

# Transitioning from 2D to 3D for the Collins Class Submarines

Gavin Hamilton

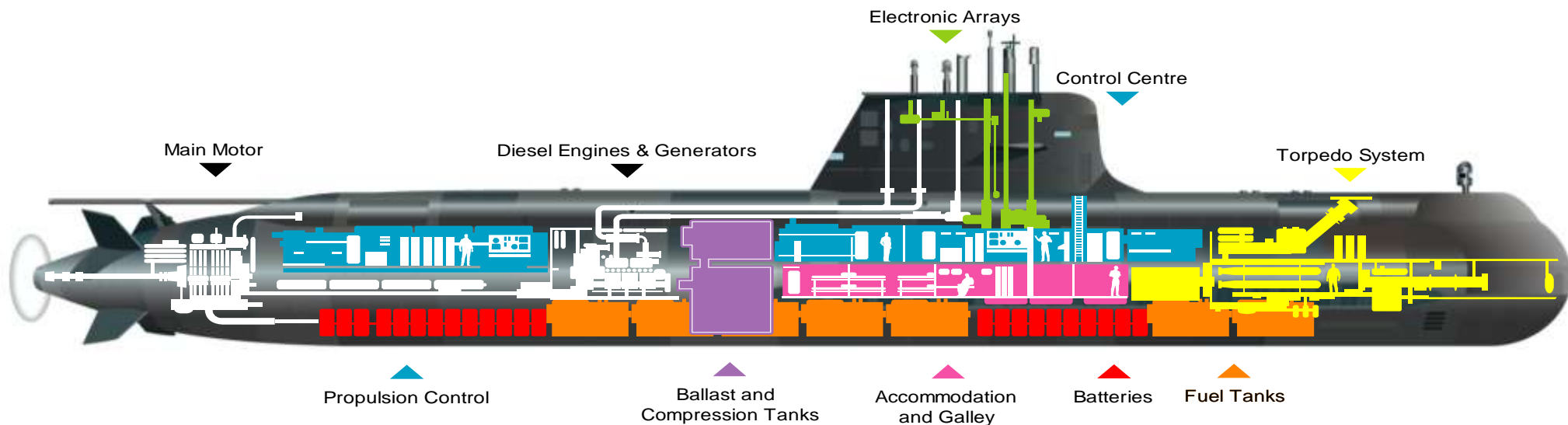
Chief Technology Officer

# Presentation Overview

- Who is ASC?
- ASC's digital journey
  - 2D CAD and Document Centric
  - 3D CAD and PLM
  - Migration Challenges
  - Benefits
- What does the future hold
- Key message

# Who is ASC?

- Australia's largest specialised naval defence shipbuilding organisation
- We have a number of long-term contracts
  - Collins Class Submarines In-Service Support
  - Collins Class Submarine Training services

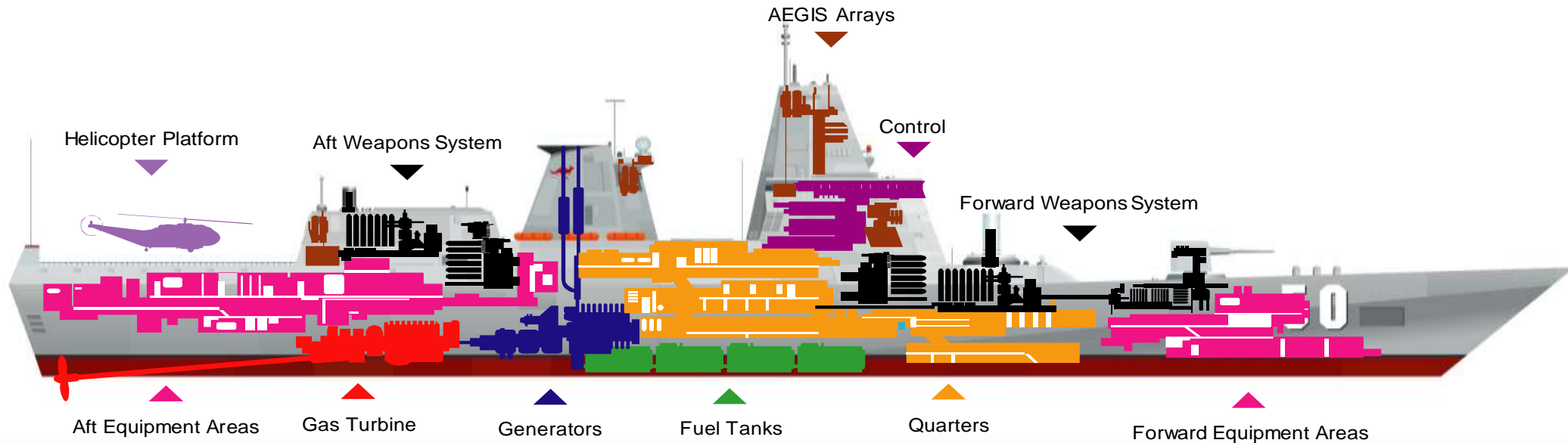


Commercial-in-Confidence

3

# Who is ASC?

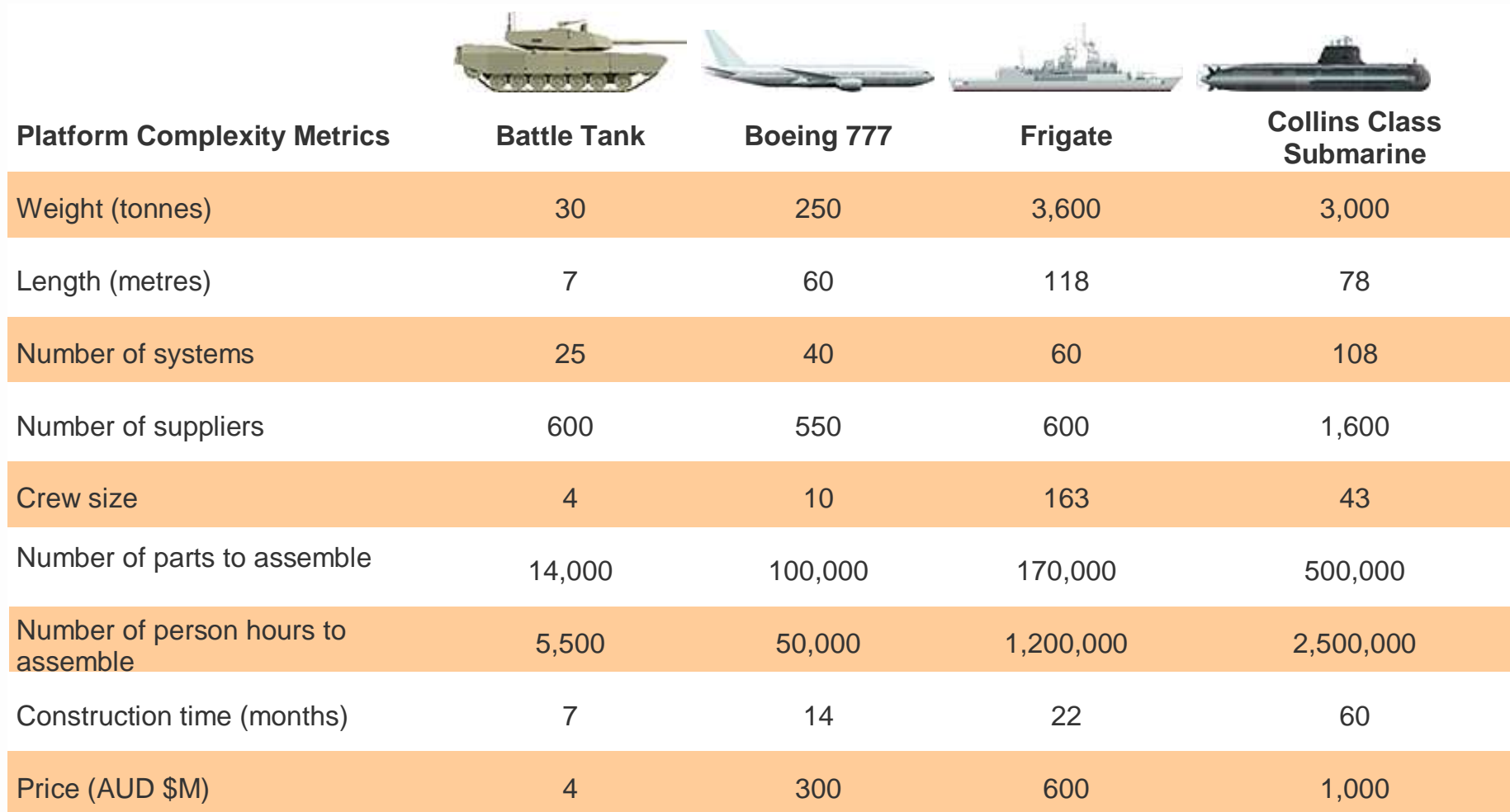
- Australia's largest specialised naval defence shipbuilding organisation
- We have a number of long-term contracts
  - Collins Class Submarines In-Service Support
  - Collins Class Submarine Training services
  - Hobart Class Air Warfare Destroyer (AWD) Program



Commercial-in-Confidence

4

# Submarine Relative Complexity



Platform Complexity Metrics	Battle Tank	Boeing 777	Frigate	Collins Class Submarine
Weight (tonnes)	30	250	3,600	3,000
Length (metres)	7	60	118	78
Number of systems	25	40	60	108
Number of suppliers	600	550	600	1,600
Crew size	4	10	163	43
Number of parts to assemble	14,000	100,000	170,000	500,000
Number of person hours to assemble	5,500	50,000	1,200,000	2,500,000
Construction time (months)	7	14	22	60
Price (AUD \$M)	4	300	600	1,000

Commercial-in-Confidence

5

# The journey (so far ...)



## Bespoke Apps

ASC developed apps for Configuration and Document Management, Logistics, Cost/Schedule Control, etc.



## 3D CAD

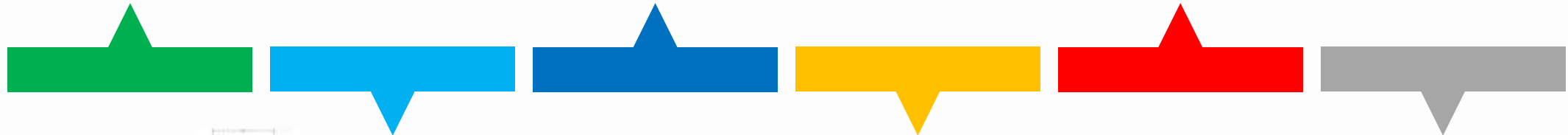
3D model created from 2D drawings  
2D drawings still used in production

## Data Integration

3D model integrated with PLM  
Data Integration Layer

- improved reporting
- platform for app development

1988



2018



## 2D CAD

Collins Class submarines designed in 2D

## PLM

Embarked on a PLM program in 2006  
Strategic program to advance ASC capability for sustainment



## Digital Working

3D design model trials using Virtual Reality  
Photo realistic virtual reality used for training  
3D Printing for prototyping

# 2D CAD and Document Centric

## ■ 2D CAD

- In excess of 25,000 drawings & 25,000 parts lists
- Printed drawings
- Review of product requires mental visualization of 2D data
- No intelligence, just an electronic drawing board
- Boat variations are difficult to maintain

## ■ Document Centric

- Record capture focus
- Manual processes and lifecycles
- Product structure inherent in numbering and package system
- Configuration controlled by other systems
- Requires knowledgeable users to find and use information

# 3D CAD and PLM

## ■ 3D CAD

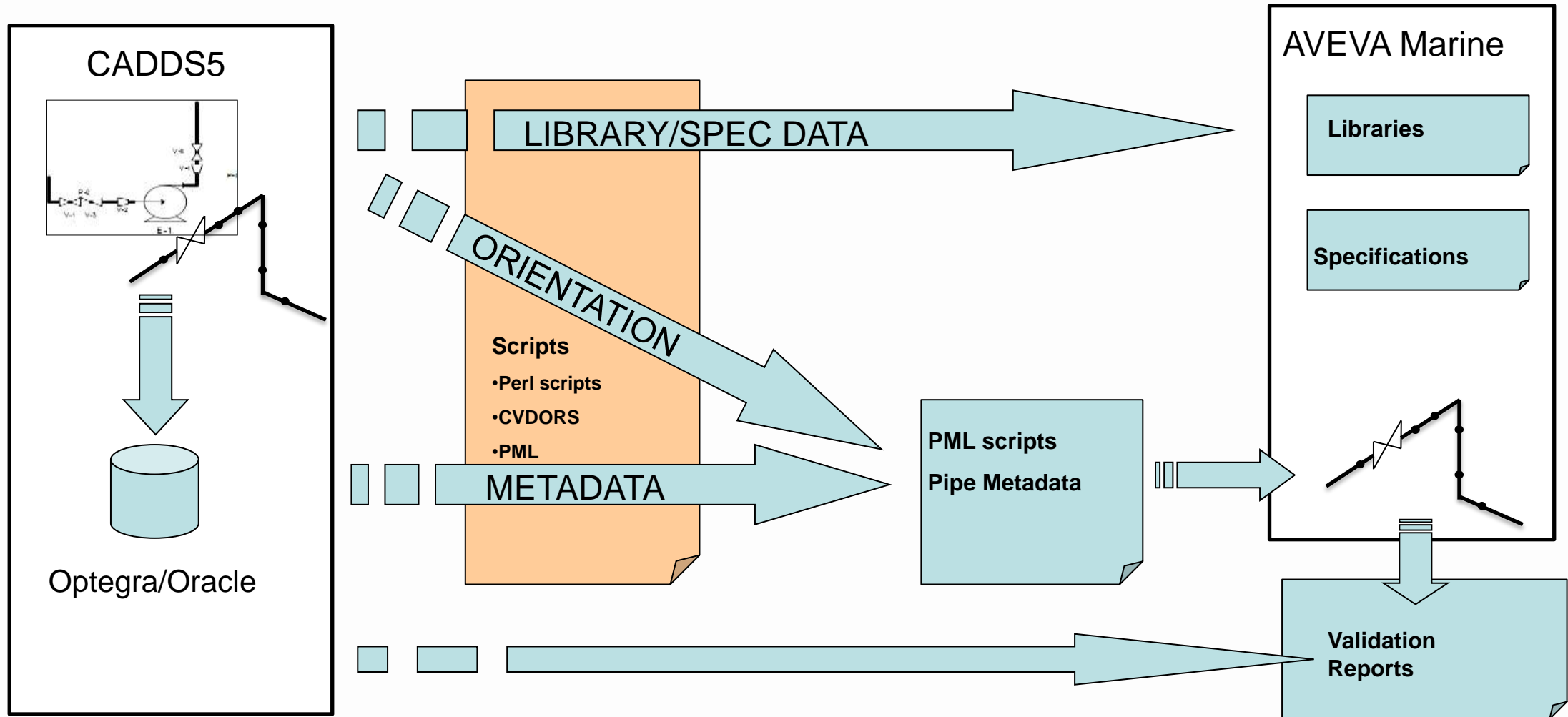
- A graphical database
- Integration with other sources – PLM, mechanical CAD tools
- Increased use across the organisation
- Intelligence to aid design
- Multi-purpose – design, planning, maintenance, investigation

## ■ PLM

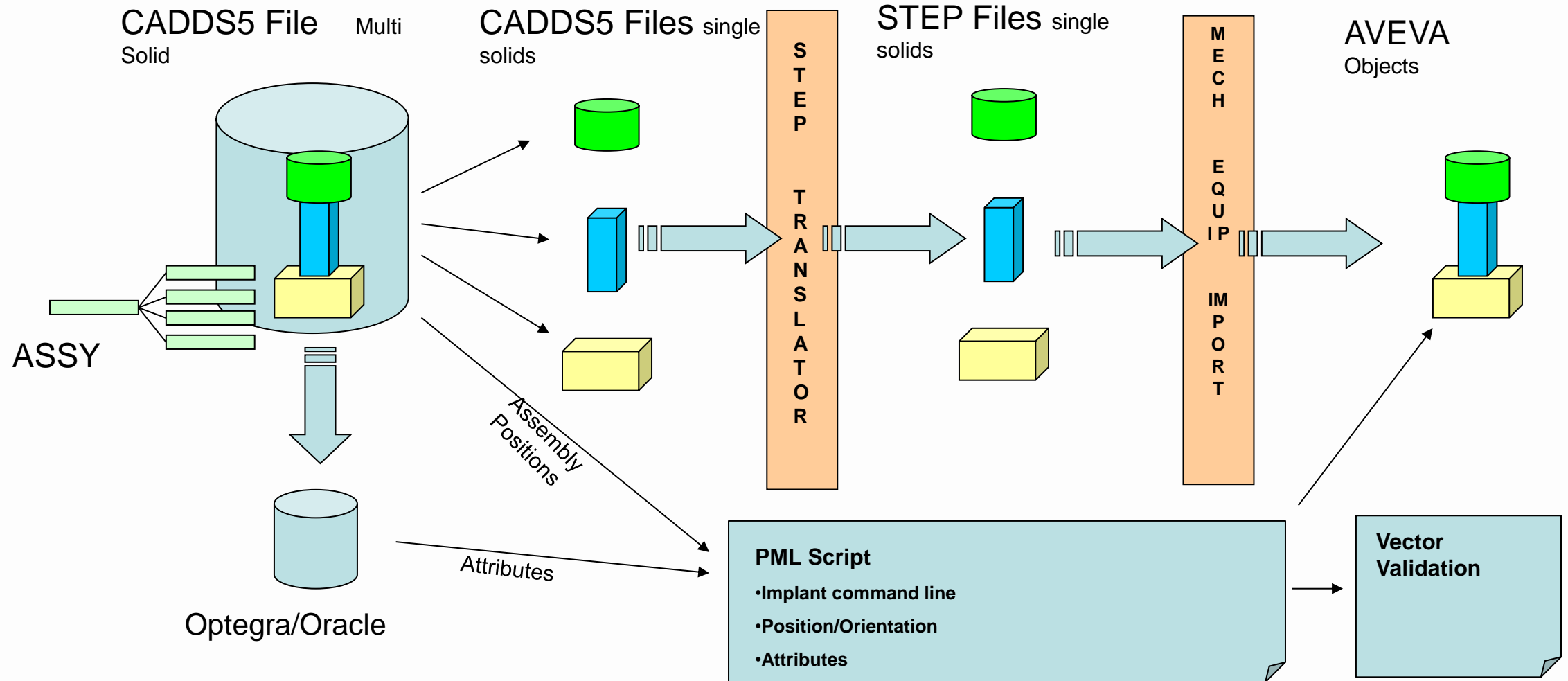
- Object capture in native formats
- Lifecycle management
- Single integrated electronic repository
- IP and security controls
- Single Source of Truth
- Fully searchable



# 3D CAD Migration – Piping Translation



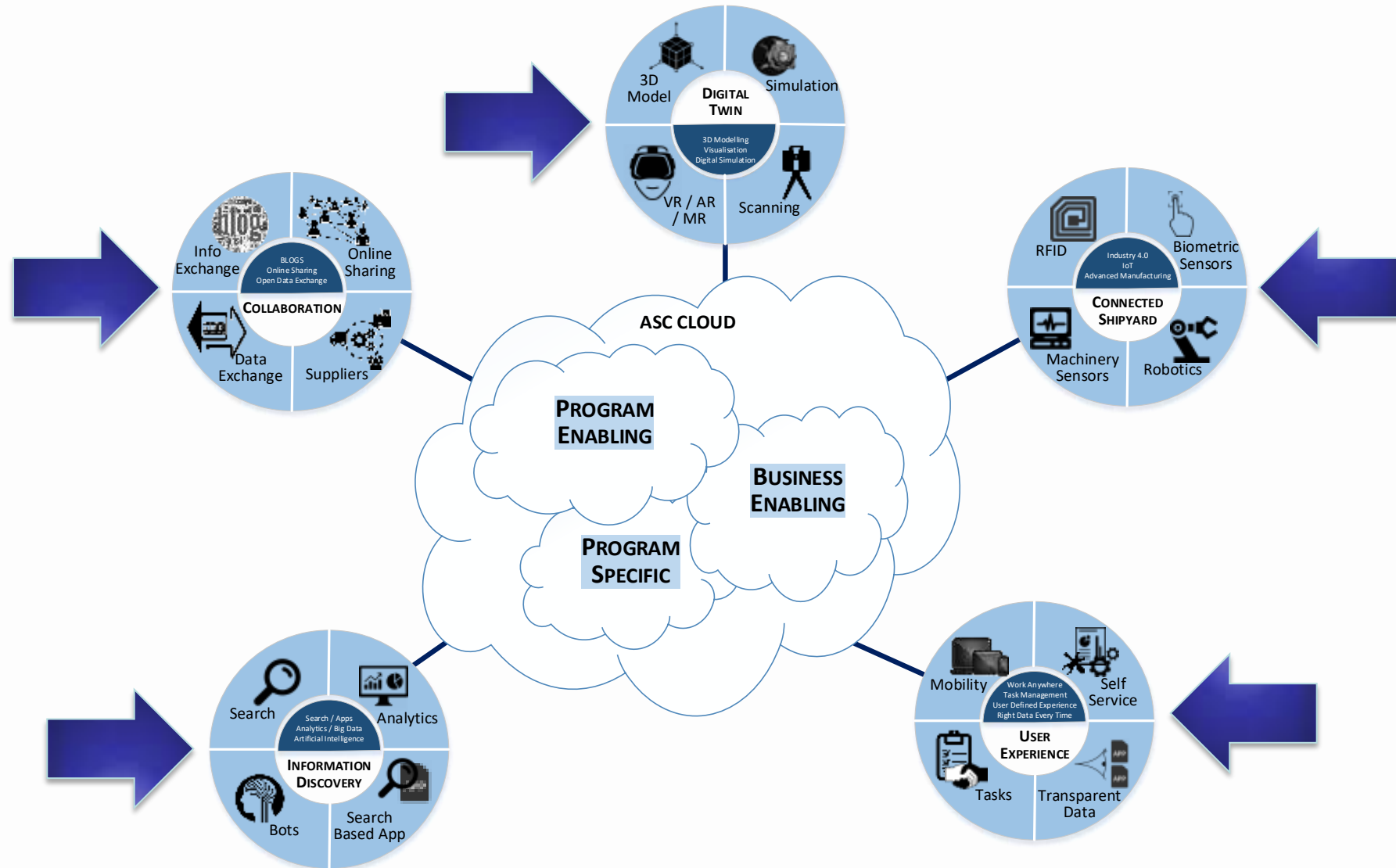
# 3D CAD Migration – STEP Translation



# 3D CAD Benefits – Removal Routes

- Characteristics of maintenance on a submarine
  - Limited and tight spaces
  - Worker occupational health and safety considerations
  - Schedule pressures
  - Bulky and heavy equipment requiring removal for maintenance
- How can 3D CAD help?
  - Plan and simulate activities in 3D before physical access is available
  - Visualise removal routes and optimise options
  - Use Virtual Reality to immerse and understand spatial constraints better
  - Practice and train in a digital environment

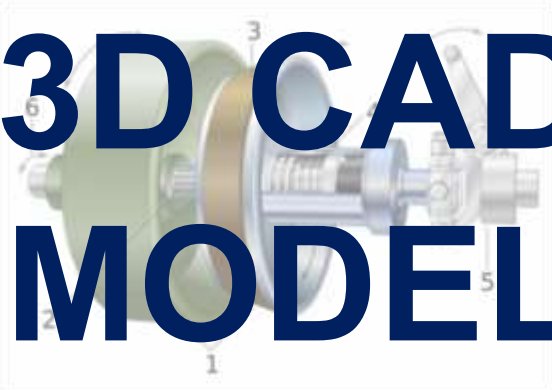
# What does the future hold?



Commercial-in-Confidence

12

# Key message



**3D CAD  
MODEL**

A 3D CAD model of a mechanical assembly, showing various components like a shaft, gears, and bearings. The model is rendered in a semi-transparent style, revealing internal parts. It is labeled with numbers 1 through 6, indicating different parts of the assembly.



**Asset  
Data**

A visualization of asset data, showing a complex network of colored lines and shapes, representing various assets and their relationships. The colors include blue, red, orange, and purple.

# My contact details

Gavin Hamilton

694 Mersey Road North

Osborne SA 5017

Phone: +61 8 8348 7875

Email: [gavin.hamilton@asc.com.au](mailto:gavin.hamilton@asc.com.au)

Web: [www.asc.com.au](http://www.asc.com.au)