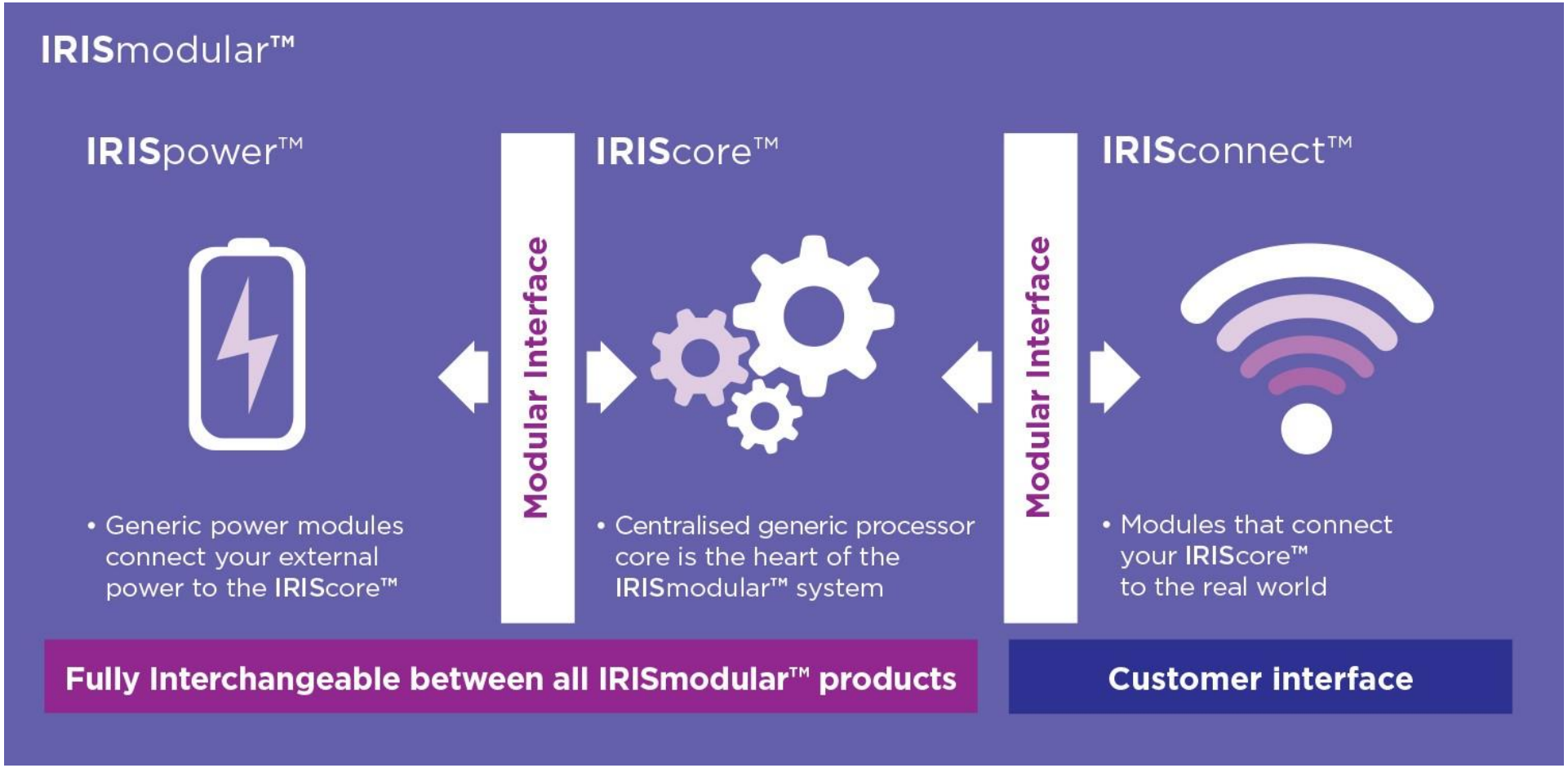
How it works



IRIS MODULAR

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The Benefits

- Very rapid development
- Technical advancement
- Low Risk
- Reduced development costs
- Reduced system costs
- Obsolescence recovery
- Improved operational availability

IRIS MODULAR

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Typical Applications

The IRISmodular development platform is typically employed for the following reasons:

IRIS MODULAR

New Products and Systems

- Customers are embracing the design methodology and utilising the IRISmodular architecture to get products to market far faster than previously possible

Obsolescence control

- Proactive use of the modular system to replace existing systems where a procurement process has identified risks or issues

Reverse engineering

- Replacement system where technical support is no longer available

Technical upgrade

- Where a system is technically out of date. The very nature of the IRISmodular solution not only allows existing functionality to be performed, but opens the doors to a whole host of new technologies, enhanced features, integration with other systems or simply the addition of something brand new.

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Submarines

Victoria Class

- **Power generation and propulsion**
  - Full upgrade to the ships' propulsion control system
  - Removal of old technology panels and replaced with units fit for servicing until 2042
  - Includes integration with ships' control system and safety interlocks

- **Other features**
  - Capability to allow additional connectivity for remote displays
  - Scalable interface to integrate with other, previously isolated, systems
  - Remote access and control from the main ship's control centre
  - On-board self-test and diagnostics capability
  - Full on-board commissioning and testing
    - Including checking of ships' wiring systems and calibration of temperature, pressure and speed sensors
    - Preparation for sea trials

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Helicopters

Chinook

- **Current sensing circuits**
  - Working with the prime contractor
  - Design and manufacture of the system to monitor the 400Hz electrical power line
  - Safety critical system

- **Other information**
  - Very specialist system that interfaces with the main control panels

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Low EM Signature Vehicles

Hunt Class

- **Salvage generator replacement project**
  - Provides emergency power to vessel
  - Working with Caterpillar on the complete replacement system to the salvage generator system. Includes:
    - Control panel for start-up, control and health monitoring
    - Integration into the ships' MCAS system allowing full surveillance in the ships' control centre

- **Other information**
  - Very specialist system for ships with high levels of electro-magnetic sensitivity
  - Full upgrade, set-up, calibration and commissioning

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Ground Based Equipment

Engine Particle Separation System

- Ground based automated test equipment
  - Tests fluid flow and particle density
  - Test equipment panel for filters used in the aerospace industry
  - Design & development of the system

- Other information
  - Ongoing after-sales service and maintenance

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Equipment Training

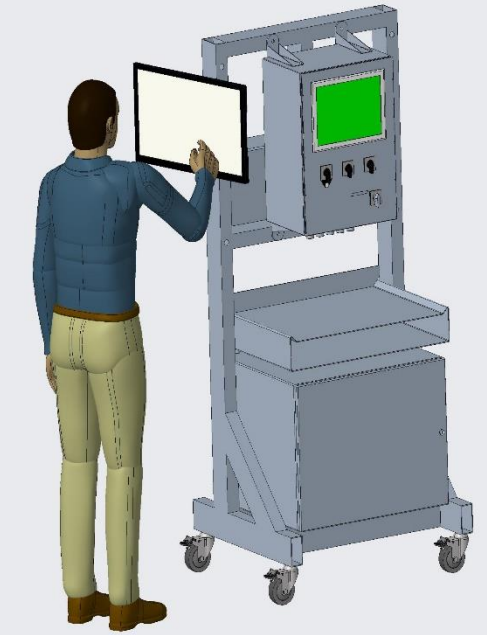
Teddington provide each system with manuals for the operation and basic setting up. In addition to this, we can provide a variety of additional training services

- Teddington provide training courses for senior staff, so that they can train operators in the use of the Local Control Panels

- Training includes:
  - General features, usage and maintenance
  - Fault finding and diagnostics techniques
  - Repair, reconfiguration and rectification techniques

- Training can be located:
  - At our facilities in St Austell, Cornwall, UK
  - At local facilities *(may require relocation of training equipment)*
  - At dedicated customer training facilities

The UK MoD has a dedicated training classroom with sets of fully working equipment and training and simulation hardware. This allows detailed scenario based training in a safe and controlled environment.



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Support

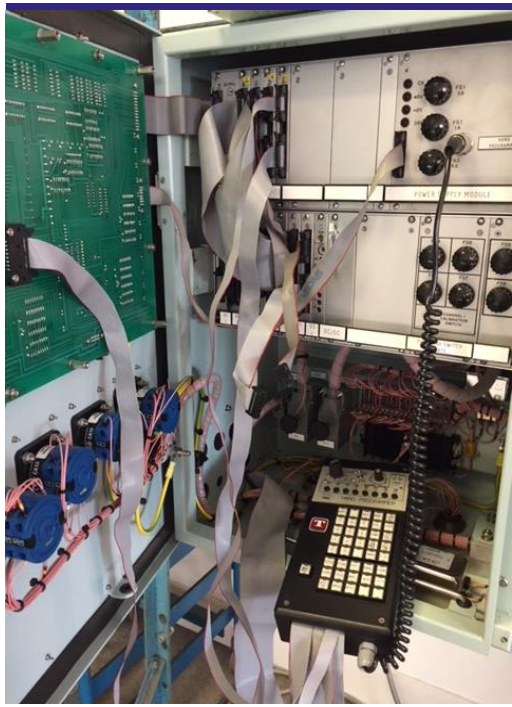
Installation, servicing, maintenance and support

- Teddington routinely works with defence ministries, crews, facilities management and contractors

- Teddington provides services for:
  - Equipment installation, maintenance and servicing
  - Diagnostics and fault rectification
  - Equipment training

- We can do this:
  - Remotely – telephone, video conferencing, email
  - Locally – at military facilities, bases

- Our engineers:
  - Hold UK security clearance
  - Are on call and available for worldwide travel
  - Experienced and in-house trained on Teddington systems



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Many thanks for your attention

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