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Ara is a constellation in the Southern Sky.

Ara is Latin for Altar – platform to launch their career.

Staircasing, multiple pathways, many paths to the summit.

Journey, and strength to continue.

The teeth of a taniwha. The waters for our STEM ecosystem.

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PROJECT BASED LEARNING- STEM IN INDUSTRY

Knowledge at Work.

Workplaces are becoming more team- oriented….It's about understanding how to pool resources and work together. "

EMBASSY OF THE UNITED STATES OF AMERICA

FAB LAB CHCH

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MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HIKINA WHAKATUTUKI

AEROSPACE EDUCATION
WWW.ROCKETS.CO.NZ

Ara STEM Cases build a bridge to industry as clients in response to Abrupt Disruption in Canterbury.

ENERGY INDUSTRY
AEROSPACE INDUSTRY
ICT INDUSTRY

We need to build a curriculum where students can learn to work together—to be responsive to the group, look at their own strengths and weaknesses and those of others and adjust their own behavior accordingly."

Patrick Griffin,
Chair of Education
(Assessment)
at the University of
Melbourne.

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STEM contexts cannot rely on routine work but use creativity to drive location dependent work

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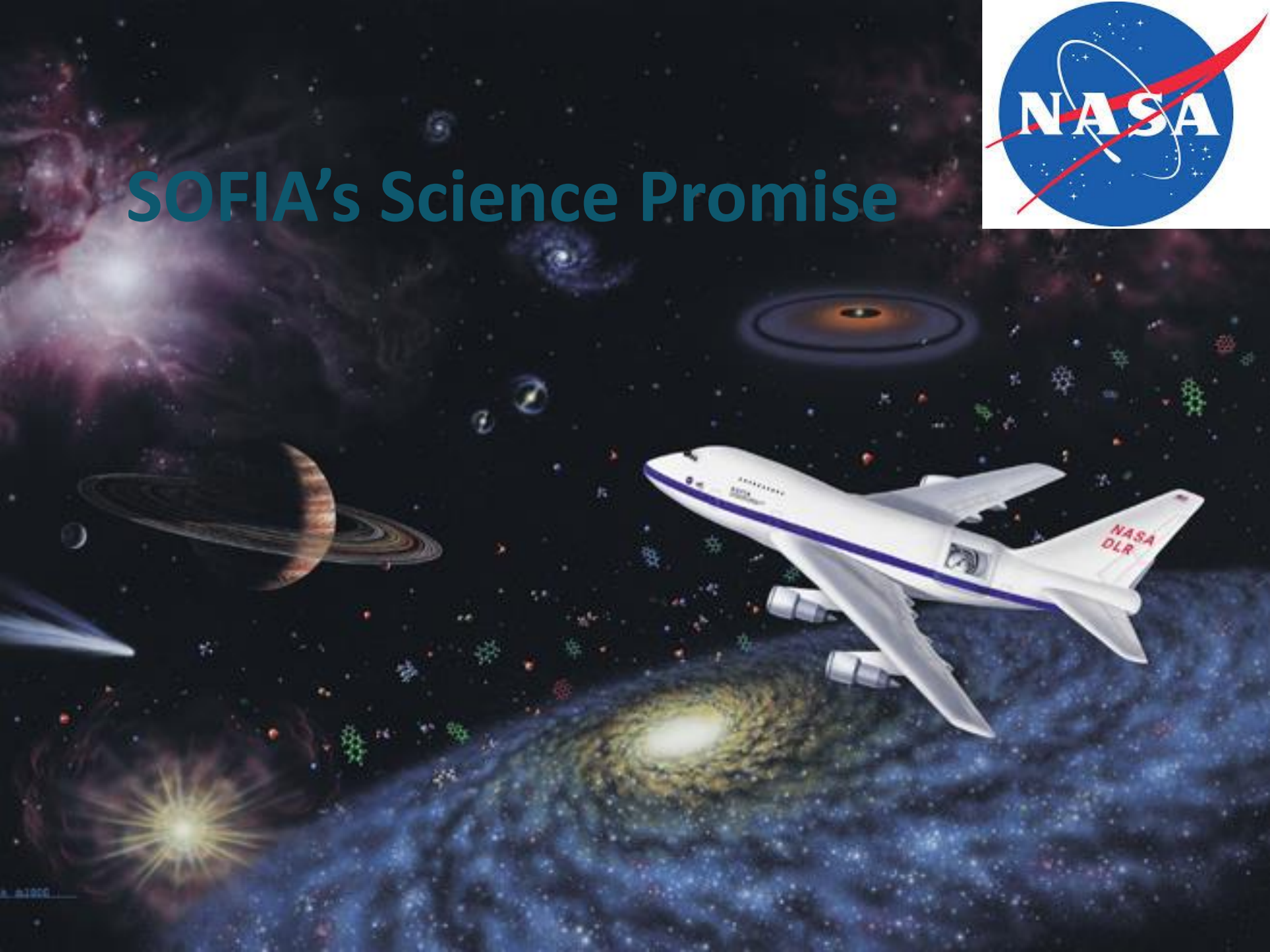
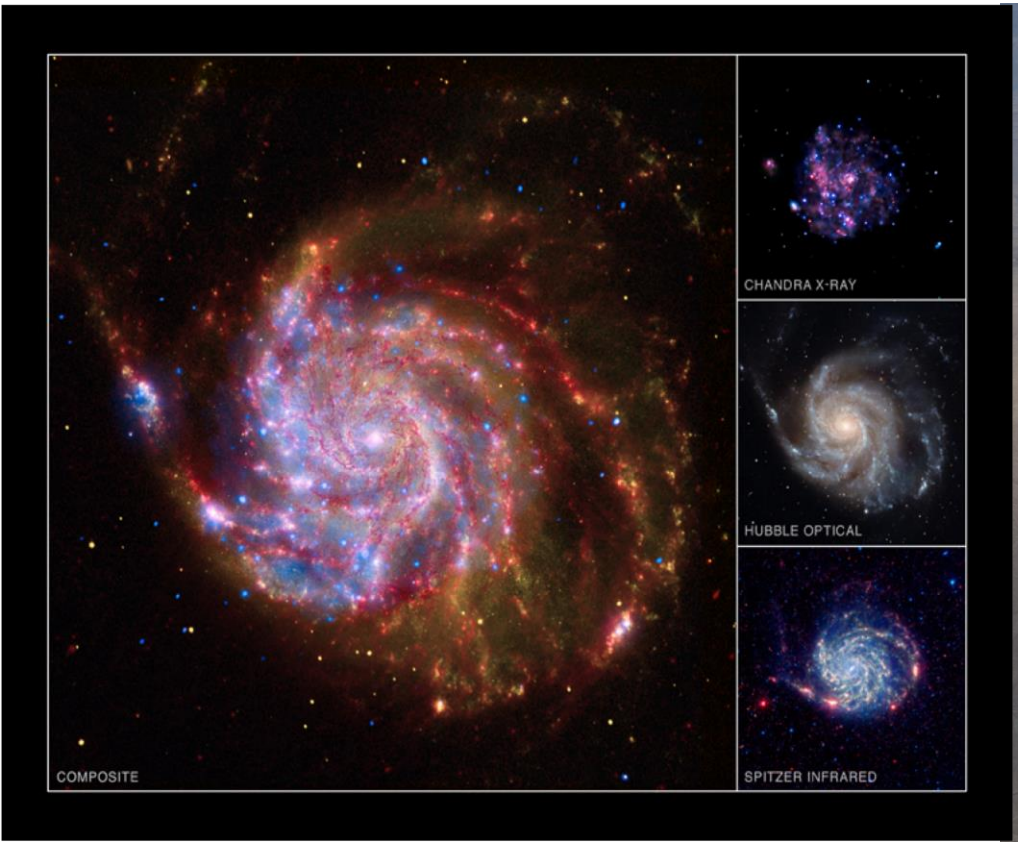
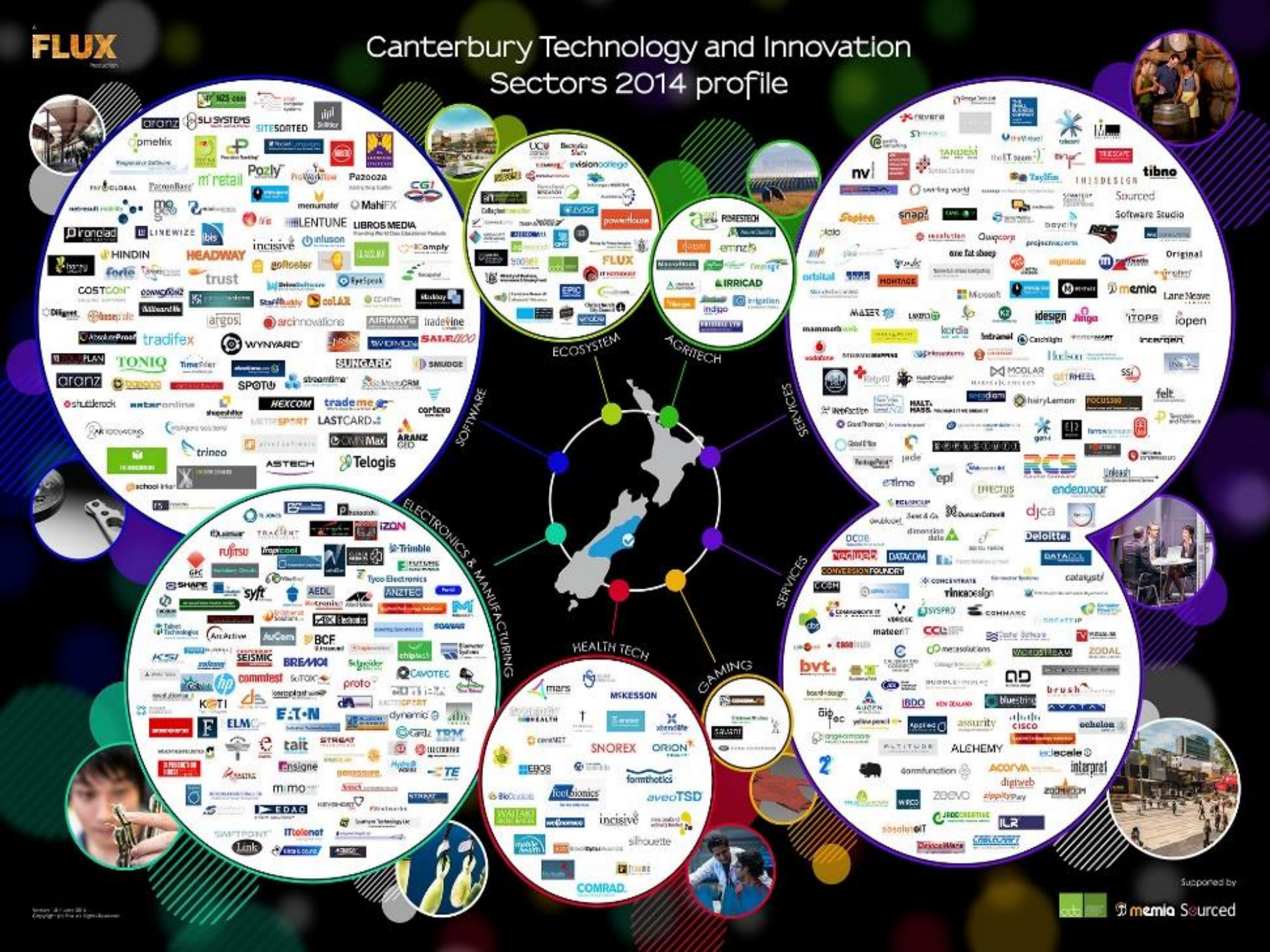
SOFIA's Science Promise



SOFIA: NASA's Stratospheric Observatory for Infrared Astronomy



Canterbury Technology and Innovation Sectors 2014 profile



Supported by

memia Sourced

What are the traditional terms in education in our STEM Ecosystem?

1. Key Competencies =
   Project based learning

2. Mathematics = algorithms

3. Physics = cause and effect

4. Biology =
understanding Ecosystems

5. Chemistry = understanding
   our effect on environment.

21st Century STEM Survival Skills

"Teachers need to understand that these are not taught skills but modelled skills"

Brian Schreuder, deputy director- general, Curriculum and Assessment Management, Western Cape Education Department.

This depends on a quality learning, a high trust Lab Culture where facilitation harnesses creative group work. A real world product is designed and tested.

Ara STEM Initiatives aim to join dots in a disrupted world to lead students into industry and life long learning.

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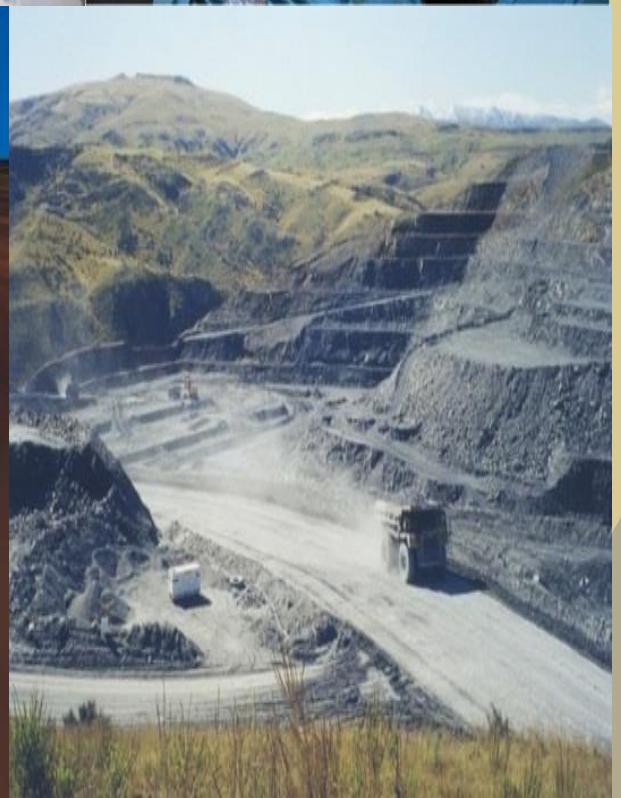

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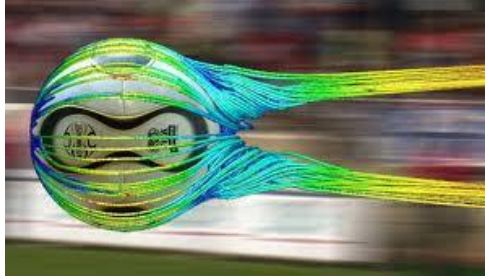

Materials

Civil

Sports

Engineering

Biomedical

Mechanical

Chemical

Energy

Electrical

Fire

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The surveys informing the Economist report cover the following list of skills needed by industry:

Digital literacy
Problem Solving
Team work
Numeracy
Critical thinking
Leadership
Foreign-language skills
Problem solving
Leadership
Communication
Creativity
Emotional intelligence
Entrepreneurship.

Digital Literacy - Ecobots New Zealand 2014
Location dependent work – not just code.

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Problem Solving - Ecobots Australia 2015

Students are not engaged in routine cognitive work

https://www.youtube.com/watch?v=Let6rBCGgq8

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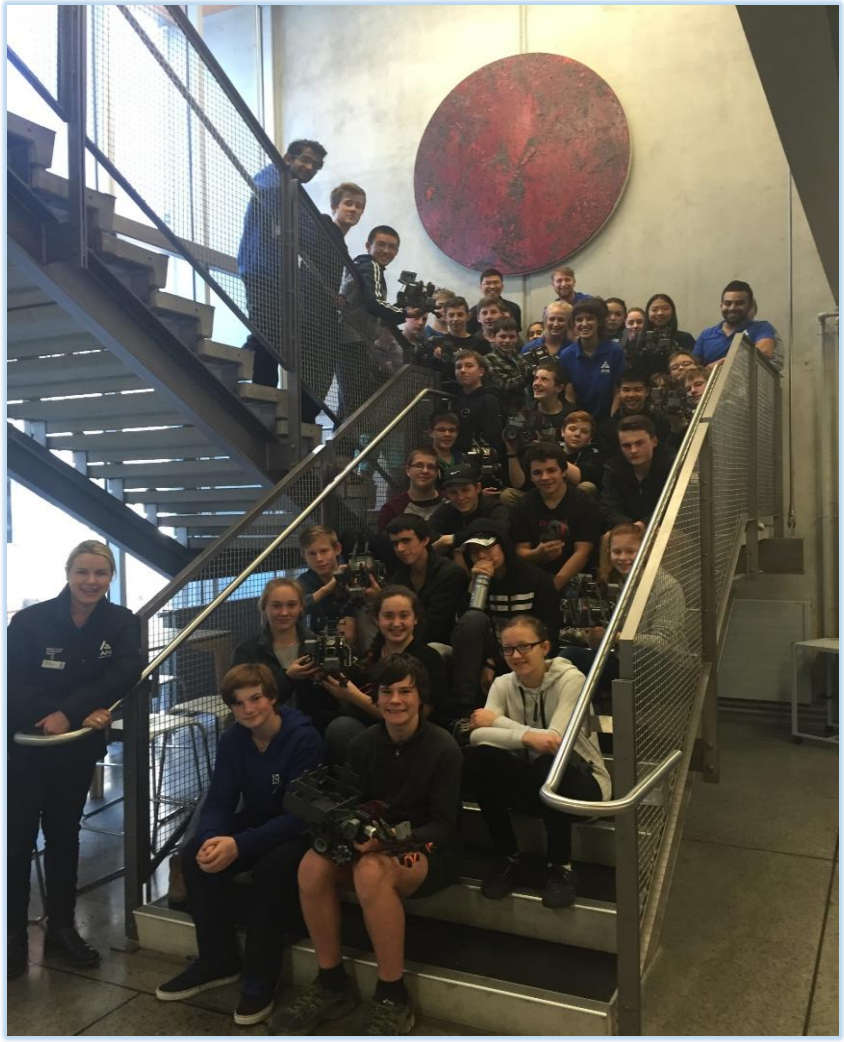
Team work - Ecobots Mars 2016 – Yrs 9-10



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Aerodynamix 2015 Yr 11-12 Students

Numeracy – predicting change

https://www.youtube.com/watch?v=vot3JkMa3Ck

Critical thinking - Sustainable energy systems

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Leadership - Aerodynamix 2016 Yr 11-12 students

Reducing Fragmentation

What contexts bind these skills together?

Project Based Learning.

Problem Based Learning.

Contexts that encourage creativity

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Contextualising STEM

1. Choose a topic related to industry demand and skills – multidisciplinary and useful.
2. Bring in ideas from assessment that allow students to combine ideas from range of skills.
3. Name according to context eg Aerodynamix is actually mechanics, projectiles, circular motion, momentum, work, energy graphing.
4. Develop activities that support soft skills and creativity rather than routine cognitive work.

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STEM knowledge profile is linked to the graduate outcomes from Sydney Accord

Natural sciences
Mathematics
Engineering fundamentals

Specialist knowledge

Engineering design
Engineering technologies
Technology in society

Range of Problem Solving skills

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What soft skills bind these hard skills together?

Leadership
Communication
Creativity
Emotional intelligence
Entrepreneurship.

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CASE STUDY 1: Evolocity

Industry: Transport

Energy / Sustainability

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Issues: TRADES

Hard skills
Carpentry
Plumbing
Mechanic (cars etc)
Tool making, fitting, turning
Welding
Painting

ENGINEERING

Soft-skills
Design
Analysis
Problem solving
Computer networking
CAD
Basic trade skills
Project Management

Women in Engineering - Avonside Girls' High School

https://www.youtube.com/watch?v=P_i2L5b3Xlo

Demonstrates advantages of Studying BEngTech

Industry-led tutors.
Aerodynamix / CAD.
Practical and applied.
Opportunities to learn at 3 Bootcamps.
Smaller classes/innovative teaching.
Project based courses – teamwork & fun.
Strong industry contacts & advice.
Internationally recognised framework.
Systems Engineering Course.

Our Children will Create the Future

"We always think that what we have today is what our children will live with tomorrow… But our children will create the future. We need to train people to have the creativity to reinterpret the world." Yong Zhao, Director of the University of Oregon's Institute for Global and online Education


MISSION TO
MARS
DISCOVER HOW TO SURVIVE AND THRIVE ON MARS
FREE holiday programme
for years 9 & 10
3-4 October 2016

CASE STUDY 2:
Mission to Mars

1. Getting there (including rocket design and build)
2. Understanding the red planet
(including satellites and the presence of water)
3. Getting around and exploration (robots)
4. Living there (including habitat Design and Build)

Mission to Mars Lessons

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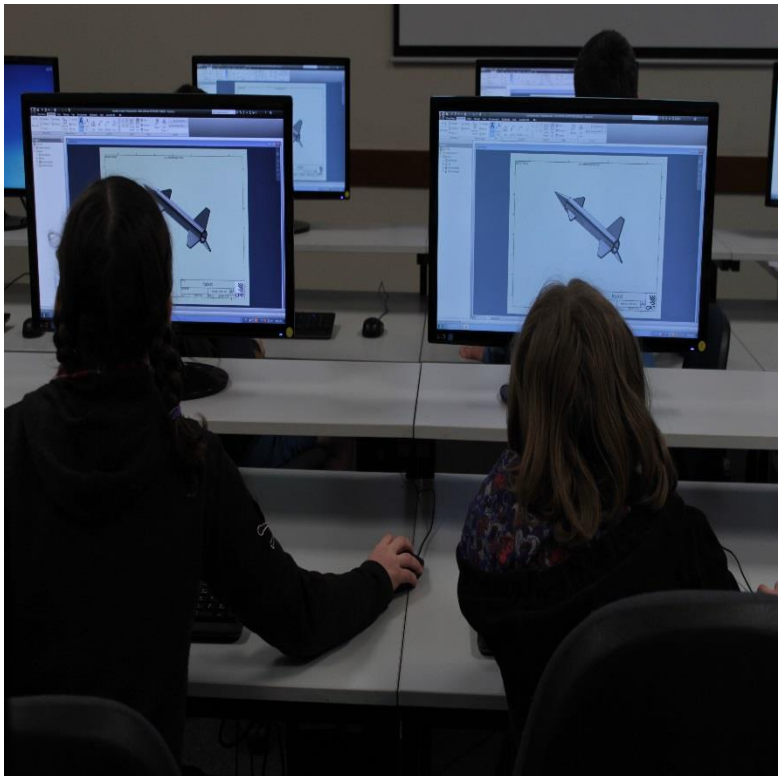
NASA's Journey to Mars and Beyond

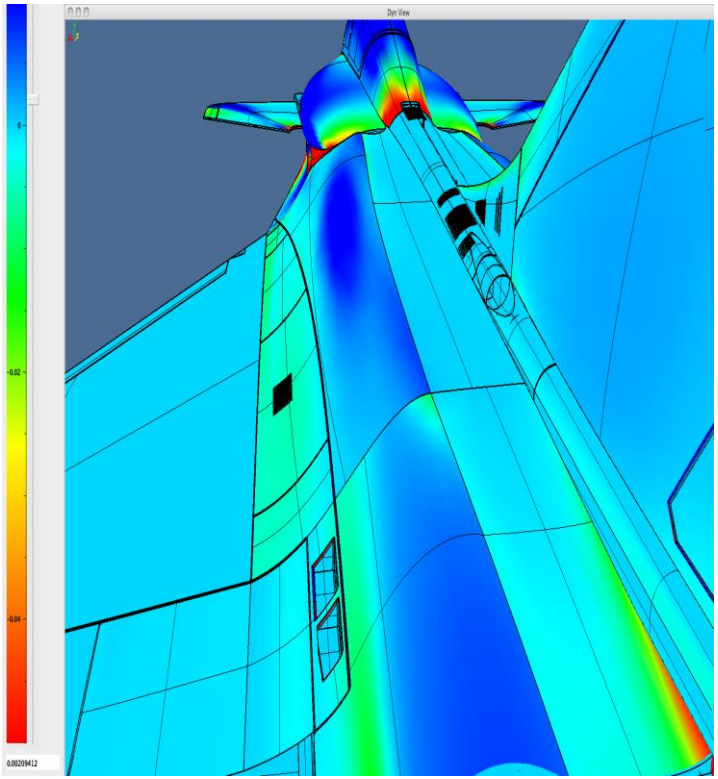
Dr. Dava Newman, NASA Deputy Administrator

#JOURNEYTOMARS @DavaExplorer

Skills and expertise. Creativity

1. Computer Aided Design – AutoCAD Fusion 360





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2. Aerodynamics

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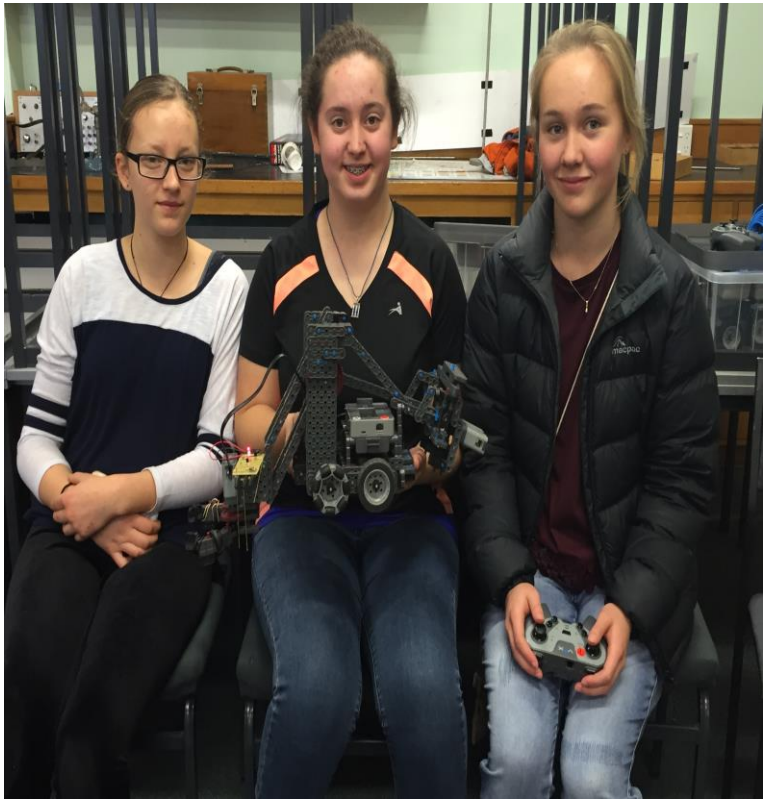
3. Robotics and Telecommunications



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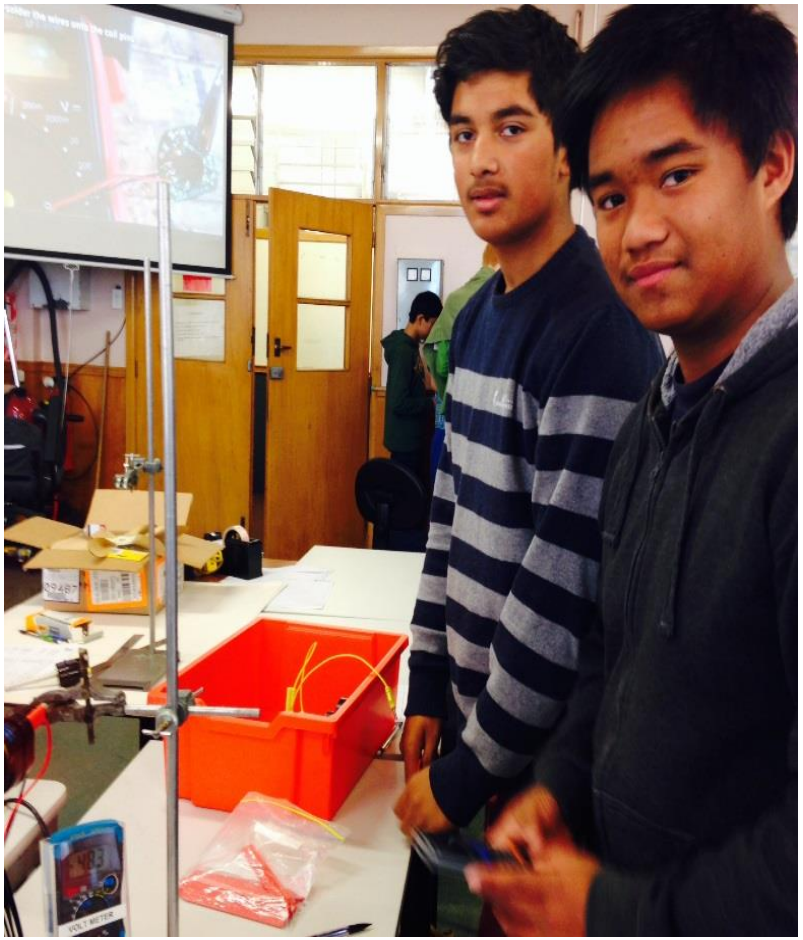
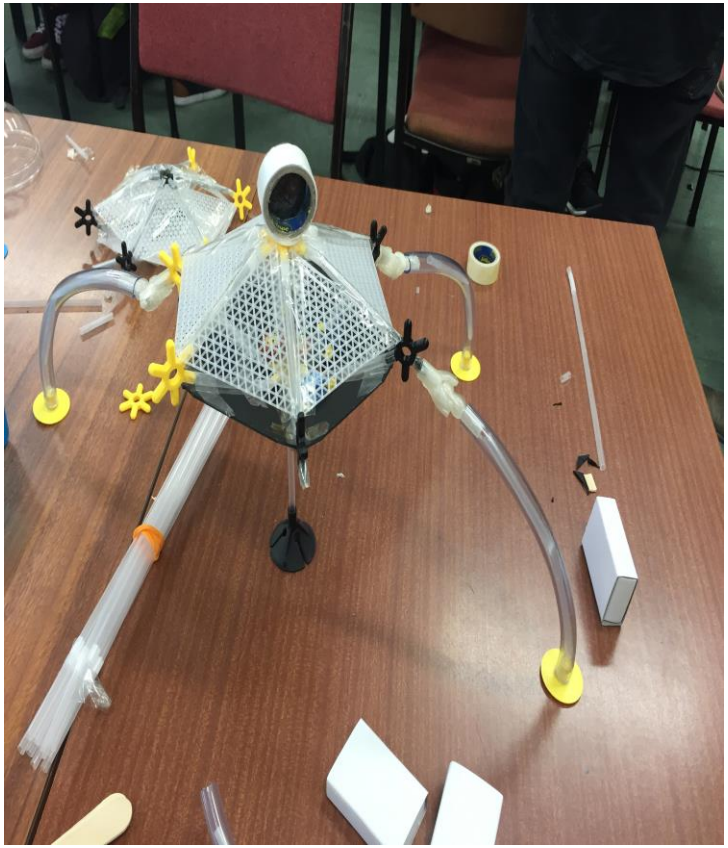
5. Energy systems & Robotics



5. Habitat Design, Community Build - Carl Pavletich, Bridget McKendry.



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Showing the outcomes to the public:

Which initiatives follow Mission to Mars?

Superfoods October 5-6th 2016 Yr 9-10

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7. Microbiology and Superfood

Dr Grant Bennett.

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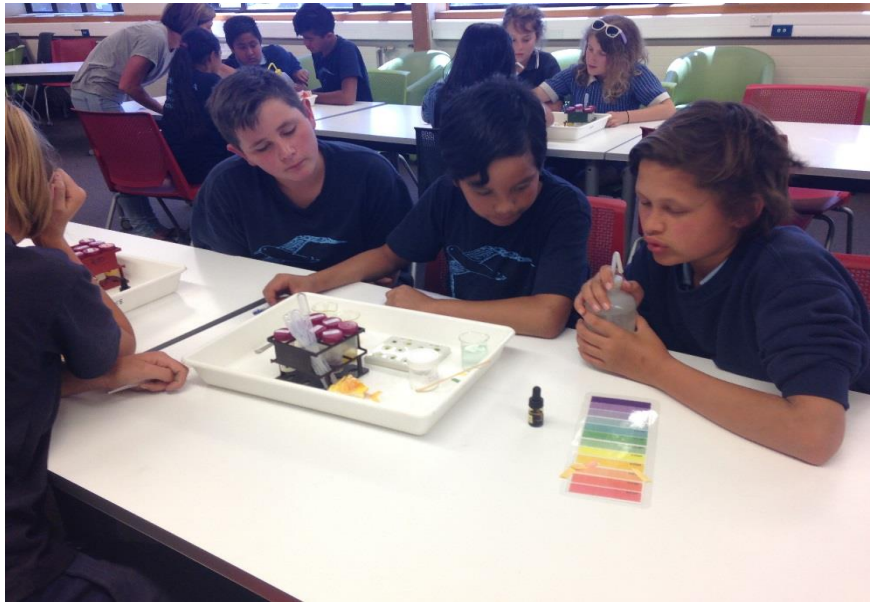
8. Astrobiology and Chemistry

Mark Mackay, Haritina Mogo#anu



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Rocketry October 7 2016 Aerospace Education
Gerry Munden & Cathy Hodge

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CASE STUDY 3:

ShadowTech for Girls

Context: ICT / Engineering Industries

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NEW ZEALAND TECHNOLOGY
INDUSTRY ASSOCIATION

CPIT logo to be added

23 June 2016

www.shadowtechday.nz

What

CONNECT
INFORM
ADVANCE

Engaging and education female secondary school students about technology career opportunities through a one day mentoring event and communications program.

Shadow Tech Day is a national community outreach initiative focused on engaging and educating female school students from years 11 to 13 about the career opportunities in the technology industry.

By having female students 'shadow' an assigned technology company mentor for a day, Shadow Tech Day will:

1. Inform female students about the wide range of career opportunities available.
2. Seek to change any negative perceptions the students have about working in this industry.
3. Encourage them to consider a career in technology.

Our purpose is to encourage more females to consider a career in technology.

Our objective is to see an increase in the number of females who choose STEM related subjects in the next few years at a secondary/tertiary level.

Why

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Growing industry. The New Zealand technology industry is a growing, dynamic and diverse industry to work in and offers pay twice the average pay rates in New Zealand.

Need for talent. The industry has an ongoing need to employ individuals with a wide variety of skills and capabilities; and gender diversity plays an important part in this.

Diversity enables better organisational performance. Gender-balanced companies demonstrate improved employee productivity and performance; and report better financial results.

Yet women are the minority. According to research undertaken by Dr Alison Hunter, Principal Lecturer in the Faculty of Business and Information Technology at Manukau Institute of Technology (Hunter, 2014) women only occupy 28% of professional IT roles overall.

Females enrolling in ICT tertiary programmes is reducing. Despite efforts by tertiary institutes, technology companies and a number of collaborative initiatives to encourage more females to choose a career in technology, the number of female students enrolling in ICT-related programmes at a tertiary level, is falling.

It's a great industry to work in. Huge variety of roles. Higher than average salaries. Great career opportunities.

Who – Ara, CATE, Careers NZ, NZTech, Futureintech, CDC.

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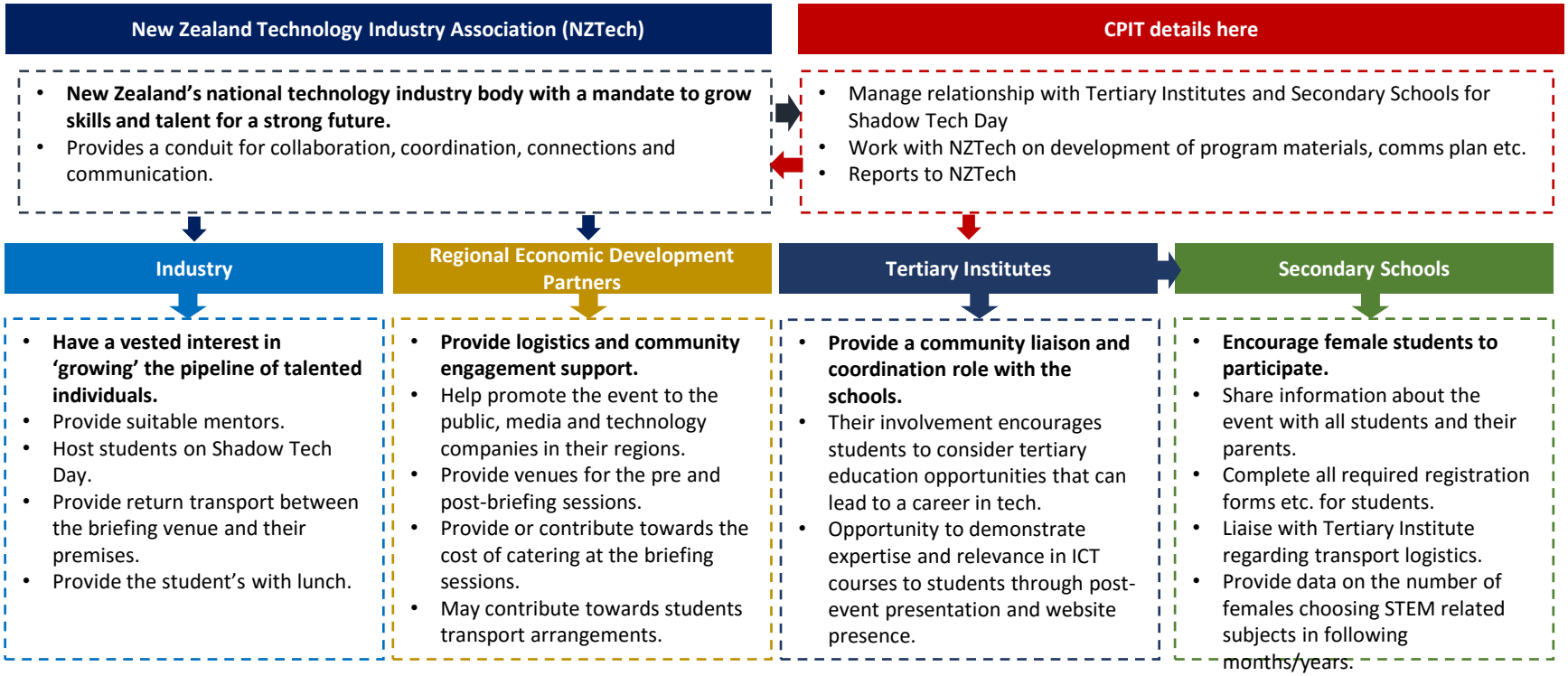
Shadow Tech Day is a collaboration between industry, education and regional economic development agencies in participating regions.



How

Programme Management: NZTech will provide resource to manage the business liaison of Shadow Tech Day Programme. SPIT will provide resource to manage relationships with schools and other tertiary institutes.

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Economic Development Agencies (EDAs): Help promote the event to the public, media and technology companies in their regions.

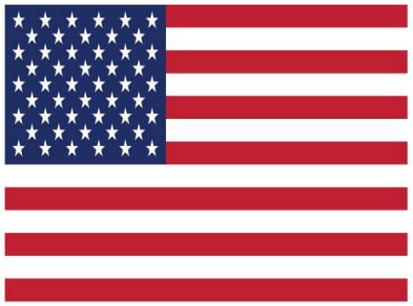
Technology Companies (Employers): Employers will host students on Shadow Tech Day, providing dedicated mentors free for students. They will also provide return transport between the briefing venue and their premises; and pay for the student's lunch.

Tertiary Institutes: Manage relationships with schools and organise school student participation.
Venues : Briefing venues will be provided by Ara for the morning meet-up and afternoon de-brief.,

Schools: Distribute Shadow Tech Day material to students and encourage students to participate. Organise student registrations and parent permission and medical forms.

Media Campaign Provider: (Subject to funding) An external provider will be engaged to develop and manage digital media to promote Shadow Tech Day to the target audience, media and public. They will also manage the Facebook group to engage students before, during and after the event.

Resources for schools and students: Print collateral, website (with online registration) and a dedicated Facebook group will be created to support the program. Pre and post surveys will be developed and circulated to participants. **Resources for employers:** Electronic collateral will be developed to promote Shadow Tech Day to employers and enable them to register to participate. This includes a brochure, website, survey and Mentor profile.



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