

# 2iC TOOLKIT

A SUBSCRIPTION SERVICE FOR SOFTWARE AND SYSTEMS ENGINEERS TO QUICKLY RESEARCH, DEVELOP AND TEST THEIR OWN MODULAR, OPEN AND INTEROPERABLE SYSTEMS

SOFTWARE FOR DIGITAL INTEROPERABILITY BETWEEN PLATFORMS, SYSTEMS AND DEVICES

2iC

**There is a need for digital interoperability in the battlespace is to dramatically improve the performance of human operators by automating tasks and responding to changing operational requirements.**

As requirements and equipment evolve, organisations need to connect systems and devices from different vendors using many different interfaces and protocols. This has traditionally meant developing slow and expensive custom solutions, as well as being prohibitively expensive, this has been fraught with risk and unpredictable outcomes.

To address this challenge, forward-thinking defence organisations are embracing a Modular Open Systems Approach (MOSA) to rapidly build “plug-and-play” open systems that deliver free-flowing digital interoperability between different devices, systems and platforms from different manufacturers across land, sea and air.

## **Introducing 2iC TOOLKIT**

2iC TOOLKIT is a rapid enabler for software and systems engineers to securely build, trial and connect their internal products to an open systems architecture and allow interoperability between legacy, modern and future devices.

It is a subscription service that delivers a modular solution using the Lean Services Architecture open standard, which was designed to address this interoperability challenge.

The innovative digital interoperability software within 2iC TOOLKIT has already been used in situations ranging from integrated soldier systems to the automation of systems on air platforms, along with maritime cross-domain security and wide area tactical communications.

A selection of 2iC’s clients include the UK Ministry of Defence, the United States Department of Defense, the Australian Department of Defence and the New Zealand Defence Force.

## 2iC TOOLKIT delivers immediate benefits:

- 1. Rapid development and integration** — engineers can rapidly adapt and integrate existing and new products by using a Modular Open Systems Approach, allowing them to reuse modules and components from any supplier across the entire deployed ecosystem.
- 2. Enhanced competition** — customers are free to competitively source any of the best-of-breed components, or items that are only available at very short notice. 2iC TOOLKIT's plug-and-play approach means users can integrate and connect seamlessly to the system.
- 3. Cost savings on manpower** — its low-code and no-code simplicity negates the need for a large team of expensive and hard to find engineers. It includes low-code LSA Software Development Kits (SDK) for Java, C++ (Windows and Linux), Android and embedded-C (microcontrollers), plus an ever-increasing library of software adaptors to integrate with existing devices, such as GPS and drones. Also, the no-code visual re-configurable workflows allow the operational processes of a system to be changed after they have been deployed, enabling customised flexibility without the need for further software development.
- 4. Reduced end-to-end system complexity** — the modular, open system allows developers to focus on optimising their own products and solutions as the plug-and-play approach eliminates integration concerns with other components in the overall system.
- 5. Drastically simplifies any technology refresh** — it supports the delivery of new capabilities or replacement technology without the need to change all components in the entire system, and so avoids the high cost of inventing and then supporting proprietary data interfaces.

Critically, users of 2iC TOOLKIT have protection over their intellectual property (IP). They have unrestricted freedom to keep and use the developed software as this increases information sharing, drives greater interoperability and improves mission outcomes.

## WHAT'S INCLUDED IN THE 2iC TOOLKIT SUBSCRIPTION

### 1. 2iC NODE

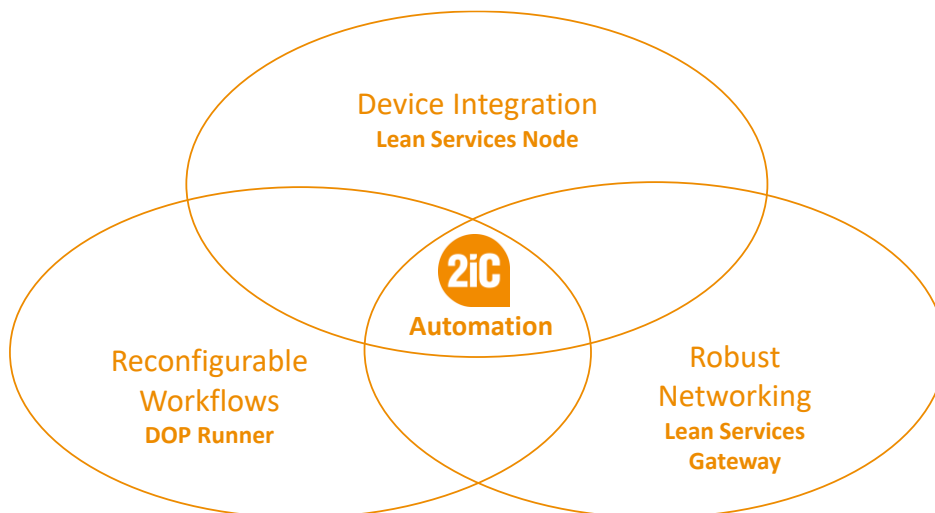
2iC NODE provides the key architectural elements for modular digital interoperability, service discovery and automation in Degraded, Denied, Interrupted and Limited (DDIL) communication environments.

It is installed on each node in the network and provides the digital backbone and open information exchange mechanism that allows true interoperability within the most challenging of environments: the modern battlespace.

2iC TOOLKIT allows unlimited use of the 2iC NODE product on internal Research & Development platforms, which comprises of three main components to deliver digital interoperability and automation:

- *Device Integration:*  
The Lean Services Node is an essential part of the Lean Services Architecture that handles local connections on-node.
- *Robust Networking:*  
The Lean Services Gateway that handles remote off-node interactions.
- *Reconfigurable Workflows:*  
The DOP Runtime is for executing user-reconfigurable business workflows across the battlespace, which can be drawn graphically using the 2iC DESIGNER software.

### The three main components of 2iC NODE

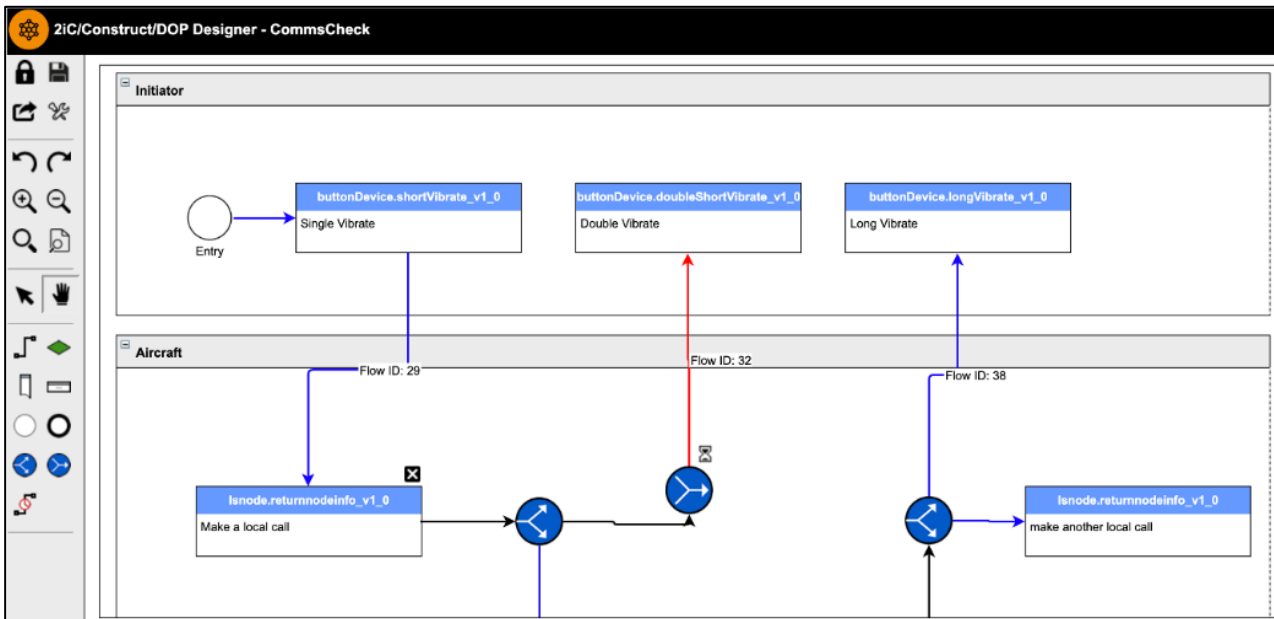


The functionality of 2iC NODE allows defence forces and suppliers worldwide to enable advanced digital interoperability and realise the benefits of open systems through the adoption of a standard services interface definition.

## 2. 2iC DESIGNER

2iC DESIGNER allows non-technical users to view, design and manage the orchestration of systems across the battlespace using a graphical tool. Users can easily draw and visualise Decentralised Operating Procedures (DOPs) to rapidly reconfigure the digital coordination between systems to meet changing needs, allowing them to eradicate manual processes and confusion, and quickly exploit opportunities.

The process is drawn visually using a drag-and-drop approach, with only the relevant instructions being deployed to nodes on a need-to-know basis, and where DOP Runtime then executes the required local operation(s):



In the diagram, the DOP image is for a comms check process between an initiator and an aircraft. Each 'swim-lane' shows the platform roles participating in the process and the blue bars represent the Lean Service calls made at each step.

### 3. 2iC SDK

A 2iC Software Development Kit (SDK) provides a simple way for developers to build open interfaces and adaptors for almost any system, platform or device—legacy, modern and future—so they can work seamlessly together within an open architecture environment.

The SDKs have been created specifically to make a new or existing system compatible and fully interoperable within a Lean Services Architecture.

The SDKs are supplied with all the necessary binary code, source files and online documentation needed to develop Lean Services systems. SDKs are available for Java, Android, C++ (Windows and Linux), and embedded-C (8-bit & 32-bit microcontrollers).

#### Key technical features and benefits:

Feature	Summary	Benefit
<b>Auto Code Creation from Schema</b>	The correct skeleton code with comments is generated for sending a call, receiving a call, sending a call response and receiving a call response, sending an event and receiving an event.	Minimises the amount of work required from a developer to use Lean Services.
<b>Supports Lean Services Architecture features out of the box</b>	The full set of standard calls and events that need to be used to integrate with the Lean Services Architecture are automatically implemented by the SDK.	The developer only needs to code the business functions required, not the Lean Services Architecture that supports the functionality.
<b>Software engineer does not need to learn new ways to work</b>	The use of the SDK means that the developer does not need to alter their working paradigm.	The developer can work in a normal manner without needing to learn new skills.
<b>Generates Java and C++ code</b>	Generates skeleton code for all desired service schemas, with comments showing where developer code needs adding, and the code also automatically registers those services with the Service Registry.	The developer can work with either Java (Windows, Linux and Android) or C++ (Windows and Linux).
<b>Natively supports Micro Lean Services</b>	The auto generation of Micro Lean Services code in C for 8-bit and 32-bit microcontrollers is supported.	An embedded developer can integrate 8-bit or 32-bit microcontrollers with 2KB of RAM with the Lean Services Architecture.

## 4. Access to the 2iC Community GitHub

The 2iC Community GitHub provides access to an ever-increasing range of sample code (built using the 2iC SDKs) to help developers get started with building systems, supplied as binaries ready to use and source code to extend and develop. These adaptors can be used as-is or extended, and examples include:

- Location (live GPS and simulated position)
- Node-Red for rapid prototyping
- Simple Display (browser-based user interface to display text, images and ask questions, along with configurable buttons)
- Camera
- Video Manager
- TAK Plug-in
- File manager
- Various Bluetooth devices.

## Online documentation, training materials and support

2iC provides all the necessary documentation, training, self-help videos and technical support to ensure engineers derive the maximum value from using the 2iC software.

The training covers how to: install the 2iC software; use the Lean Service Code Generator to create Lean Service System skeleton code; build and run a Lean Service System; test a Lean Service System and join a Lean Service to the Lean Service Network; configure 2iC Gateway for your network.

2iC provides the following support:

- Online Self-Help and Knowledge Base
- Online ticket creation for incident support (with agreed Service Levels) covering:
  - Identifying and troubleshooting problems in the software
  - Assistance with issues during installation and upgrades
  - Identifying and creating required bug reports
- In addition to the 2iC Standard Support Service, 2iC includes product updates and new releases as part of the overall support offering.

## HOW TO BUY

2iC TOOLKIT is available as a subscription on a per-user, per-quarter basis. Discounts are available for multiple users and multiple quarters. An enhanced support option is available on an hour draw-down basis. Any production/live use of 2iC NODE can be negotiated separately.

## 2iC CORE SOFTWARE

Delivering the underlying infrastructure for digital interoperability

### PRODUCTS

#### 2iC NODE

Provides the key architectural elements for modular digital interoperability, service discovery and automation in Tactical/DDIL environments

#### 2iC TOOLKIT

For software and systems engineers to research, develop and test their own modular, open and interoperable systems

#### 2iC TRUST

For secure and flexible interoperability across different trust domains (classification, nationality or organisation)

### PRODUCTIVITY TOOLS

#### 2iC DESIGNER

Allows non-technical users to view and easily manage different systems and visually design re-configurable workflows

#### 2iC MISSION CONTROL

For approved users to see what is deployed in the network, understand system status and manage configurations

#### 2iC SDK

Software Development Kits (SDK) for rapidly integrating current, future and legacy systems using a Modular Open Systems Approach (MOSA)

## 2iC SUPPORT & SERVICES

Comprehensive professional services, training and technical support

### GET IN TOUCH

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