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& ICT Education

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About the Presenter

- Electrical Engineer, Computer Scientist
- Studied in Germany and Australia
- Completed Honours, with 10 years of industry experience
- Moved to Australia in 1999. Citizen since 2006.
- Formerly head of SAP Research in Asia-Pacific. Lived in Singapore, worked in India, China. Reported into France, Germany, US - 25 years ICT industry experience
- Joined NICTA in 2013. Now heading up the National Digital Careers Program
- Six school-age children (Year 12- Year 1).
- 3D printing; Arduino, Mac, iPhone developer … and enthusiastic hobby surgeon :-)

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Problem Statement

Misconceptions about Information & Communication Technology

- Students' lack of interest in studying ICT, and STEM in general.
- Skills gap opening, youth unemployment, missed economic opportunities

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Purpose of Digital Careers

- 4 year program, funded by the Australian Government, Department of Communications, based on the successful Group X pilot in QLD.
- Increase interest amongst school students in digital technologies, engage students who have not yet developed an interest in ICT;
- Increase the portion of student enrolment in ICT courses at universities and TAFE;
- Increase awareness of career diversity, opportunities and benefits of an ICT based study program/education;
- Raise the profile and reputation of the ICT industry and ICT careers;
- **Improve the capability and confidence of school ICT teachers and catalyse the professionalisation of ICT teaching, and**
- **Provide education and training material and professional development for ICT educators (school teachers)**

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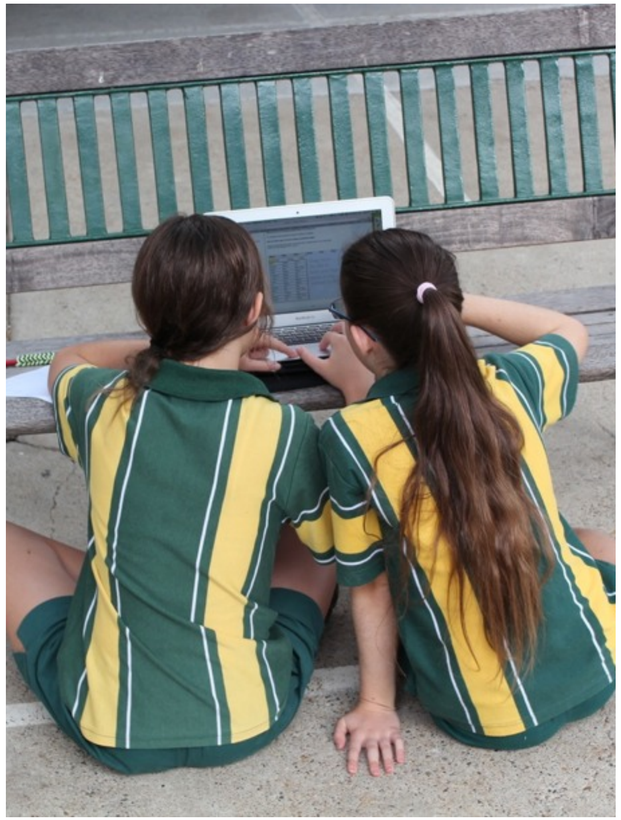
Start Early



Sometimes earlier :-)

Stakeholders

- Students: Years 5-10 (10-15 years old)
- Parents
- Teachers & Career Advisors
- Universities, Industry
- Government & Society as a whole

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3 Pillars

- **Activities & Events for Students**
- **Teacher Engagement Professional Development**
- Promotion and diversity of ICT industry

Opportunity for support by Universities

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Activities & Events

Year 10

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Year 5

Career Fairs

Website, Social Media, Classic Media

Big Day In

Gap 1

Club Kidpreneur

Bebras

Gap 2

Young ICT Explorers

Inform

Involve

Engage

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Activities & Events for Students /2014

- Inform 114,000 students through events.
- Involve & engage 33,000-38,000 students through activities
- Retain students along inform - involve - engage pathway.

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Bebras and the ACARA Digital Technologies Curriculum

- Within 45 minutes, Bebras introduces 21 of the 44 strands in the new digital technologies curriculum with a particular focus on computational thinking
- www.bebras.edu.au

Australian Curriculum: Digital Technologies (F–10) scope and sequence

Strand		Foundation – Year 2	Year 3 and 4	Year 5 and 6	Year 7 and 8	Year 9 and 10 (Elective sub
Digital Technologies knowledge and understanding	*Digital systems*	2.1 Identify and use digital systems (hardware and software components) for a purpose	4.1 Explore and use a range of digital systems with peripheral devices for different purposes, and transmit different types of data	6.1 Investigate the main components of common digital systems, their basic functions and interactions and how such digital systems may connect together to form networks to transmit data	8.1 Investigate how data are transmitted and secured in wired, wireless and mobile networks, and how the specifications of hardware components impact on network activities	10.1 Investigate the role of h software in managing, controll securing the movement of and in networked digital systems
	Representation of data	2.2 Recognise and explore patterns in data and represent data as pictures, symbols and diagrams	4.2 Recognise different types of data and explore how the same data can be represented in different ways	6.2 Investigate how digital systems use whole numbers as a basis for representing all types of data	8.2 Investigate how digital systems represent text, image and audio data in binary	10.2 Analyse simple compression of data and how content data are separated from presentation
Digital Technologies processes and production skills	*Collecting , managing and analysing data*	2.3 Collect, explore and sort data, and use digital systems to present the data creatively	4.3 Collect, access and present different types of data using simple software to create information and solve problems	6.3 Acquire, store and validate different types of data, and use a range of commonly available software to interpret and visualise data in context to create information	8.3 Acquire data from a range of sources and evaluate authenticity, accuracy and timeliness	10.3 Develop techniques for acquiring, storing and validating quantitative and qualitative data from a range of sources, considering privacy and security requirements
					8.4 Analyse and visualise data using a range of software to create information; and use structured data to model objects or events	10.4 Analyse and visualise data to create information and address complex problems; and model processes, entities and their relationships using structured data
	Creating digital solutions by:					
	Defining	2.4 Follow, describe and represent a sequence of steps and decisions (algorithms) needed to solve simple problems	4.4 Define simple problems, and describe and follow a sequence of steps and decisions (algorithms) needed to solve them	6.4 Define problems in terms of data and functional requirements, and identify features similar to previously solved problems	8.5 Define and decompose real-world problems taking into account functional requirements and economic, environmental, social, technical and usability constraints	10.5 Precisely define and decompose real-world problems, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs
	Designing			6.5 Design a user interface for a digital system, generating and considering alternative designs	8.6 Design the user experience of a digital system, generating, evaluating and communicating alternative designs	10.6 Design the user experience of a digital system, evaluating alternative designs against criteria including functionality, accessibility, usability, and aesthetics
	Implementing			6.6 Design, modify and follow simple algorithms represented diagrammatically and in English involving sequences of steps, branching, and iteration (repetition)	8.7 Design algorithms represented diagrammatically and in English; and trace algorithms to predict output for a given input and to identify errors	10.7 Design algorithms represented diagrammatically and in structured English and validate algorithms and programs through tracing and test cases
			4.5 Implement digital solutions as simple visual programs with algorithms involving branching (decisions), and user input	6.7 Implement digital solutions as simple visual programs involving branching, iteration (repetition), and user input	8.8 Implement and modify programs with user interfaces involving branching, iteration and functions in a general-purpose programming language	10.8 Implement modular programs, applying selected algorithms and data structures including using an object-oriented programming language
	Evaluating	2.5 Explore how people safely use common information systems to meet information, communication and recreation needs	4.6 Explain how developed solutions and existing information systems meet common personal, school or community needs; and envisage new ways of using them	6.8 Explain how developed solutions and existing information systems are sustainable and meet local community needs, considering opportunities and consequences for future applications	8.9 Evaluate how well developed solutions and existing information systems meet needs, are innovative and take account of future risks and sustainability	10.9 Critically evaluate how well developed solutions and existing information systems and policies, take account of future risks and sustainability and provide opportunities for innovation and enterprise
	Collaborating and managing	2.6 Work with others to create and organise ideas and information using information systems, and share these in safe online environments	4.7 Work with others to plan, the creation and communication of ideas and information safely, applying agreed ethical and social protocols	6.9 Manage the creation and communication of ideas and information including online collaborative projects, applying agreed ethical, social and technical protocols	8.10 Create and communicate interactive ideas and information collaboratively online, taking into account social contexts	10.10 Create interactive solutions for sharing ideas and information online, taking into account social contexts and legal responsibilities
					8.11 Plan and manage projects, including tasks, time and other resources required, considering safety and sustainability	10.11 Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability

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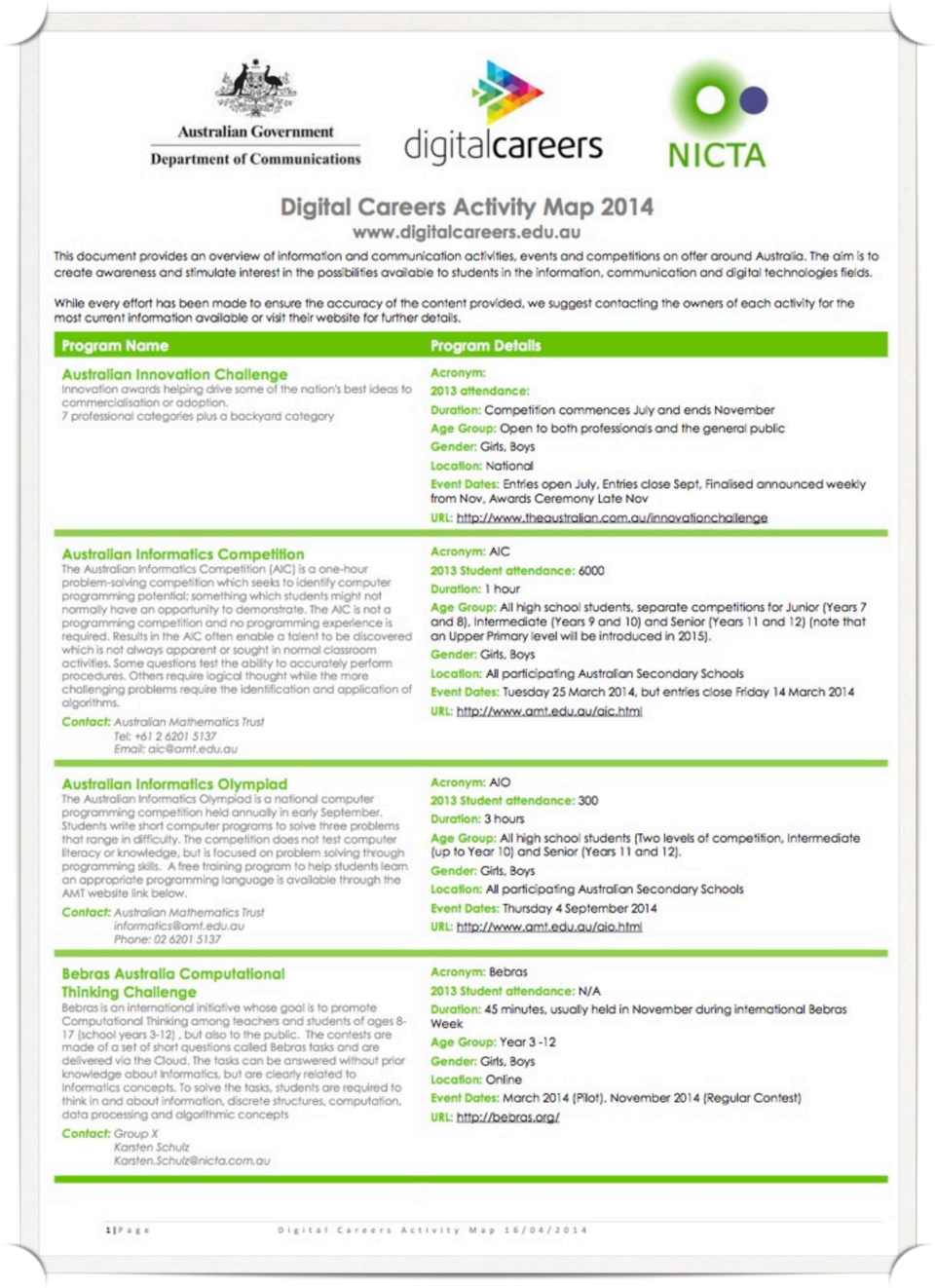

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Department of Communications

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Digital Careers Activity Map 2014

www.digitalcareers.edu.au

This document provides an overview of information and communication activities, events and competitions on offer around Australia. The aim is to create awareness and stimulate interest in the possibilities available to students in the information, communication and digital technologies fields.

While every effort has been made to ensure the accuracy of the content provided, we suggest contacting the owners of each activity for the most current information available or visit their website for further details.

Program Name	Program Details
Australian Innovation Challenge Innovation awards helping drive some of the nation's best ideas to commercialisation or adoption. 7 professional categories plus a backyard category	**Acronym:** **2013 attendance:** **Duration:** Competition commences July and ends November **Age Group:** Open to both professionals and the general public **Gender:** Girls, Boys **Location:** National **Event Dates:** Entries open July, Entries close Sept, Finalised announced weekly from Nov, Awards Ceremony Late Nov **URL:** http://www.theaustralian.com.au/innovationchallenge
Australian Informatics Competition The Australian Informatics Competition (AIC) is a one-hour problem-solving competition which seeks to identify computer programming potential; something which students might not normally have an opportunity to demonstrate. The AIC is not a programming competition and no programming experience is required. Results in the AIC often enable a talent to be discovered which is not always apparent or sought in normal classroom activities. Some questions test the ability to accurately perform procedures. Others require logical thought while the more challenging problems require the identification and application of algorithms. **Contact:** *Australian Mathematics Trust* *Tel: +61 2 6201 5137* *Email: aic@amt.edu.au*	**Acronym:** AIC **2013 Student attendance:** 6000 **Duration:** 1 hour **Age Group:** All high school students, separate competitions for Junior (Years 7 and 8), Intermediate (Years 9 and 10) and Senior (Years 11 and 12) (note that an Upper Primary level will be introduced in 2015). **Gender:** Girls, Boys **Location:** All participating Australian Secondary Schools **Event Dates:** Tuesday 25 March 2014, but entries close Friday 14 March 2014 **URL:** http://www.amt.edu.au/aic.html
Australian Informatics Olympiad The Australian Informatics Olympiad is a national computer programming competition held annually in early September. Students write short computer programs to solve three problems that range in difficulty. The competition does not test computer literacy or knowledge, but is focused on problem solving through programming skills. A free training program to help students learn an appropriate programming language is available through the AMT website link below. **Contact:** *Australian Mathematics Trust* *informatics@amt.edu.au* *Phone: 02 6201 5137*	**Acronym:** AIO **2013 Student attendance:** 300 **Duration:** 3 hours **Age Group:** All high school students (Two levels of competition, Intermediate (up to Year 10) and Senior (Years 11 and 12). **Gender:** Girls, Boys **Location:** All participating Australian Secondary Schools **Event Dates:** Thursday 4 September 2014 **URL:** http://www.amt.edu.au/aio.html
Bebras Australia Computational Thinking Challenge Bebras is an international initiative whose goal is to promote Computational Thinking among teachers and students of ages 8-17 (school years 3-12) , but also to the public. The contests are made of a set of short questions called Bebras tasks and are delivered via the Cloud. The tasks can be answered without prior knowledge about Informatics, but are clearly related to Informatics concepts. To solve the tasks, students are required to think in and about information, discrete structures, computation, data processing and algorithmic concepts **Contact:** *Group X* *Karsten Schulz* *Karsten.Schulz@nicta.com.au*	**Acronym:** Bebras **2013 Student attendance:** N/A **Duration:** 45 minutes, usually held in November during international Bebras Week **Age Group:** Year 3 -12 **Gender:** Girls, Boys **Location:** Online **Event Dates:** March 2014 (Pilot). November 2014 (Regular Contest) **URL:** http://bebras.org/

Activity Map

A directory of available ICT student activities in Australia

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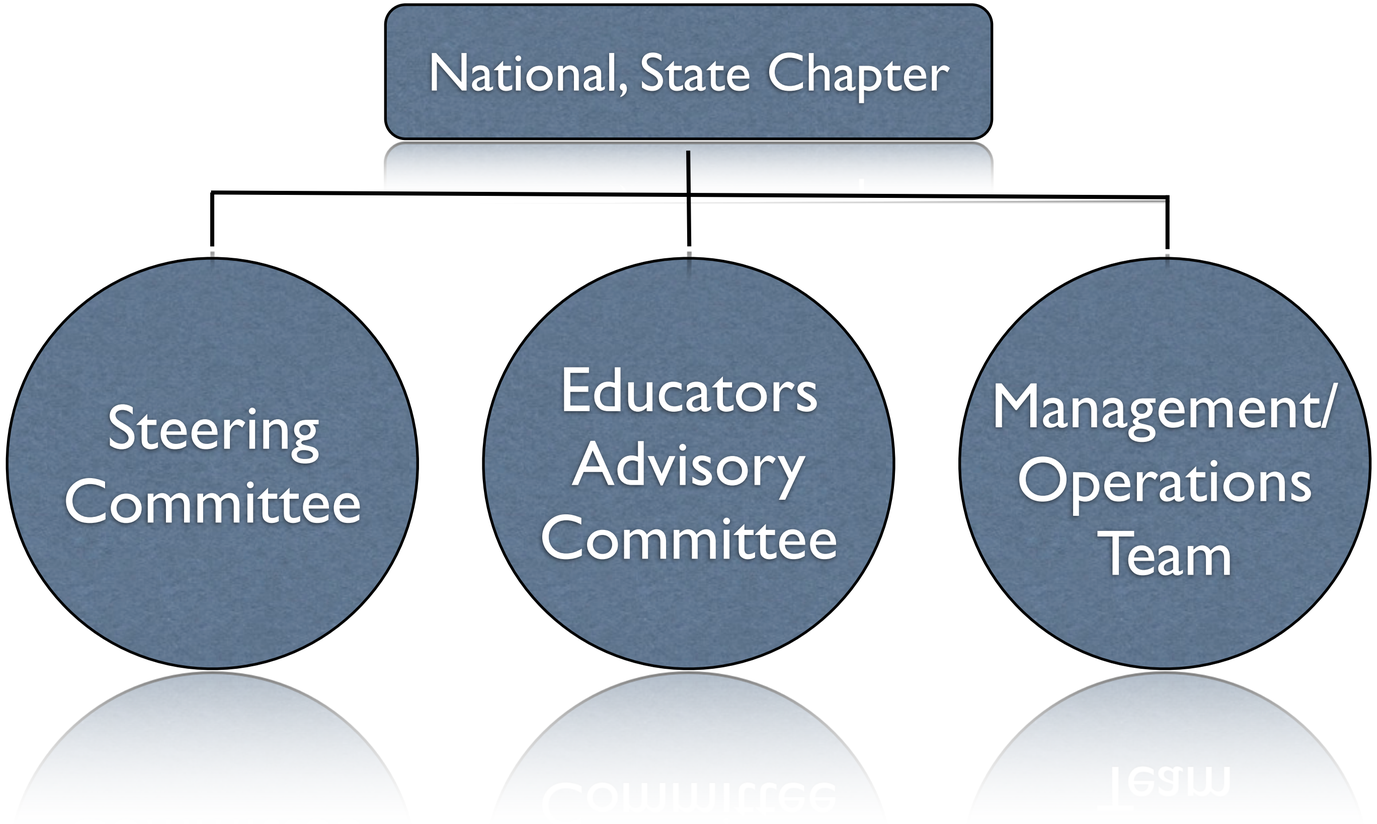
DC Organisational Model



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Teacher Engagement & Professional Development

- We Listen to the needs of the teachers…
  - Educator Advisory Committees
- We Support teachers ...
  - Teaching the teacher outreach program (QUT, UQ)
  - MOOC with University of Adelaide (Years 7-8)
  - ICT in Schools: Strategic partnership with CSIRO
  - Partnership with ACARA re. Network of Expertise, Bebras
  - University Academic mentorship program (proposed)
  - Activity Map

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