



Australian Government



DEFENCE INDUSTRY &
INNOVATION

NEXT GENERATION
TECHNOLOGIES FUND

NEXT GENERATION TECHNOLOGIES FOR SAFEGUARDING AUSTRALIA



SIX KEY DRIVERS SHAPING OUR SECURITY ENVIRONMENT TO 2035

(DWP2.6)

NEW THREATS

E.G. CYBER

**GLOBAL
SUPERPOWERS**

**OTHER
COUNTRIES**
CHALLENGING
TRADITIONAL
ROLES

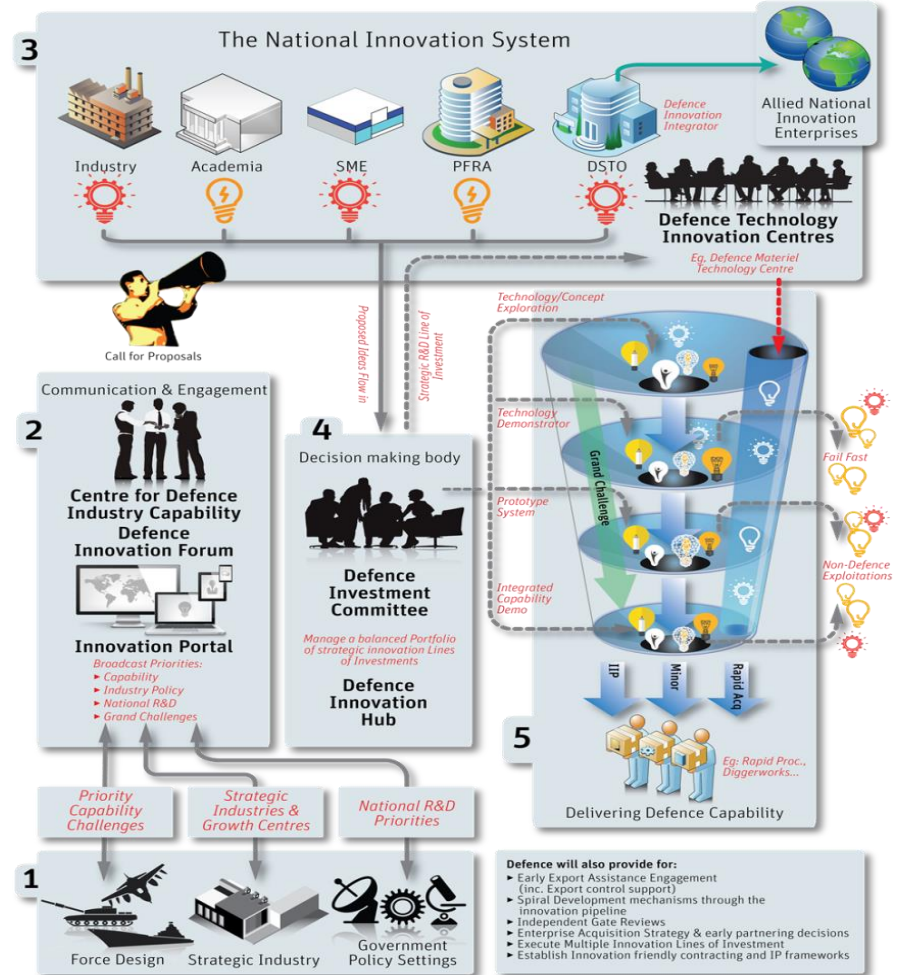
TERRORISM
HOME AND ABROAD

STATE FRAGILITY
DRIVEN BY MANY
INFLUNCES

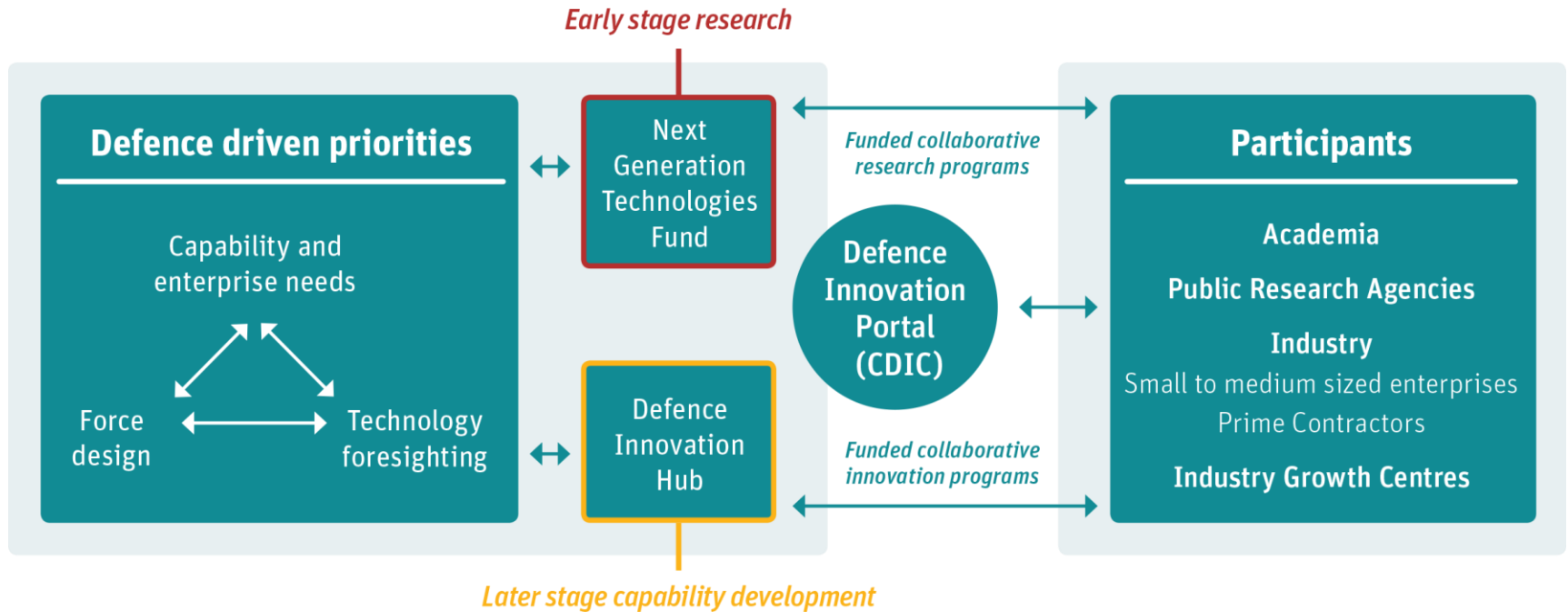
**REGIONAL
MILITARY
MODERNISATION**

OVERALL DEFENCE INNOVATION ECOSYSTEM

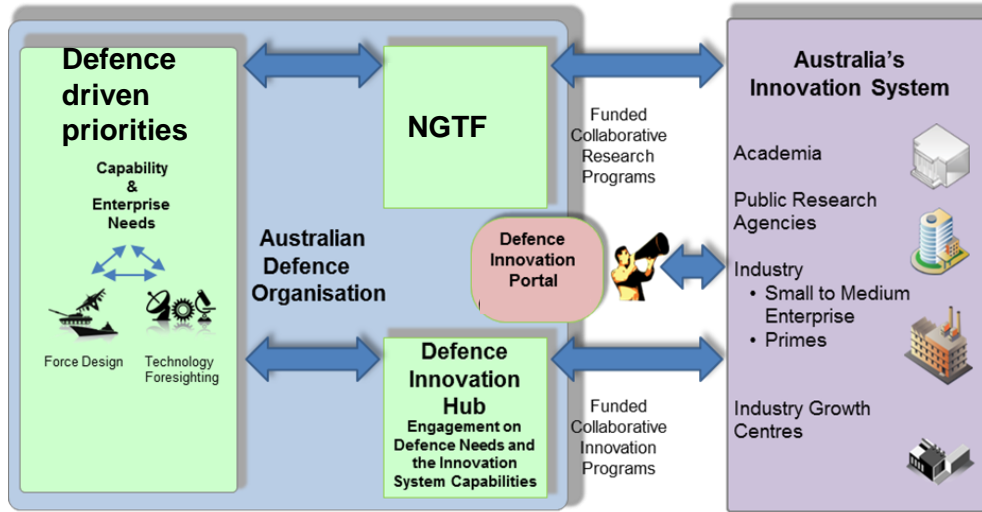
- **\$1.6 Billion over 10 years**
- Defence Innovation Hub
- Centre for Defence Industry Capability (CDIC)
- Next Generation Technologies Fund



DEFENCE INNOVATION ECOSYSTEM



Principal Elements of Defence Innovation Statement



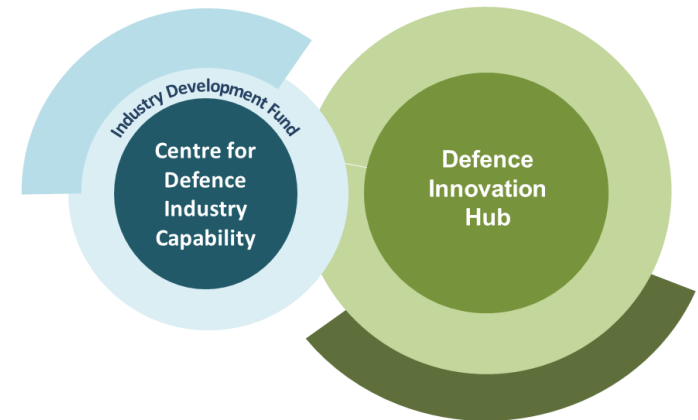
The Defence Innovation Hub – Turning Research into Capability

A single Defence Innovation Hub is to be established within Defence and charged with managing the portfolio of investments in Defence innovation. The Defence Innovation Hub's budget of **\$640 million** over the decade will be directed to **Defence's highest priority capability challenges and needs**. The processes will be **streamlined** to enable industry and Defence to undertake collaborative innovation activities through-out the capability development life cycles, from initial concept through prototyping and testing to introduction to service. The Defence Innovation Hub will incorporate and rationalise the numerous existing innovation programs.

Next Generation Technologies Fund – Defence's Strategic Research

The Government will invest approximately **\$730 million** over the decade in next generation technology to better position itself to respond to strategic challenges and provide the **"game changing"** capabilities of the future. **The Defence Science & Technology Group will take the lead role** in both conducting and integrating research in emerging technology.

DST Group will work collaboratively with academia, publicly funded research agencies, Australian industry, other areas of Defence and Government and our allies to create a vibrant and interlocking innovation capability using collaboration networks.



Future Delivery Model: The Centre for Defence Industry Capability and the Defence Innovation System

Impact of the Next Gen Tech Fund

New money for Defence research

- ‘New money’, not a re-framing of existing funding sources –
 - Managed by DST Group –
 - Investment priorities generated via rigorous process –
-

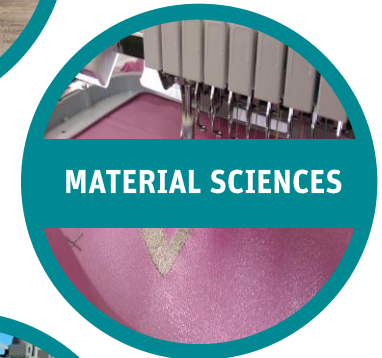
Collaborative Research Programs

- Creating a vibrant and interlocking innovation capability –
 - Research focused on driving Defence outcomes –
-

New Defence Capability

- Delivering product to Defence through Integrated Investment Program –

CURRENT PRIORITY AREAS



THE EVOLVING NEXT GENERATION TECHNOLOGIES PROGRAM FRAMEWORK



NEXT GENERATION TECHNOLOGIES FUND

A new approach to Defence Innovation

A once-in-a-generation opportunity

**Investment in early innovation to ensure
Defence remains resilient to
emerging threats**



Australian Government



**DEFENCE INDUSTRY &
INNOVATION**

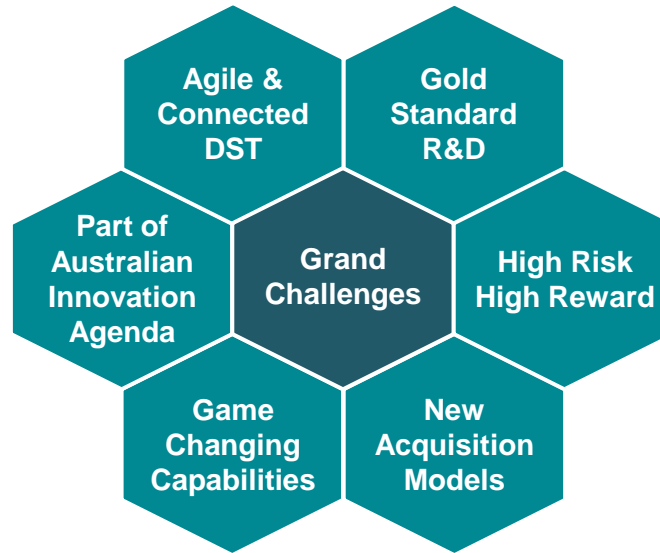
NEXT GENERATION
TECHNOLOGIES FUND

GRAND CHALLENGES FOR SAFEGUARDING AUSTRALIA

Dr Roger Neill – Program Lead

Dr Karen O'Connor – Science Portfolio Director

THE GRAND CHALLENGES PROGRAM – NEXT GEN TECH FUND



What is a Grand Challenge?

A complex, large scale defence or national security (NS) challenge of high order:

- Linked to key Defence or NS priorities
- Delivers significant advances
- Solution-focused

What a Grand Challenge is NOT

- More money for core Defence R&D
- Duplicating existing programs or efforts
- Incrementally improving existing capabilities
- Addressable through small scale effort
Covered by other Next Gen Tech Fun subprograms

THE GRAND CHALLENGE SPECTRUM

Program size is over \$250m (ten years)

Small number of Challenges

Broad engagement

Every challenge resourced for success

Risk tolerant

***Fail-fast* won't imply project failure**

JINDALEE – AN EARLY GRAND CHALLENGE

Proof-of-concept phase – 6 years **1972-78** (~\$30-40m 2016 equivalent)

Operational feasibility and costing **1979-85** (~\$90m 2016 equivalent*)

Would it qualify as a Grand Challenge?

A complex, large scale defence or national security (NS) challenge of high order, which is:

- ✓ linked to Australia’s key defence or NS priorities
- ✓ not well addressed by currently available technologies, systems or methodologies
- ✓ audacious, though considered, use of new concepts and emerging technologies to deliver significant advances
- ✓ scientifically, technically and/or socially complex
- ✓ of special relevance to Australia, unlikely to be addressed by offshore efforts or accessible from them, and distinctively addressable by an Australian-led effort**
- ✓ likely to require an intensive, large scale, multi-disciplinary, multi-party, but time-bound collaborative effort

* The Development of over-the-horizon radar in Australia, D.H. Sinnott – Recommended reading!

** With Jindalee, demonstrated indigenous capability ‘opened doors’ for international collaboration

GRAND CHALLENGES ARE...

Solutions focussed

- focus on the desired effect rather than technology –
 - addresses a specific problem –
-

Game changing

- delivers substantial enhancement over existing capability –
 - not being addressed by an existing program –
-

All about engagement

- significant input from academia and industry –
- funding for relationships (~\$250m over 10 years) –



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DEFENCE INDUSTRY &
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COUNTER IMPROVISED THREATS GRAND CHALLENGE

Dr Shane Canney Project Director CIT Grand Challenge
Dr Greg Newbold Deputy Project Director CIT Grand Challenge

WHAT IS AN IMPROVISED THREAT?

**Improvisation of readily available technology
to create threats**

**Rapidly employed using innovative, unpredictable
approaches creating uncertainty**

**Generates an asymmetric advantage over
conventional approaches**



COUNTER IMPROVISED THREATS GRAND CHALLENGE

Defeat improvised systems without casualties

Demonstrate an integrated system prototype that enables stand-off detection and neutralisation of improvised threats in a complex joint battlespace in 3 years

Mature selected emerging and/or disruptive concepts and technologies

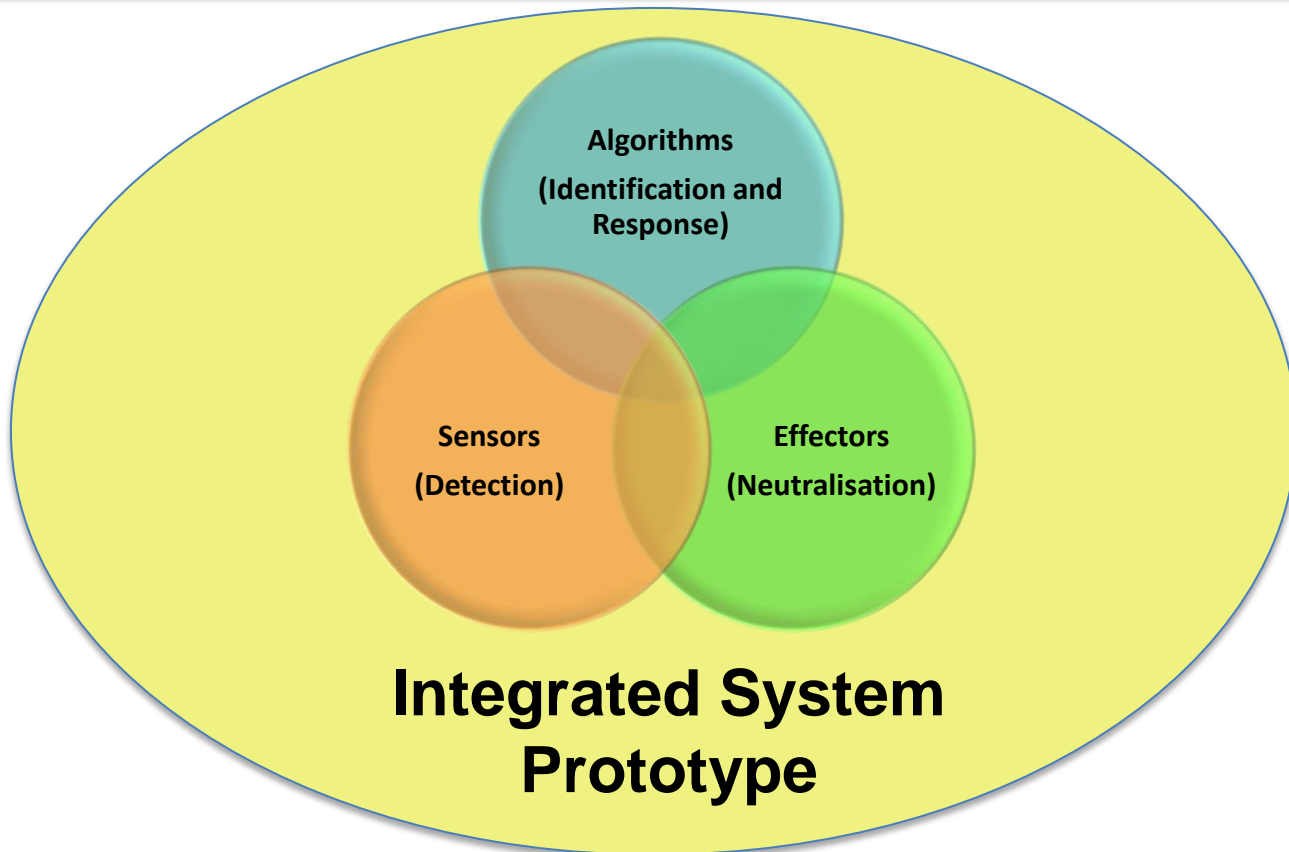
Architect a modular flexible tactical defeat system

Demonstrate the military utility of an iteratively integrated prototype defeat system

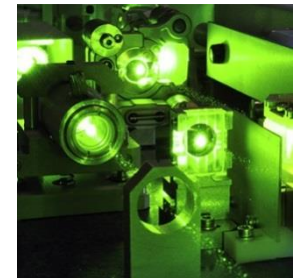
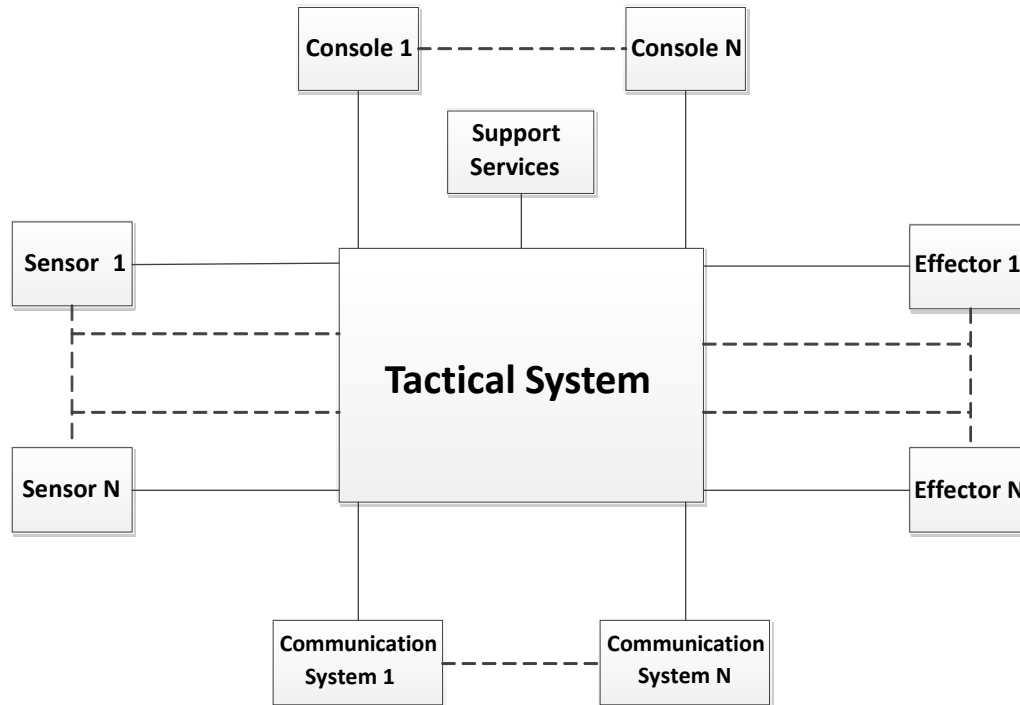
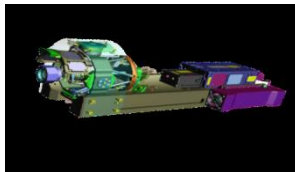
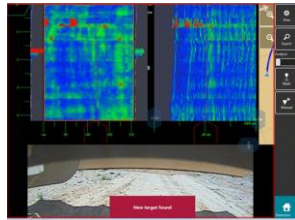
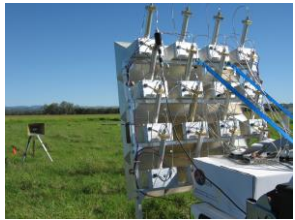


Key Concept/Technology Elements

Demonstrate an integrated system prototype that enables stand-off detection and neutralisation of improvised threats in a complex joint battlespace



Illustrative Integrated System Concept



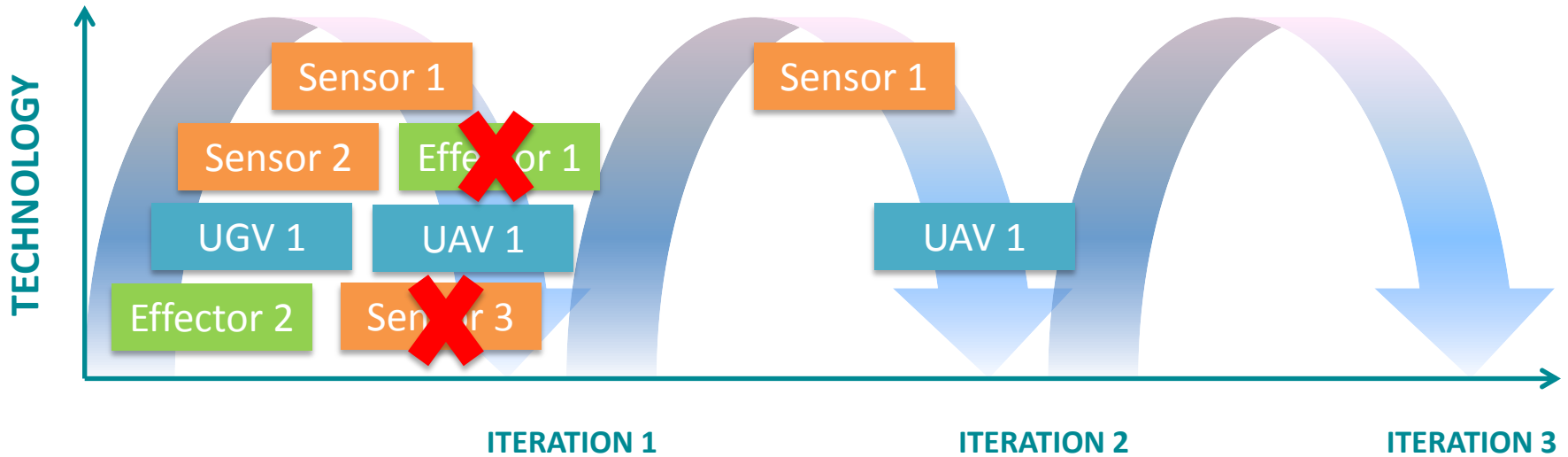
ITERATIVE DEVELOPMENT AND TEST



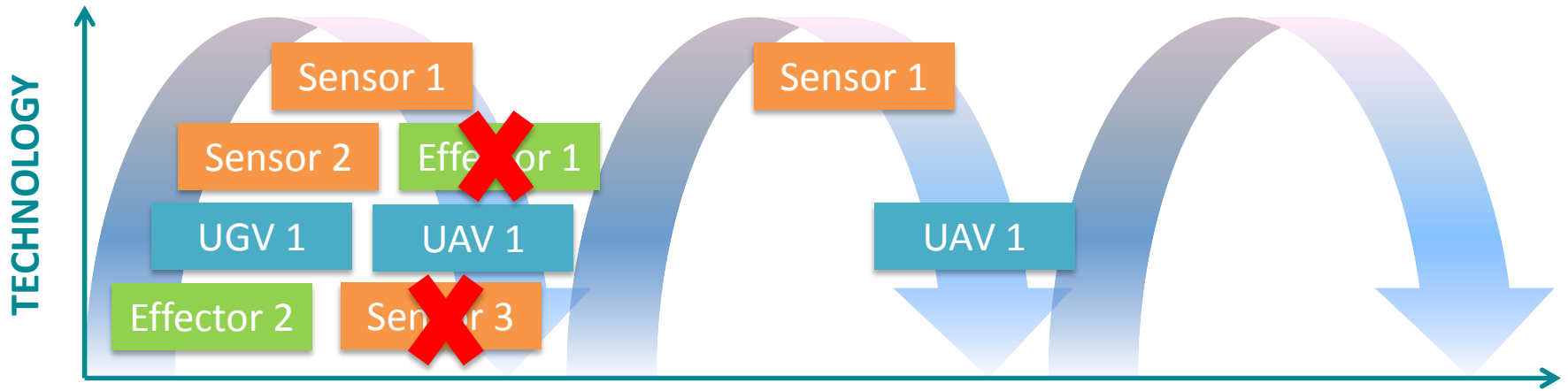
ITERATIVE DEVELOPMENT AND TEST



ITERATIVE DEVELOPMENT AND TEST



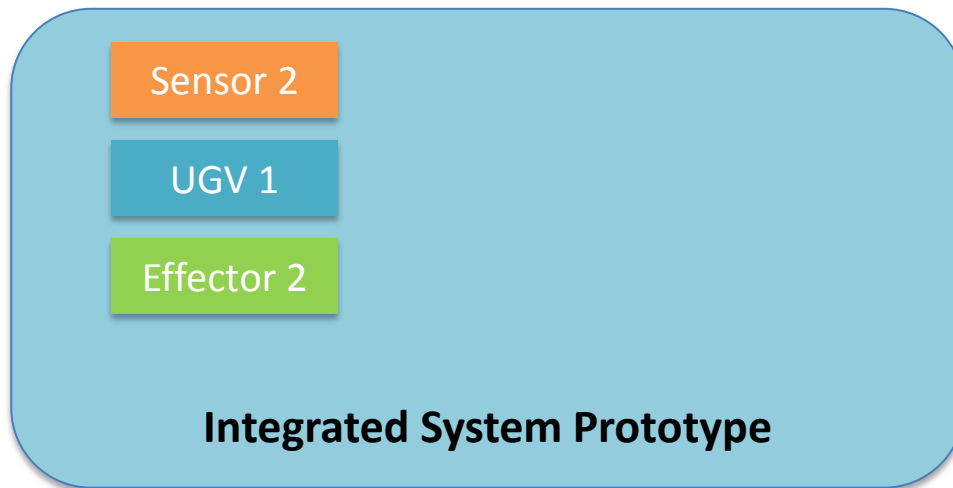
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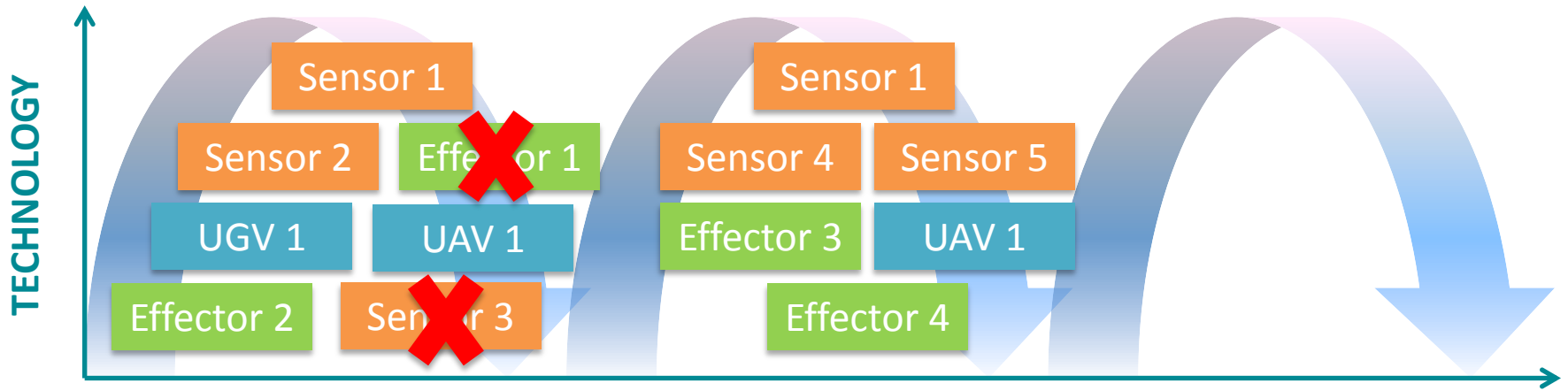
ITERATION 1

ITERATION 2

ITERATION 3



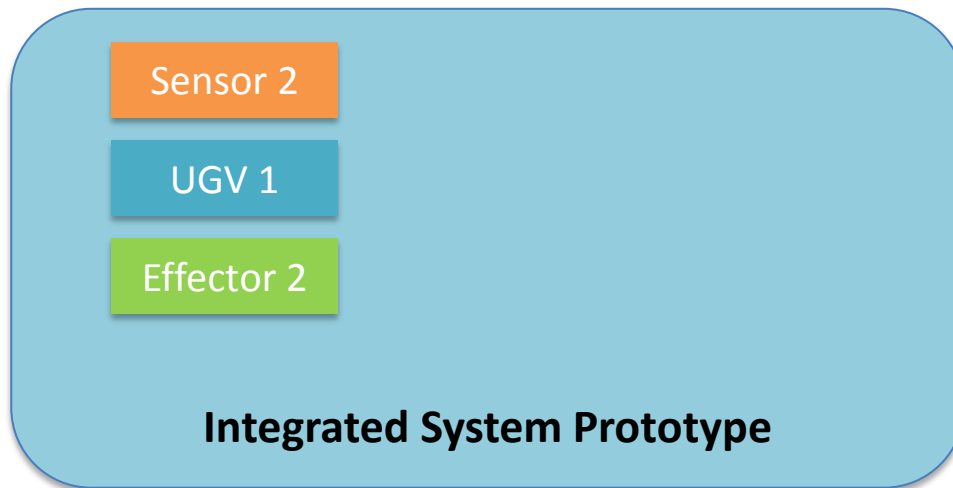
ITERATIVE DEVELOPMENT AND TEST



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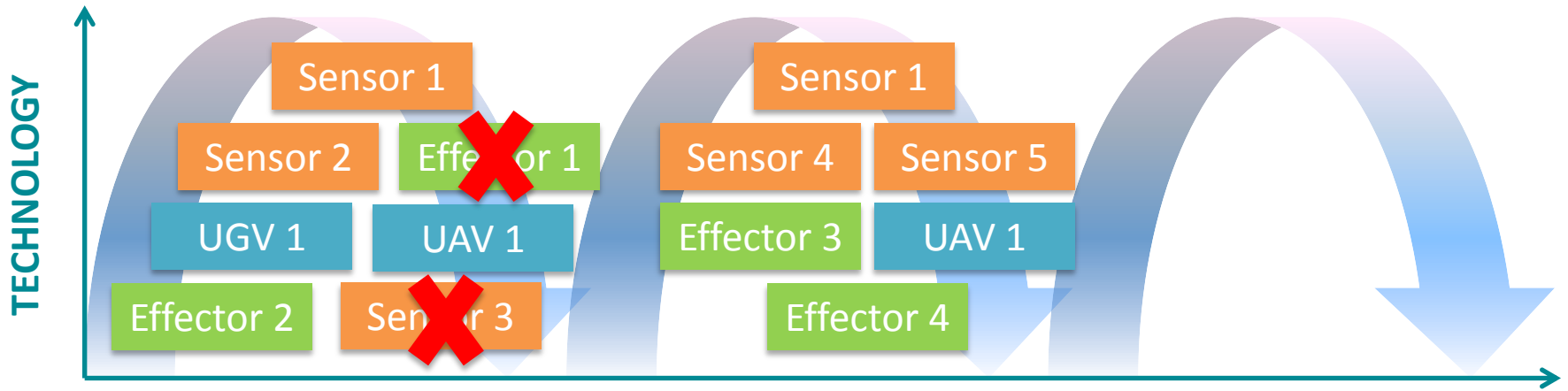
ITERATION 2

ITERATION 3



Integrated System Prototype

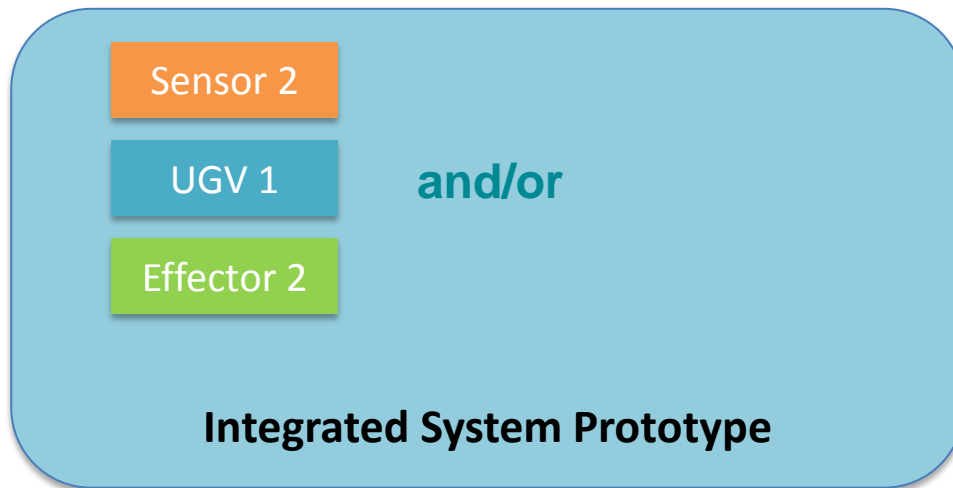
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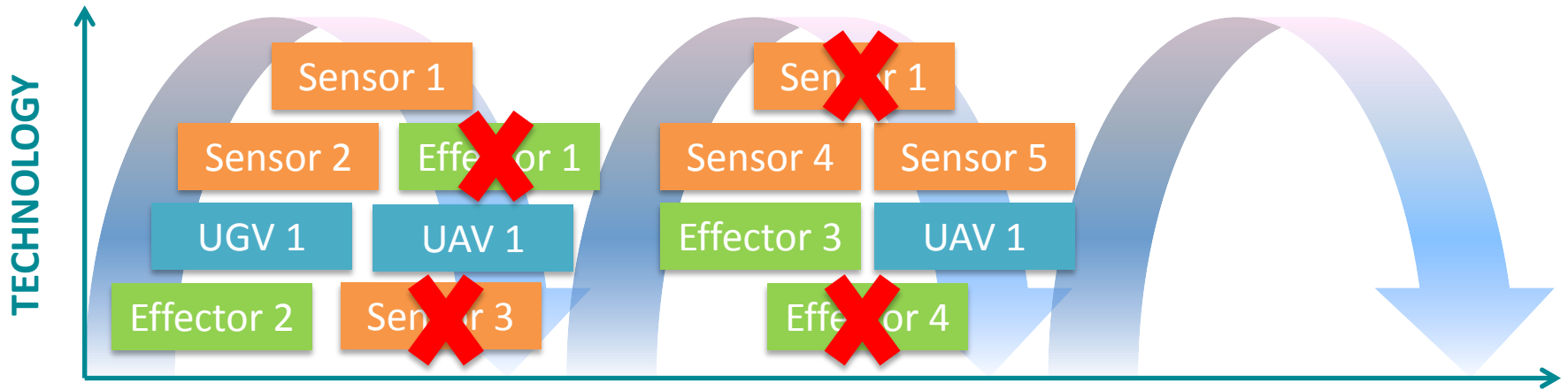
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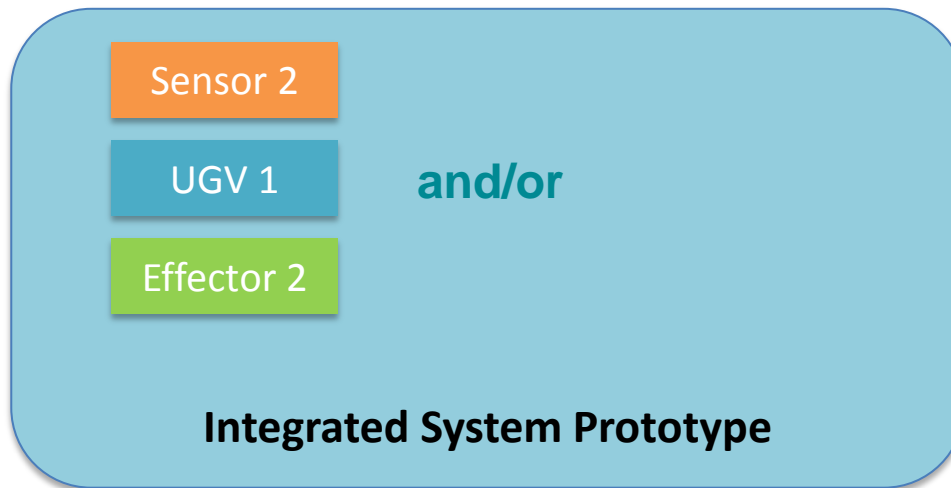
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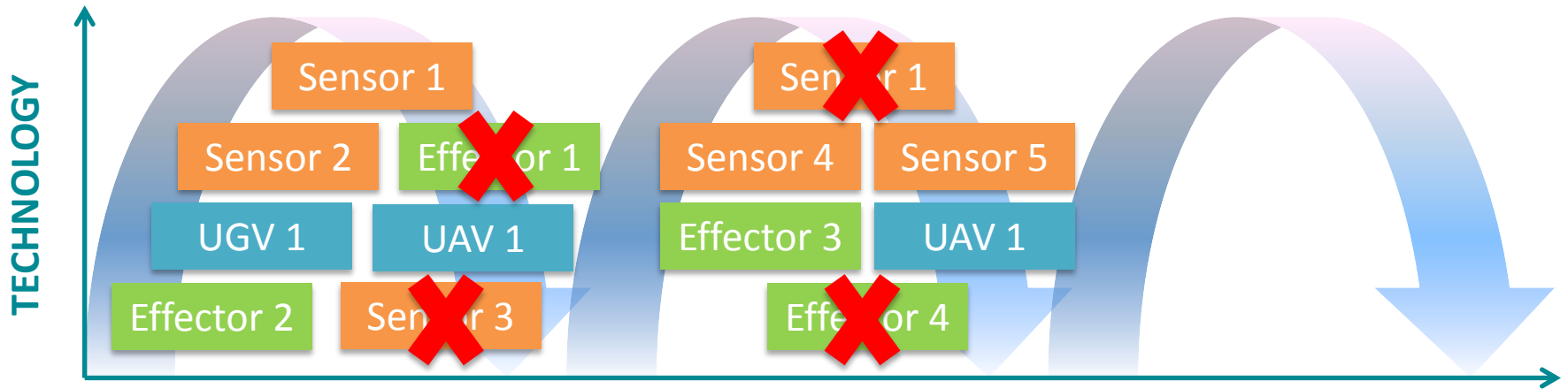
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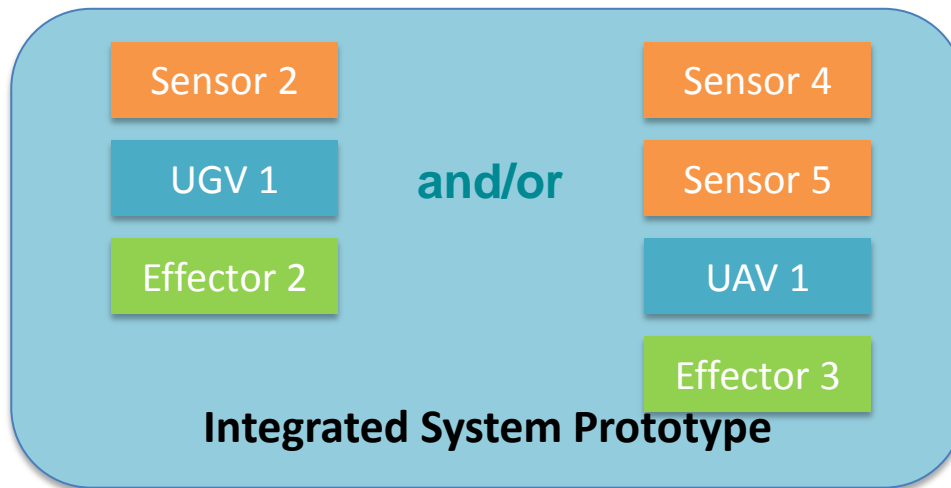
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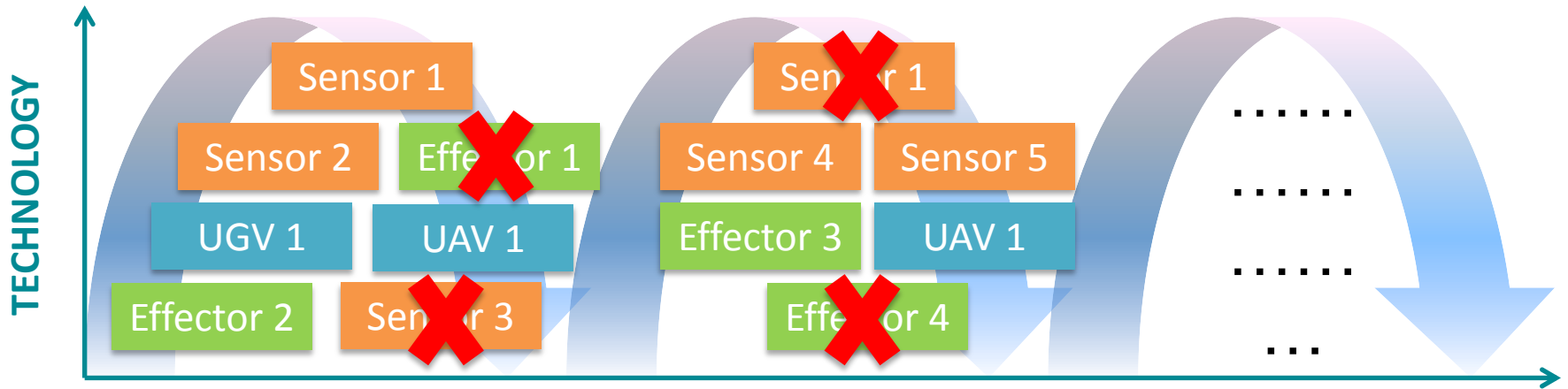
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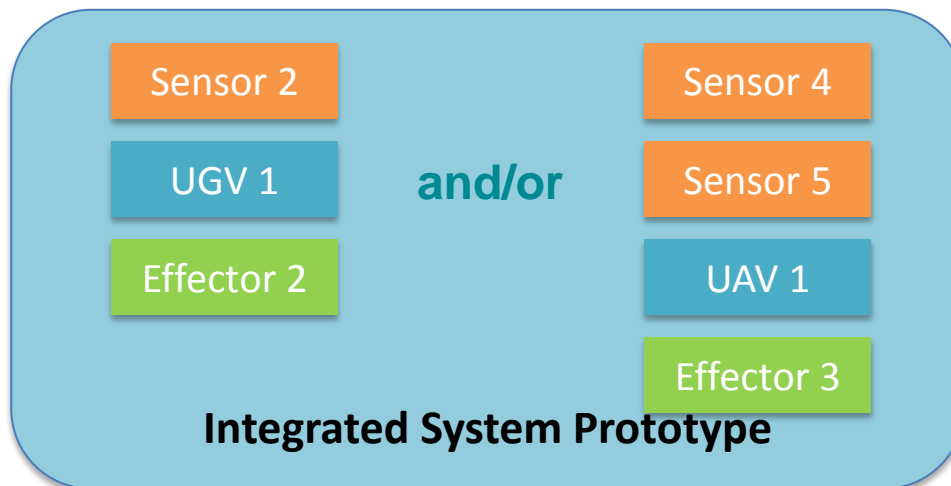
ITERATIVE DEVELOPMENT AND TEST



ITERATION 1

ITERATION 2

ITERATION 3

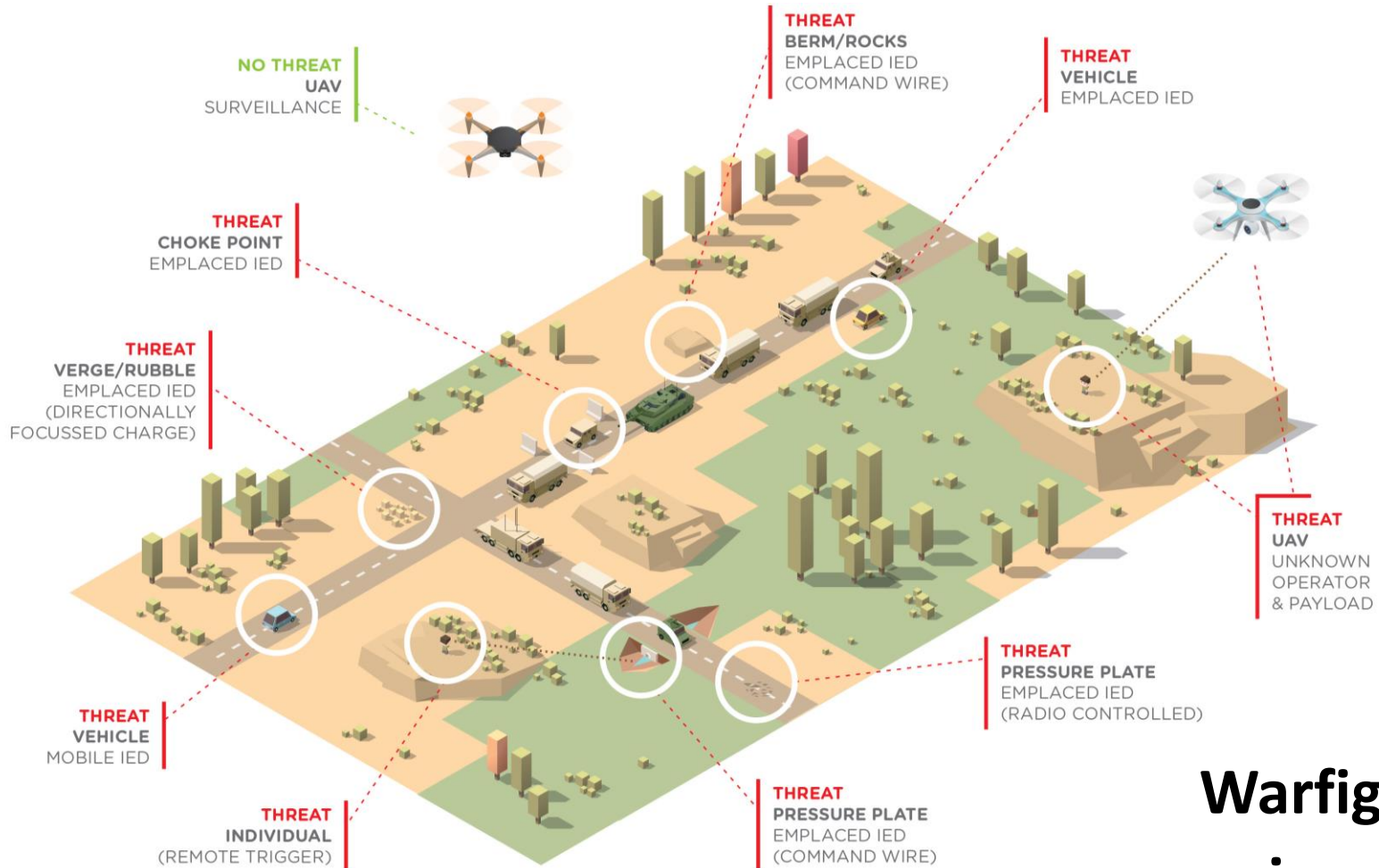


OPERATIONAL VIEWS



Civilian environment

OPERATIONAL VIEWS



Warfighting environment

S&T CHALLENGES

**Detection of small and often concealed threats
in cluttered environments**

Tracking of low signature, slow moving targets

Data fusion across multiple sensors

**Target discrimination and identification tailored
to the nature of the threat**

Neutralisation in complex environments in a risk managed way

Force protection through stand-off

- separating operator outside threat impact zone –
- increased use of autonomous systems –

CIT GRAND CHALLENGE FOCUS AREAS AND WORK STREAMS

Technology maturation

– sensors, effectors –

Algorithm development

– sensor fusion, automatic target recognition –
– response options (effector/threat interaction) –

System architecture development

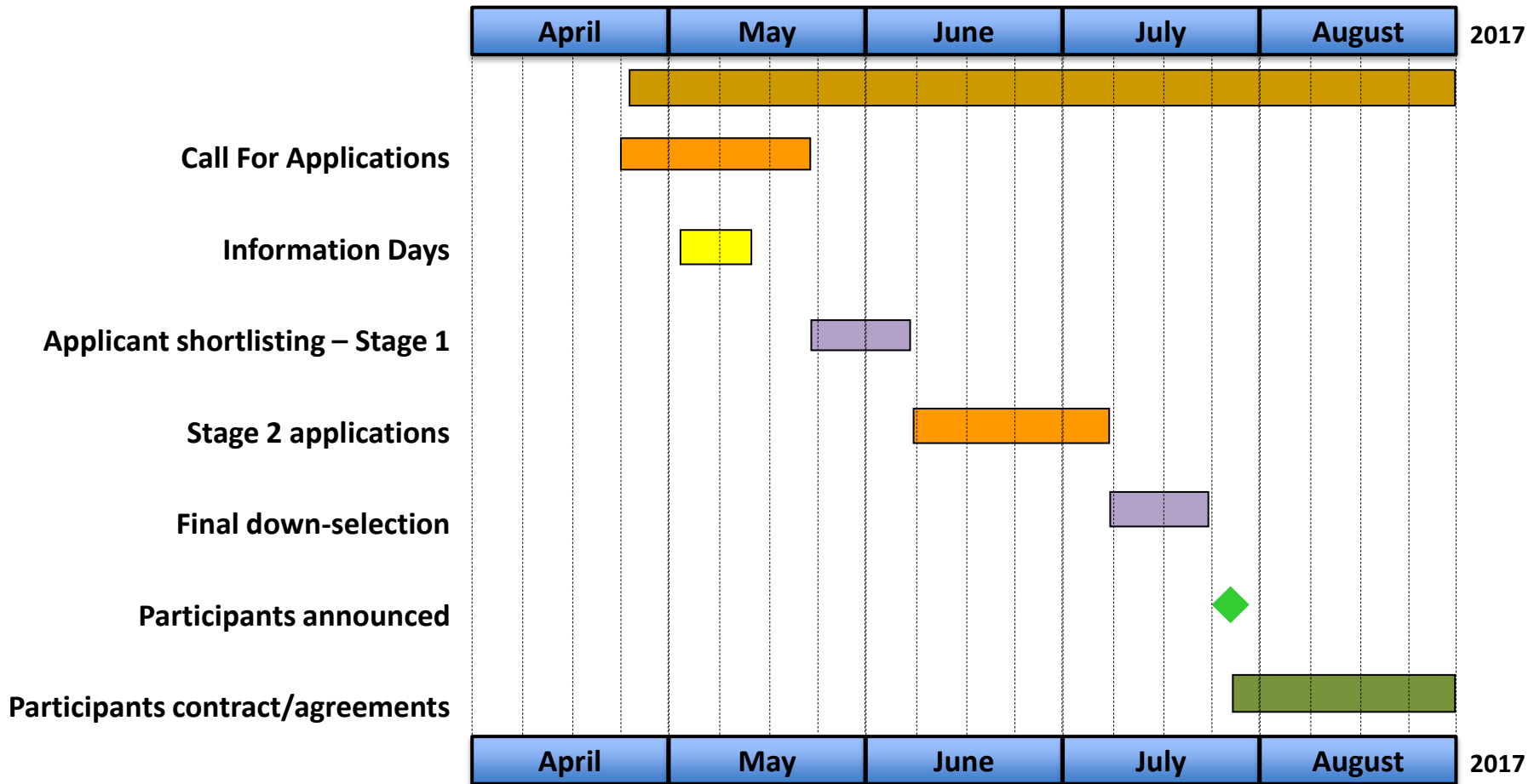
– open, modular framework –

Systems integration

– human, autonomous and tactical defeat systems –

Priority for initial call

INITIAL CALL FOR APPLICATIONS TIMELINE



ASSESSMENT OF INITIAL APPLICATIONS – INITIAL CALL

Evaluations panel (led by DST) with key stakeholders

Assessment criteria

Suitability Alignment of innovation proposal with Grand Challenge goals

Feasibility Extent to which the proposal can be developed and adopted

Timeliness Timeframe to mature innovation to contribute to Grand Challenge

Contribution to Australian capability Generate increased capability and capacity in the Australian community

Balanced investment across the work streams

Further information

grandchallenges@dst.defence.gov.au

www.business.gov.au/cdic