



Regional
Development
Australia

TOWNSVILLE AND NORTH WEST QLD

STEMBooster Program Pre-Budget Submission

21 January, 2021



*RDA facilitates and advocates for sustainable economic development
by collaborating with regional stakeholders.*



An Australian Government Initiative

STEMBooster

North and North West Queensland

PROPOSAL DETAILS

Program Name	STEMBooster North and North West Queensland
Sponsor	Glenys Schuntner, Chief Executive Officer RDA Townsville & North West Queensland
Manager	Erin Kiernan, Project Manager RDA Townsville & North West Queensland
Proposed Start Date	Within 4 weeks of contract signing
Proposed Completion Date	4 years after contract signing

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1. EXECUTIVE SUMMARY

Regional Development Australia Townsville and North West Queensland (RDA) works across the North and North West Queensland region that covers 5.8% of Australia, which is 6.5 times the area of Tasmania. The region is made up of diverse communities across 15 local government areas. Regional businesses are facing skills shortages while the region also experiences high unemployment. Science, technology, engineering and maths (STEM) skills in particular are in demand but are not being met. The STEMBooster Program is a major skills and economic development initiative to develop the pipeline of talent in the region. This transformational program will positively impact future employment outcomes and sustainability of the region's economy which was valued at \$16.8 billion in Gross Regional Product (GRP) in 2017/18.

1.1 THE PROBLEMS WE ARE SOLVING

STEMBooster will address the increasing demand for STEM skills in the region whilst working towards improving the poor education attainment levels, low access to new technologies and STEM learning, high unemployment rates (7.6%) and particularly the high youth unemployment rates (10.5% in the Townsville region and 23.5% in the Outback region)¹.

1.2 WHAT WILL WE DELIVER

STEMBooster will connect educators, parents, students and industry. The program will be developed to suit the needs of local industry in the North and North West Queensland region with four core components. Based on industry feedback, the program will commence with a focus on Years 7 to 10 at high schools, but will expand to incorporate Years 4 to 6 at primary schools from 2023.

- 1) Businesses will be engaged to provide advice, do school visits to encourage consideration of STEM subjects as having real world applications, host site visits and work placements.
- 2) Curriculum will be developed to meet the region's industry needs and to provide content in the context of the North and North West Queensland setting.
- 3) Smart technologies that are relevant to businesses (eg drones, 3D printers, robots etc) will be deployed to schools along with coaching on their use and relevant curriculum.
- 4) RDA will facilitate the above components of the Program and implement community engagement, professional STEM networks, a school visit program, STEM events and online engagement.

1.3 OUTCOMES AND BENEFITS

Short term outcomes will include significant increases in student engagement in STEM. Longer term outcomes will include an increased uptake in STEM subjects in Years 11 and 12 with more students going into STEM related apprenticeships, vocational training and university education. Benefits will be accrued to businesses to enable them to grow and invest in the region; to governments that are prioritising STEM for future economic benefit such as reducing unemployment and increasing tax revenue; and to communities that need employment opportunities to prosper. An increase in the region's STEM skilled workforce could equate to an additional \$672 million p.a. to GRP².

¹ Queensland Government Statistics Office, Regional Profiles, June Qtr 2020

² According to PwC in 2015, if we could move just 1% of the workforce into STEM roles this would increase Gross Domestic Product (GDP) in Australia by \$57.4 billion, that is, approximately 4%. Given the region's Gross Regional Product in 2017/18 was \$16.9 billion, the impact could be extrapolated to equate to an additional \$672 million per annum to the North and North West Queensland regional economy.

1.4 INVESTMENT

\$7.3 million over four years, that is, an estimated 0.01% of the region's GRP over that period.

2. PROGRAM VISION AND OVERVIEW

RDA's Vision for the region – a prosperous, sustainable, cohesive and liveable region

“To achieve our vision for the region, we need to develop the skills and create jobs for current and future generations. Communities will prosper through local employment and opportunities to attract population. However, to achieve this we need to overcome obstacles and significantly ramp up efforts in STEM skills learning amongst high school and primary school students, regardless of their location or socio-economic background. We must break down the increasing divide in educational outcomes in our region, and ensure all children in our region have access to STEM learning and activities, information and opportunities to pursue pathways in STEM related studies and jobs.”

RDA Townsville and North West Queensland

The STEMBooster Program is a major skills and economic development initiative to develop the pipeline of talent in North and North West Queensland, an area that takes in 15 local governments and one quarter of Queensland's area including very remote and remote areas. The region has historically been an economic powerhouse, but over the last ten years the region has suffered droughts, floods, cyclones, mining downturns and the closure of major employers. However, the outlook is positive on the back of mining, agriculture, services including IT, tourism and health, advanced manufacturing and emerging opportunities in defence and aviation industries.

STEMBooster will address the increasing demand for STEM skills whilst working towards improving the poor education attainment levels, high unemployment rates, particularly the high youth unemployment rate, and develop a more suitable workforce for current and new businesses across the region.

STEMBooster will connect educators, parents, students and industry. The program will be developed to suit the needs of local industry in the North and North West Queensland region with six core components.

- 1) Engaging with the business community to develop priorities, commitment to the program including school visits, student site visits and work experience;
- 2) Engaging with the education community to tailor curriculum for STEM subjects to be relevant to the region's industries, geography, and demography;
- 3) Developing STEM education networks;
- 4) Engaging with families, students, careers advisors and media to promote STEM opportunities;
- 5) Purchasing and distributing technology into schools, with the associated coaching of teachers to use it;
- 6) Project management to deliver the above.

Based on industry feedback, the program will commence with a focus on Years 7 to 10 at high schools, but will expand to incorporate Years 4 to 6 at primary schools from 2024.

“We need a reliable pipeline of specialist STEM skills; but we also need informed workers, users and consumers who have the curiosity and imagination to be part of the broader STEM economy. This must be underpinned by lifetime engagement for all Australians with STEM, beginning in childhood and constantly renewed as knowledge and technologies expand”.

Office of Australia's Chief Scientist, *Science, Technology, Engineering and Mathematics: Australia's Future*, September, 2014 (P 21)

3. ISSUES

The Townsville and North West Queensland region is made up of very diverse communities that are facing high unemployment issues (particularly that of youth), skills shortages, skills development issues, and limited access to new technologies and STEM learning opportunities. These issues and our proposal to address them has received broad support.

3.1 ECONOMIC GROWTH VS DECLINE

According to data from .id economics, 11 out of the 15 LGA's in the RDA Townsville and North West Queensland region have experienced slowing economic growth in 2018/19. With the declining headline GRP ranging from 0.8% to as large as -14.7%³. This recent data exemplifies a whole of region economy that has been in negative growth in recent years going from \$21billion GDP in 2015/16 to \$16.8billion in 2017/18.

3.2 UNEMPLOYMENT

Our region currently has 10,510 people unemployed, which is well above state average (7.6% vs 6.4% in Queensland⁴) but some local government areas in our region have unemployment as high as 54.9%.

Youth unemployment is 10.5% in the Townsville region and 23.5% in the Outback region (vs 15.6% in Queensland – November 2020)⁵.

The STEMBooster program will help us future proof our workforce, creating skilled employers for businesses.

3.3 SKILL SHORTAGES

Glencore's Mount Isa Mines, as one of the largest employers in the region, has stated they are experiencing an on-going significant skills shortage, indicating the challenge the region is facing in terms of high unemployment vs a looming skills crisis. Anecdotal evidence from a wide range of businesses and recruitment firms confirms that there is a skills shortage in the region which is worsening.

This trend is continuing and highly relevant in our region, yet there is not enough being done to ensure we have the STEM skills for jobs in demand now and into the future to support our region's economic development and community sustainability.

³ .id economics/ .id the population experts; online; 23.1.20

⁴ Queensland Government Statistics Office, Regional Profiles, June Qtr 2020

⁵ Queensland Government Statistics Office, Regional Profiles, June Qtr 2020

“Between November 2013 and November 2018, employment in STEM occupations grew by 16.5 per cent, which is 1.6 times higher than the growth rate in non-STEM jobs. Looking ahead, this trend is set to continue. By May 2023, the Department of Jobs and Small Business projects STEM occupations will grow by 10.8 per cent (271,300 people), whereas all non-STEM jobs are projected to grow by 6.1 per cent (614,900 people) over the same period.

The 108 occupations in the STEM classification are disproportionately higher-skilled relative to other occupations. At November 2018, 73.0% of people employed in a STEM occupation work in a skill level occupation equivalent to a bachelor degree or higher, compared to just 21.6% of the non-STEM occupation employees. Furthermore, there are a large number of people employed in STEM occupations in the other higher skill groups, Skill Level 2 (239,700 persons, commensurate with an Associate Degree, Advanced Diploma or Diploma) and Skill Level 3 (448,600, commensurate with a Certificate IV or Certificate III), indicating the range of pathways into STEM related jobs.

Given the recent and projected growth of STEM occupations, Ivan encouraged anyone planning their next career move, study or training to consider building skills in science, technology, engineering and/or mathematics.

“This analysis of STEM occupations shows there will be many job opportunities available in the future in these fields. STEM related skills are likely to provide a solid foundation for a successful career.”

Department of Employment, Skills, Small and Family Business, March, 2019.

3.4 SKILLS DEVELOPMENT ISSUES

There are a number of challenges to be addressed to improve STEM skills in the region.

- Education levels are significantly lower when compared to the rest of Queensland and Australia.
- Townsville state schools have had a dramatic decline in students studying STEM subjects, with a 4%⁶ decrease between 2010 and 2017. The decline in physics and maths enrolments has been particularly sharp. In comparison, Brisbane state high schools grew solidly between 2010 and 2017 by about 28% averaged across chemistry, physics, biology and Maths B and C. The Mackay region also showed growth in STEM subject participation and Cairns at a modest level. With the Townsville region seriously underperforming in STEM participation at high school, this limits both individual students and the regions prospects.
- There is limited access to STEM learning, equipment and activities to stimulate STEM engagement, particularly in our regional and remote communities. We have over 70 schools across our region teaching years 7 to 10 and many are located in remote or very remote areas that have limited industry using STEM technologies, therefore the exposure for not only the students, but the wider community to new technologies and STEM opportunities are rare, possibly even non-existent for some students and communities.
- Addressing these issues can be difficult given that the region covers a vast geographical area which is 25.9% of Queensland, 5.8% of Australia and equal to 6.5 times the size of Tasmania. 14% of the region’s population live in a very remote or remote area (3.9% - very remote and 10.6% remote⁷)

⁶ Ian Atkinson, E-Research, James Cook University

⁷ Census 2016

with Townsville being the largest centre with 84% of the population. However, 12 of the 15 local government areas in the region are classified as having very remote and/or remote status. In other words, there is a large distance to cover to deliver additional specialized face to face engagement with students, parents and teachers let alone deliver equipment.

“Lower levels of digital inclusions are experienced by Indigenous Australians, older Australians, people with a disability, the unemployed and people with lower levels of educational attainment. Geography also plays a role, with significant regional variations..... some rural and regional areas are ‘well behind’ the cities. These regions include... North West Queensland”.

Strategic foresight for regional Australia, CSIRO and the Department of Infrastructure, Regional Development and Cities, December 2017.

- Telecommunications infrastructure is lagging in the remote and very remote areas which hinders online classroom engagement.
- 52.3% of persons in the region are classified as being in the two most disadvantaged quintiles on the Index of Relative Socio-Economic Disadvantage (vs 40% in Queensland - Census 2016). Lower socio-economic regions and schools are known to currently have less access to STEM engagement.
- The region has a large Indigenous population (9.8% compared to 4% in Queensland⁸). School attendance is a challenge in some Indigenous communities.
- Currently Certificates 1 to 4 skills and qualifications are most prevalent in the region (23.1% vs university degrees 13.8% vs diploma qualifications 7%) with most working in trades. The region is missing out on the opportunities to develop higher skills levels for more advanced technical professions. There is a risk that higher level jobs and associated salaries and local economic impact will continue to gravitate to capital cities unless we create the skills in region for higher level jobs.
- Population turnover is relatively high in our region. One cause will be the lack of career pathways. Another challenge is community amenity and liveability. To develop, retain and attract skills, our region also needs to consider these issues. Having STEM career pathways available will assist.
- The majority of businesses in the region are small to medium size that require their workforces to be flexible in work competencies (jack of all trades, master of none) rather than having a high level of specialised technical skills. Businesses are looking for more micro-credentials in specific competencies, many of which are STEM related.

⁸ Queensland Government Statistics Office, Regional Profiles, March Qtr 2019

In an article by .id the population experts that addresses the impact of skills shortages on local economic development, the article addresses the drivers of skills shortages noting “one factor is the underinvestment in staff training post GFC as businesses reduce costs. The decline in VET sector also illustrates the ongoing underinvestment in skill development”. The article goes on to discuss “the priority might be to improve skills and training opportunities through facilitating partnerships between government, industry, education providers and community leaders”.

The impact of skills shortages on local economic development, .id the population experts, Rob Hall, Urban Economist, December 23, 2019.

In a survey conducted by RDA in the North and North West Queensland region, 81% of the respondents believed that STEM subjects will be more important than humanities subjects at high school to help fill the jobs over the next decade.

3.5 NATIONAL EDUCATION CONCERNS

The OECD Programme for International Student Assessment (PISA) has determined that “Australia’s 15 year olds had fallen years behind the rest of the world in maths, reading and science. Australia now ranks 29th among developed countries in mathematics, down from 11th place in 2003 and has slipped from 8th to 15th place in science and 4th to 16th place in literacy.

In the article Federal Education Minister the Hon Dan Tehan MP said “Alarm bells should be ringing”.

“Building on cutting edge work undertaken at Oxford University, new analysis by PwC shows that 44 per cent (5.1 million) of current Australian jobs are at high risk of being affected by computerisation and technology over the next 20 years. Businesses competing in a global economy driven by data, digital technologies and innovation will need more employees trained in science, technology, engineering and mathematics (STEM). Research indicates that 75 per cent of the fastest growing occupations now require these skills. Modelling by PwC finds that shifting just 1 per cent of the workforce into STEM roles would add \$57.4 billion to GDP (net present value over 20 years).”

PWC, Future-proofing Australia’s workforce by growing skills in science, technology, engineering and maths (STEM) /April 2015 – A Smart Move

3.6 OTHER STEM PROGRAMS AND COMPLEMENTARITY

Currently there are several small STEM initiatives in the region, but they are not making the level of impact required to deliver the required step change to meet future job needs. A STEMBooster program will provide the framework to develop and magnify STEM awareness amongst students, parents and teachers, and facilitate the uptake of STEM subjects, providing students and future employers with STEM skills developed in schools, vocational training or university.

Some individual schools in the region have been implementing part of the ME Hunter program to promote STEM in their schools. Thuringowa State High School has partnered with James Cook University to implement the iSTEM program and is also supporting other schools in the region with the program. The program is encouraging a greater uptake of STEM subjects, however the lack of funding to fully develop the iSTEM program and provide tooling and skills to teaching staff is severely limiting the rollout of the program. Thuringowa High School has been highly supportive of the development and roll out of the proposed STEMBooster program,

Tec-NQ is a registered training organisation (RTO) and a senior secondary school that teaches a STEM program called P-Tech (Pathways in Technology). P-Tech is a STEM-based qualification aimed to equip

technicians with a transferable skill set that enables the identification, integration, operation, maintenance and repair of new and emerging technology in an industrial setting. The program has been operating successfully however is limited in student numbers due to equipment and resource availability and government funding is not on-going. Tec-NQ would be a beneficiary of the STEMBooster program by growing its potential future student base and as a result has been highly supportive of the development and roll out of the proposed STEMBooster program.

3.7 BROAD SUPPORT FOR STEMBOOSTER TO ADDRESS ISSUES

RDA has secured strong and broad support for STEMBooster from representatives of all levels of government, educators, industry and businesses.

Federal Government support has been forthcoming from Senator Susan McDonald, Member for Herbert Mr Phillip Thompson OAM MP, Member for Dawson Mr George Christensen MP, and Member for Kennedy the Hon Bob Katter MP. They have recognized the issues our region faces and the opportunity to better prepare skills for future jobs and our region's prosperity and have provided letters of support.

Please see Appendix 4 for copies of letters of support for STEMBooster program from these parliamentarians and other key stakeholders.

4. PROPOSED ACTIVITIES, PARTNERSHIPS, OUTPUTS

The following table provides advice on proposed timelines, activities, partners and outputs. While indicative dates are provided, the program could commence within four weeks of signing a contract.

TIMELINES, ACTIVITIES, PARTNERSHIPS, OUTPUTS

Indicative Timeline	Activities	Partners involved	Outputs
August 2021 to September 2021	RDA to invite and establish a STEMBooster Program Steering Committee and set up governance structure	<ul style="list-style-type: none"> • Mining rep • Agriculture rep • Defence industry rep • Manufacturing rep • Education Queensland • Dep Employment, Small Business and Training • James Cook University (JCU) • Central Queensland University (CQU) • TAFE • Tec-NQ • Position for funding partner 	<ul style="list-style-type: none"> • Formation of Steering Committee • Ideally an industry representative and RDA will co-chair • Initial meeting • Terms of Reference (TOR) established • Position Description for Program Manager to be developed and approved
September 2021 to December 2021	<ul style="list-style-type: none"> • Recruitment • Planning and detailed budgets • Development of sub-strategies and action plans • Engagement and information gathering from those involved with STEM to create a whole of region knowledge bank • Recruit a curriculum developer 	Steering Committee	<ul style="list-style-type: none"> • Engagement of a Project Manager for the term of the project • Detailed 4 year strategic plan and budget, 1 year detailed operational plan and budget • Stakeholder Engagement Strategy and Action Plan • Marketing and Communications Strategy and Action Plan • Establishment of a STEM network and hold first 2 events in Townsville and Mount Isa • Consolidation of information on different STEM programs into a report and directory to encourage collaboration and cross referrals, launch report (web and print versions) and distribute to all stakeholders • Tender for a curriculum developer
January 2022 – May 2022	Develop the STEM curriculum for grade 7 to 10	Curriculum Developer Steering Committee Education Queensland	Australian Curriculum tailored to the North and North West QLD industries and environment for grades 7 to 10
January 2022 to July 2022	Industry Engagement	<p>Key business and industry representatives from across a broad range of sectors including mining, manufacturing, construction, defence, agriculture, etc.</p> <p>Steering Committee</p>	<ul style="list-style-type: none"> • Host workshops with industry (Townsville, Mount Isa and online) • Establish a framework and objectives for on-going industry engagement • Confirm 10 companies as partners in the first stage roll out • Identify challenges and risks to deliver safely and effectively • Gain commitment from businesses to support the program over the next 4 years • Complete a plan for 2022 roll out of school visits, site visits and work placements

Indicative Timeline	Activities	Partners involved	Outputs
July 2022 to December 2022	School Engagement (Trial Technology program)	Initial pilot with 5 target schools with 1 in each of the following: <ul style="list-style-type: none"> Townsville Mount Isa Gulf Corridor (between Townsville and Mount Isa) Remote Indigenous school 	<ul style="list-style-type: none"> Determine target schools and establish relationship Develop the technology investment program for roll out Trial investment program to 5 schools (October/November 2022) Review and assess trial (December 2022)
December 2022 to February 2023	Undertake a review process	Industry partners Participating Schools	<ul style="list-style-type: none"> School reviews (December 2022) – assess progress and uptake Industry review (January 2023) – assess progress and feedback Plan for changes (January/February 2023) – what changes need to be made to assist with the following years' program
February 2023 to June 2025	Continued roll out of STEMBooster Program <ul style="list-style-type: none"> Engagement with businesses for school visits, site visits and work placements Engagement with schools to roll out technology investment program Community engagement and marketing activities on-going Ongoing review process 	<ul style="list-style-type: none"> Steering Committee Schools Students and parents Businesses 	<ul style="list-style-type: none"> Delivery of school visit program Delivery of social media content and campaigns Delivery of web content and hosting Delivery of educator networking opportunities Delivery of business engagement and involvement with the schools and students
February 2023 to June 2025	Technology Investment for Schools	All 76 schools in North and North West QLD that teach years 7 to 10	<ul style="list-style-type: none"> All schools to have a drone, 3D printer and robots Students will have hands on STEM learning experiences
July 2023 to June 2025	STEMBooster extension to 112 primary schools for grades 4 to 6	Steering Committee Schools	<ul style="list-style-type: none"> STEM curriculum for grades 4 to 6 STEM teaching materials and technologies into primary schools to provide hands on learning experiences

5. ALIGNMENT WITH GOVERNMENT OBJECTIVES

The following are just some of the Australian and Queensland Government departments and agencies and other organisations that recognise the importance of STEM skills for future jobs and industry development. The relevant publications or initiatives are listed below.

Australian Government	
CSIRO/ Department of Infrastructure, Regional Development and Cities	Publication: <i>Strategic foresight for regional Australia</i>
Department of Industry, Innovation and Science	Report: <i>National Innovation and Science Agenda</i>
Department of Education	Initiative: <i>Inspiring STEM Literacy</i>
Department of Employment, Skills, Small and Family Businesses	Report: <i>STEM jobs are growing faster than other jobs</i>
Department of Defence	Report: <i>Moving Towards a High-Tech Future for Defence. Workforce Strategic Vision underpinned by Science, Technology, Engineering and Mathematics, 2019 – 2030.</i>
Defence Jobs	<i>STEM opportunities</i>
Office of the Chief Scientist	Report: <i>Optimising STEM Industry School Partnerships</i>
Queensland Government	
Jobs Queensland	Report: <i>Future work, future jobs: Preparing Queensland for the evolution of work</i>
Department of Education	Strategy: <i>A strategy for STEM in Queensland state schools</i>
Multi- Department	Initiative: <i>Advance Queensland</i>
Department of Employment, Small Business and Training	Report: <i>Skills for Queensland Discussion Paper</i>
Department of State Development, Infrastructure, Local Government and Planning	Priority Industries such as Advance Manufacturing, Defence, METS
Other	
Regional Development Australia Townsville and North West Queensland	Strategy: <i>Townsville and North West Queensland Economic Recovery and Growth Strategy 2020 - 2030</i>

*“Too few Australian students are studying science, maths and computing in schools – skills that are critical to prepare our students for the jobs of the future. We also need to create an environment that attracts the world’s best talent to our shores. We will support **all Australian students to embrace the digital age** by promoting coding and computing in schools to ensure our students have the problem solving and critical reasoning skills for high wage jobs.”*

National Innovation and Science Agenda Report, Australian Government, 2015

Identified in the publication, **Strategic foresight for regional Australia**, by CSIRO and the Department of Infrastructure, Regional Development and Cities, *“the role of government may shift away from supporting established businesses or industries to investing in knowledge and data generation”*. The STEMBooster program will assist the Australian Government to invest in knowledge generation in our region, therefore enabling our region to secure a stronger, skilled workforce for the future.

The Australian Government has developed the **National Innovation and Science Agenda**. One of the four key pillars of this agenda is: *“Working together: increasing collaboration between industry and researchers to find solutions to real world problems and to create jobs and growth”*. The STEMBooster program is exactly this; it is about connecting industry in our region, to schools, students and communities, developing the skills needed now and into the future.

As part of the above Agenda, through the **Department of Education** the Australia Government is focusing on helping students and teachers to embrace innovation and science from an early age, and harness new sources of growth to deliver the next age of economic prosperity in Australia. The STEMBooster Program will help the Australian Government to deliver this Agenda by bringing technology into schools and promoting the STEM skills required for jobs in the future.

While we value the work of the *Inspiring STEM Literacy* initiative, by the Department of Education, the initiative focuses on early childhood and this will play a role in influencing our future workforce in the longer term. The STEMBooster program initially focuses on Years 7 to 10 and then Primary School Years 4 to 6. We aim to encourage and influence students to consider STEM in their subject selection for the final years of secondary school, and their further education pathways whether it be Vocational Education Training (VET) or university education. Feedback from industry is that Years 7 to 10 is the best place to start the STEMBooster Program with the goal of relatively quick impact for employers facing skills shortages in coming years. However we also recognise the need to work in earlier years and propose commencing in primary schools in our third and fourth years of the program.

The STEMBooster program assists the **Department of Employment, Skills, Small and Family Business** to meet its purpose which is to *“Foster a productive and competitive labour market through employment policies and programs that assist job seekers into work, meet employer needs and increase Australia’s workforce participation”* and *“Facilitate jobs growth through policies and programs that promote fair, productive and safe workplaces, and facilitate the growth of small business.”*

“As the demand for a technologically skilled workforce increases across the globe, there is a need for Defence to take a stronger role in partnering and collaborating across Government, industry and academia to secure a strong and diverse talent pool... which represents the diversity of the Australian community, specifically highlighting the career pathways for women and indigenous Australians into STEM careers, As Defence in a major employer of STEM skills there is a need for us to take a leading role in shaping the national STEM agenda and communication our workforce needs for the future. There are a large number of STEM engagement initiatives occurring across Defence, industry and academia and more broadly; however, we must ensure that these initiatives have an impact on students, parents, teachers and communities to develop a strong diverse talent pool”.

*Moving Towards a High-Tech Future for Defence,
Workforce Strategic Vision underpinned by Science, Technology, Engineering and Mathematics, 2019 – 2030
Department of Defence*

The **Department of Defence** could play an important role in the STEMBooster program in our region for a variety of reasons. With its focus on STEM skills and careers, the Department of Defence could be involved as an industry partner to help the program develop relevant defence industry content and a pathway for students to consider developing their career opportunities in the Defence Force or defence sector. Our region, particularly Townsville, has a large Australian Army presence at Lavarack and an Australian Airforce presence at Townsville Airport, meaning there is ample opportunity to align with the Department of Defence, the Defence Force and Defence Jobs.

As per the report from the **Office of the Chief Scientist**, *Optimising STEM Industry School Partnerships*, the STEMBooster Program could also assist the Australian Government to achieve many of the recommendations.

- Understanding the workforce needs – government and industry should collaborate to develop a more detailed understanding of future workforce needs.
- Teacher professional learning – support principals and lead teachers to engage with industry and other partners to develop and implement high quality, contemporary, professional learning materials and teaching practices in STEM related subjects.
- VET in schools – bring together industry and secondary school teachers to acquire and maintain industry currency requirements in line with national standards.
- Solving real world problems – governments and industry should work together to focus on the narrative for primary and secondary students on how STEM skills and knowledge can solve real world problems.

The STEMBooster Program also supports key recommendations outlined in the **Jobs Queensland Report - Future work, future jobs: Preparing Queensland for the evolution of work**. These recommendations are:

1. Collaborate with industries, regions, communities and unions to proactively plan for and collectively respond to work and workplace change and significant transitions in the economy.
2. Implement strategies that build and enhance industry leadership and workforce planning capability to support transitions in Queensland.
3. Drive enhanced linkages between economic development and workforce development policy and programs across the Queensland Government to promote inclusive economic growth and employment opportunities for Queenslanders.

4. Through skills investment and employment policies and programs, prioritise the development of industry and regional partnerships that promote workforce participation in quality work for young people and other cohorts experiencing difficulty in the labour market.
5. Empower and support local leaders to lead localised and collaborative responses to workforce opportunities and challenges in regional economies in accordance with local priorities.
6. Collaborate with industry to ensure that skills investment policy and program settings are responsive to the extent and pace of change being experienced in some industry sectors and some regions.
7. Collaborate with industry and other relevant stakeholders to make available accurate information and advice that assists individuals to make positive career pathway decisions within school and throughout their working lives.

The **Queensland Government** has identified the need for STEM education and developed a strategy to address this, ***A strategy for STEM in Queensland state schools***. The STEMBooster project will assist the Queensland Government in using ‘Innovative and effective approaches to STEM Education’ and will heavily draw on the need for ‘Partnerships’ by aligning learning with real-world expectations and potential employers. The STEMBooster Project will complement and support the work done to date and into the future by the Queensland Government to put STEM into schools⁹.

The Queensland Government recognises the importance of STEM skills for the future workforce by developing the ***Advance Queensland*** initiative which is: “positioning Queensland as a leader in the knowledge economy, so we can create jobs now and in the future”.

The STEMBooster program can address the concerns from the ***Skills for Queensland*** Discussion Paper: “the increasing pace of disruptive technology means that in many industries and occupations Queenslanders need to re-skill now to be ready as new jobs and industries emerge”. In particular, science, technology, engineering and mathematics (STEM) skills will be critical to making this transition and supporting new jobs and driving economic growth”.

The **Department of State Development, Infrastructure, Local Government and Planning** has prioritised industries for growth including Advanced Manufacturing, Defence Jobs and Mining Equipment, Technology and Services (METS), all of which would benefit from the STEMBooster program developing the future workforce. These prioritised industries will not be able to grow without a STEM skilled workforce across the state, and hence the STEMBooster program links very closely to the goals of growth of jobs and the Queensland economy.

⁹ Letter of Support, Appendix 4, Maree Flynn, STEM Champion, Department of Education

6. OUTCOMES AND BENEFITS

6.1 THE OUTCOMES TO BE ACHIEVED IN 4 YEARS

1. Students engaged in STEMBooster – target of 3,000

North and North West Queensland has a population about one third of the size of the Hunter, but over a region that is 15 times larger and this program is initially for a 4 year period. RDA Hunter reached over 7,500 students over 10 years across a range of STEM initiatives.

2. Schools engaged in STEMBooster – target of reaching all 76 high schools, and a target of 50 schools to start using the curriculum in 2022 – 2025. The primary school program is proposed to commence roll out in 2023 with an initial target of 15 schools.

Our region has 76 schools teaching grades 7 to 10 and 112 schools teaching grades 4 to 6. RDA Hunter now has 25 schools involved in their program.

3. Businesses engaged in STEMBooster – target of 30

RDA Hunter has 32 Hunter-based businesses involved in their program after 10 years.

4. Social media engagement – target of 1,500 followers on Facebook. Linking students and teachers to YouTube content – target of 25,000 views

RDA Hunter's ME program has more than 4,000 followers on Facebook and the YouTube channel has had more than 74,000 views.

5. Increased uptake of STEM subjects in Years 11 and 12 - target of 20% increase by 2025; target of significant increase to state average within 10 years; target of increasing about state average within 15 years.

At RDA Hunter, 17% of students on the ME program select HSC physics compared with the NSW average of 14%. 12% of ME program students select HSC engineering studies compared to the NSW average of 4%.

6. Improved access to equipment for teaching, increased confidence and capabilities of teachers in STEM – target of 80%+ satisfaction rate with the program

7. Effective collaboration with schools – target of 80%+ satisfaction rate with the program

8. Effective collaboration with industry – target of 80%+ satisfaction rate with the program

9. Effective STEM networks developed – target of 500 members by 2025

10. Pipeline of new employees with STEM skills for businesses – target of 10% increase of STEM skilled workforce by 2030 - will work with industry on short and longer term measurement of this

11. Innovative workforce – will work with industry on measures for this

12. School attendance improvement – will work with educators on the potential for STEMBooster activities to promote and encourage school attendance where there are attendance issues

6.2 ECONOMIC BENEFITS

Australian, Queensland and local governments, employers, educators, families and students can all benefit from the delivery of the STEMBooster program.

As mentioned above, according to PwC in 2015, if we could move just 1% of the workforce into STEM roles this would increase Gross Domestic Product (GDP) in Australia by \$57.4 billion, that is, approximately 4%.

Given the region's Gross Regional Product in 2017/18 was \$16.8 billion, the impact of a similar step up in STEM could be extrapolated **to equate to an additional \$672 million per annum to the North and North West Queensland regional economy.**

Increases in education standards will lead to a reduction in unemployment, a reduction in welfare payments, an increase in taxes for governments and an increase in local spending in communities.

6.3 COMMUNITY BENEFITS

Increases in education standards will lead to a reduction in unemployment and the associated higher levels of crime that we currently experience in the region.

Higher salaries will lead to better quality lifestyles, including housing, healthcare and recreation outcomes.

Higher education levels are also usually associated with better awareness of health issues and better health outcomes.

Communities are stronger with a lower level of unemployment and crime and are in a position to support each other, for example through volunteering and sponsorship of local sports, arts and events.

6.4 RDA HUNTER EXPERIENCE

RDA Hunter has the benefit of rolling their program out over the past 10 years and have several case studies to demonstrate the benefits achieved through the STEM ME Program.

- Kotara High School (Hunter Region NSW) demonstrated benefits (2013):

Kotara High has been a school partner of the ME Hunter Program since 2011. The true impact of the ME Hunter Program on this school and its students is evident and supported by student's subject choices for 2013. For the first time ever, the Industrial Technology Faculty has more subjects being offered than the English Department. The department has seen an increase of 25% of new subjects being offered in 2013. Notable increases can be seen in the following:

- *Two (2) IT Metal Year 9 classes have become part of the curriculum structure.*
- *Students are branching out in their subject choices and Kotara High is offering Design and Technology and Information Technology for Year 9 students for the first time.*
- *Renewed interest in IT Electronics by Year 9 students as a subject choice.*
- *Year 11 & 12 students have elected to study Metals & Engineering and Engineering Studies.*

- Overall participation in STEM in the Hunter Region (2014)

RDA Hunter's ME Program was featured on ABC's national news Bulletin.

Bucking the national trend of falling science enrolments, RDA Hunter's ME program is making a difference to Hunter school students and industry. Selection of physics for example has risen 5% to above the NSW average at schools participating in the program.

Highlights of benefits include:

- *Secondary school participation in the ME Program has increased from 4 schools to 26 schools (which is a majority of secondary schools in the Hunter).*
- *So far, over 7,500 students have been involved in the program*
- *Industry participation has increased from 4 to 32. These companies range from small to medium sized technology companies to multi-nationals.*
- *The uptake by year 11 students in Physics has grown to now put the Hunter above the NSW average*
- *Students attending as ME Program School are now twice as likely to undertake engineering studies are significantly more likely to complete higher education as a result.*
- *One of the ME Partner schools in 2012 for the first time ever has put on an extension maths class (3 unit)*

The Hunter Region demonstrates the benefits directly to students and school when implemented sustainably over a number of years. The Hunter ME program commenced fully in 2011 after running a pilot program in 2009 to 2011 which involved four schools and four industry partners. The program started to see significant traction in the industry and in the community after 2014, with 20 industry partners and 25 schools working in the program. The STEMBooster program will need to tailor the Hunter curriculum to enable it to be relevant to the students in the North and North West Queensland region.

The program will also need to take into account the vast distances in the region. These distances will add extra difficulties to the program's industry engagement and its rollout. To fully realise the potential and benefits of the STEMBooster in North and North West Queensland, a minimum period of four years is required but ideally the program needs the ability to extend to 10 years and be adopted into regular programming of schools and industry.

7. INVESTMENT AND PARTNERSHIPS

7.1 INVESTMENT

The total cash investment required to deliver the STEMBooster program is \$7.3m over 4 years.

Activity/ Output	Year 1	Year 2	Year 3	Year 4	Total
Curriculum development and tailoring to the region, roll out with professional development sessions for teachers, provide opportunities after roll out to provide support to new teachers, updating and/ or adding content as required – focused on <u>grades 7 to 10</u> but with opportunities for application to micro-credentials for business employees	300,000	100,000	50,000	50,000	500,000
School Technology Investment Program – eg drones, 3D printers, robots/ mechatronics; VC equipment if not available (ie through laptop or TV); freight delivery; coaching of teachers to use the equipment	100,000	400,000	400,000	100,000	1,000,000
School STEM Visit Program – to engage teachers and students in STEM across 76 schools in 15 local government areas	100,000	250,000	250,000	250,000	850,000
Marketing, logo development, web content development and hosting, social media content development and campaigns, traditional media, to promote and boost STEM interest and engagement (with a core focus on students and parents)	155,000	150,000	150,000	150,000	605,000
Community engagement activities, coordination including participation in regional community events to promote STEM (with a core focus on influencing parents and students as well as employers)	150,000	150,000	150,000	150,000	600,000
Industry (eg defence, manufacturing, mining, agriculture, health etc) engagement, confirming skills requirements, signing up businesses/ organisations to the program, coordinating school visits, webinars, site visits, work placements, participation in business events, presenting at regional forums – goal of involving 30 businesses across 15 local government areas by year 4	150,000	150,000	150,000	150,000	600,000
High school educator and school career advisor engagement, activities, coaching, coordination including the formation of the STEM network and opportunities for educators in STEM to come together in person/ online – across 76 schools, vocational education and university	150,000	150,000	150,000	150,000	600,000

Activity/ Output	Year 1	Year 2	Year 3	Year 4	Total
departments (potentially up to 1,000 key contacts across all 15 local government areas)					
Annual STEM Forum to bring together all stakeholders, focus on progress, issues, opportunities and to put the spotlight on STEM, support 15 regional teachers, 15 regional students with their parents to attend, record presentations for use online to further extend the reach of content	100,000	100,000	100,000	100,000	400,000
Engage in National Science Week activities across the region to cross-promote STEM, STEMBooster and careers in STEM – ideally 1 event in each of the 15 local government areas	45,000	45,000	45,000	45,000	180,000
Project Management Project Manager / Secretariat and Overheads Secretariat support to the Steering Committee, governance, stakeholder engagement, strategic planning, budgeting, reporting, management of contractors, management of funds and payments, contribution to book-keeper and administration support costs, staff training, use of facilities – electricity, phones, internet, stationery, photocopier, printer, mobile phone costs RDA Committee and CEO time is provided in-kind	150,000	150,000	150,000	150,000	600,000
Purchase of new desk, storage, chair, laptop, computer accessories to accommodate Project Manager/ Secretariat	5,000	0	0	0	5,000
Annual independent audit and report	10,000	10,000	10,000	10,000	40,000
Development of STEMBooster program curriculum for <u>primary school grades 4 to 6</u>	0	0	200,000	0	200,000
STEM teaching materials and technologies for 112 primary schools, freight delivery and coaching of teachers	0	0	0	620,000	620,000
Primary school educator engagement, activities, coaching, coordination including the formation of the STEM network and opportunities for primary school educators in STEM to come together in person/ online	0	0	0	150,000	300,000
Contingency (only on approval and production of receipt)	50,000	50,000	50,000	50,000	200,000

Activity/ Output	Year 1	Year 2	Year 3	Year 4	Total
	1,460,000	1,705,000	1,855,000	2,280,000	7,300,000

7.2 FUNDING SOURCES

RDA is a not for profit incorporated association with operational costs covered by the Australian Government through the national Regional Development Australia program. The STEMBooster program aligns with RDA's economic development objectives, but its implementation is outside the scope of regular funding. Hence it is critical that RDA is funded for the delivery of the STEMBooster program in its entirety. RDA will provide in-kind support through the Committee's and Chief Executive Officer's oversight of the program.

7.3 PARTNERSHIPS

RDA will establish partnerships with a large range of organisations, businesses and people through the life of the program. These will include, but not be limited to, industry groups, businesses, schools and education providers, teachers, students and the greater community. RDA's extensive regional relationships and networks will prove to be of high value in developing partnerships to increase the level of STEM skills in the region.

8. TIMELINE

This proposal is for a four year program and RDA can commence the project with four weeks' notice. An indicative timeline of activities is available in Section 4.

9. RISK AND CONSEQUENCES

9.1 RISK

While a full risk assessment and management plan will be put in place when the program proceeds, the following are the four key areas of risk that we have identified and wish to address here.

9.1.1 INDUSTRY ENGAGEMENT

RDA is confident it will be able to mitigate the risk of low industry engagement by accessing its vast regional network and by collaborating and partnering with key organisations such as Townsville Enterprise Limited (TEL), local Chambers of Commerce, and key government departments that work closely with industry such as the Department of State Development, Infrastructure, Local Government, and Planning.

9.1.2 UPTAKE OF THE STEM CURRICULUM

To ensure there is an increased uptake of STEM within the curriculum and across all schools, RDA will partner with the Department of Education, local STEM champions and teachers regarding the curriculum development and professional development to use it. Furthermore, RDA will facilitate the development of a STEM teachers' network to support teachers and their sharing of information of promoting and teaching STEM in schools.

9.1.3 TECHNOLOGY INTO SCHOOLS

To mitigate the risk of technologies not being used in schools, we'll ensure that any technologies and resources provided to schools are sent with an action plan and activity ideas for the teachers and students to utilise the technology or resource. We will ensure the provision of training as necessary, either in person or virtually.

9.1.4 FINANCIAL MANAGEMENT OF PROGRAM

RDA will apply its experience and high standards of governance and management to ensure the sound financial management of the funds provided. RDA has operated under a Funding Agreement with the Australian Government since 2009 and the Regional Development Australia Program Office would be able to provide an insight into our track record of delivering outputs, outcomes and managing budgets.

RDA also has the advantage of a strong partnership formed with RDA Hunter, as demonstrated by our MOU. RDA Hunter has offered to share their knowledge and experience on how to best manage the funding to meet the program deliverables based on their 10 years of experience in delivering STEM programs.

9.2 CONSEQUENCES

Should this proposal not be agreed to and funded, we will see poorer economic outcomes for the North and North West Queensland region and its communities. The region will see an increased skills shortage which will negatively affect industry and businesses, continuing unemployment for those without the right skills, continued poor education attainment levels and continued disparity between Indigenous and non-Indigenous, remote and city education levels.

APPENDIX 1: KEY REGIONAL DATA¹⁰

Population:	267, 385 (as at June 2019) Projected to 353,453 by 2041
Population by Age:	34.6% of population aged 0 – 24 years of age (vs 32.4% in QLD – June Qtr 2019)
Indigenous Population:	25,388 (9.8% vs 4.0% in Queensland - 2016 Census)
Labour Force:	138, 91 (June Qtr 2020)
Unemployment:	10,510 (8.3% vs 6.1% in Queensland - June Qtr 2020)
Youth Unemployment:	10.5% in Townsville; 23.5% in Outback Queensland (November 2020)
Disadvantage:	52.3% of persons in the two most disadvantaged quintiles on the Index of Relative Socio-Economic Disadvantage (vs 40% in Queensland - Census 2016)
Area:	448,024km ² (25.9% of Queensland; 5.8% of Australia (that is 6.5 times the area of Tasmania)
Population in Remoteness Areas:	3.9% very remote, 10.6% remote, 85.4% outer regional (Census 2016)
Remoteness by area:	12 of the 15 local government areas have status as being very remote or remote
Gross Regional Product:	\$16.8 billion in 2017/18

¹⁰ All data sourced from Queensland Government Statistics Office, Regional Profiles except Gross Regional Product which is sourced from .id economics/ .id the population experts; online; 23.1.20

APPENDIX 2: REGION'S BUSINESS INDICATORS

Indicators <i>(RAI Insight 2nd Edition – May 2019)</i>	Regions National Ranking (Out of 10) 1 Indicates the Region is a National Leader 10 indicates the region is significantly behind
Research & Development – Science - Presence of organisations that meet standards to provide scientific or technical expertise and resources to perform research and development (R&D) on behalf of companies, registered with Innovation Australia, (2015) – see note below	3
Patent applications - Average annual number of applications for patents per 10,000 working age population, 2007-16 – see note below	3
Business Dynamo - Innovation through implementation in the business or commercial sphere	8
Trademark applications - Average annual number of applications for trademarks per 10,000 working age population	7
Knowledge-intensive business services - Employees in knowledge-intensive business services per 10,000 working age population	6

The businesses indicators show a higher rating than what is realised in the business communities. This is due to much of the *Research and Development* and the corresponding *Patent Applications* being focused on: Marine Biology at the Australian Institute of Marine Science and James Cook University (JCU); Tropical Health research and development at JCU and Townsville Hospital. Townsville institutions are world leaders in these areas of research.

However, in the general business community within the region, made up of small and medium sized enterprises, very little research and development is occurring. This is demonstrated in the indicators for innovation, trademarking applications and the number of employees working in the knowledge-intensive business services in the region, all of which are below average.

APPENDIX 3: REGION'S EDUCATION AND WORKFORCE INDICATORS

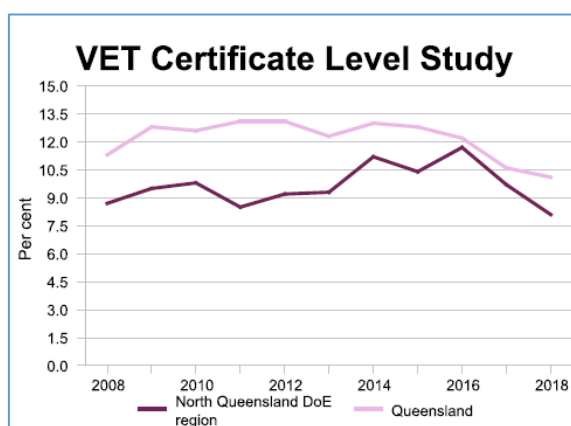
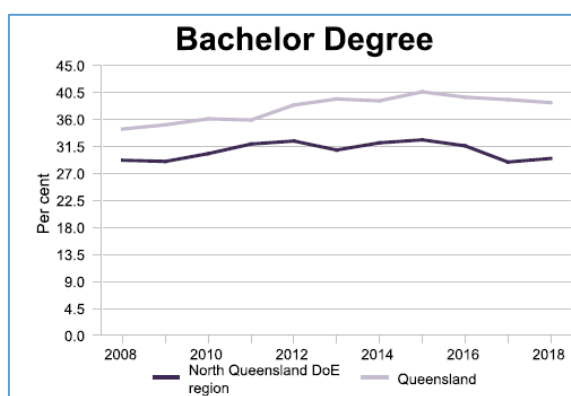
Indicators – Education, Youth and Unemployment <i>(RAI Insight 2nd Edition – May 2019)</i>	Regions National Ranking (Out of 10) 1 Indicates the Region is a National Leader 10 indicates the region is significantly behind
Young dependency ratio - Youth (14 years or below) as a proportion of the working age (15-64 years) population	7
Primary School Literacy and Numeracy - Average of 5 NAPLAN test scores (years 3 & 5)	8
Secondary School Literacy & Numeracy - Average of 5 NAPLAN test scores (years 5 & 7)	8
High school completion - % of population completing year 12 (persons usually resident) – see note below	3 (47.9%)
Learning or Earning - % of people aged 15-24 years engaged in education or employed (persons usually resident)	7 (92.5%)
Unemployment rate - % unemployment for all age groups above 15 years old	10
Youth unemployment - % unemployment 15-24 years	8
Welfare dependence - % population over 15 years receiving age pension, unemployment benefit or other payment	4 (4.9%)
Long Term Unemployment - % people receiving an unemployment benefit for longer than 6 months	7 (4.9%)

The region has a high youth population however the average education level is poor at Primary School and Secondary School with a rating of 8 out of 10. We note however that students are still completing high school rather than leaving school early. This is being driven by the lack of employment opportunities as seen by the unemployment rankings of 8 out of 10 for *Youth Unemployment* and an extremely poor ranking of 10 out of 10 for *Unemployment Rate* for all age groups. The ranking numbers indicate that regionally the youth are poorly educated when compared to the other regions.

Indicators – Workforce <i>(RAI Insight 2nd Edition – May 2019)</i>	Regions National Ranking (Out of 10) 1 Indicates the Region is a National Leader 10 indicates the region is significantly behind
Workforce Skill - Index of ANZSCO occupation skill level	4
Population turnover - People that moved to or from the region 2011-16 as a percentage of the total population in 2011	6 (37%)
Science & Engineering qualified - % of employed persons qualified in science, technology and engineering, 2016 – see note below	2

Rankings indicate that the region’s skill level is above average, however this is not being driven by internal skilling, as shown by the education ranking. The skilled workforce is being imported from outside the region. The 1 in 3 population turnover every 5 years shows that these skilled individuals generally are not settling in the region.

Bachelor and VET completion rates in the North Queensland Region of the Department of Education (very similar to the RDA North and North West Queensland region).



APPENDIX 4: LETTERS OF SUPPORT

Letters of support were received from the following people prior to the pre-budget submission made in January 2020. We have continued to engage with these stakeholders and they, or their successors, continue to support RDA in our efforts to improve the workforce in our region.

Senator Susan McDonald

George Christensen MP, Federal Member for Dawson

Phillip Thompson MP OAM, Federal Member for Herbert

Bob Katter MP, Federal Member for Kennedy

Cr Jenny Hill, Mayor, Townsville City Council

Cr Joyce McCulloch, Mount Isa City Council

Mr Michele Falconieri, President, Townsville Chamber

Mr David Glasson, President, MITEZ

Maree, Flynn, STEM Champion, Department of Education, Queensland Government

Ms Michelle Bellingan, Acting Vice Chancellor (TNWQ), CQUniversity

Professor Ron While, Dean, College of Science and Engineering, James Cook University

Mr Trevor John, Director of Regional Development, RDA Hunter

Townsville Enterprise Limited has also included support for STEMBooster in its pre-budget submission.