

Boosting NZ Digital Skills

Response to recent industry plans

Dr Grant Paton-Simpson
with Dr Ben Denham





Existing Initiatives



Digital Tech – Industry Transformation Plan

(Version 1.1 Oct 2021)

Digital Technologies – Draft Industry Transformation Plan 2022-2032

(Jan 2022)



Some key points:

- 1) We need a far stronger domestic talent pipeline
- 2) Much more weight should be put on work-integrated learning opportunities, short courses, micro-credentials, and degree apprenticeships (learn as you earn)
- 3) Students need much larger and better coordinated internship opportunities

Responses

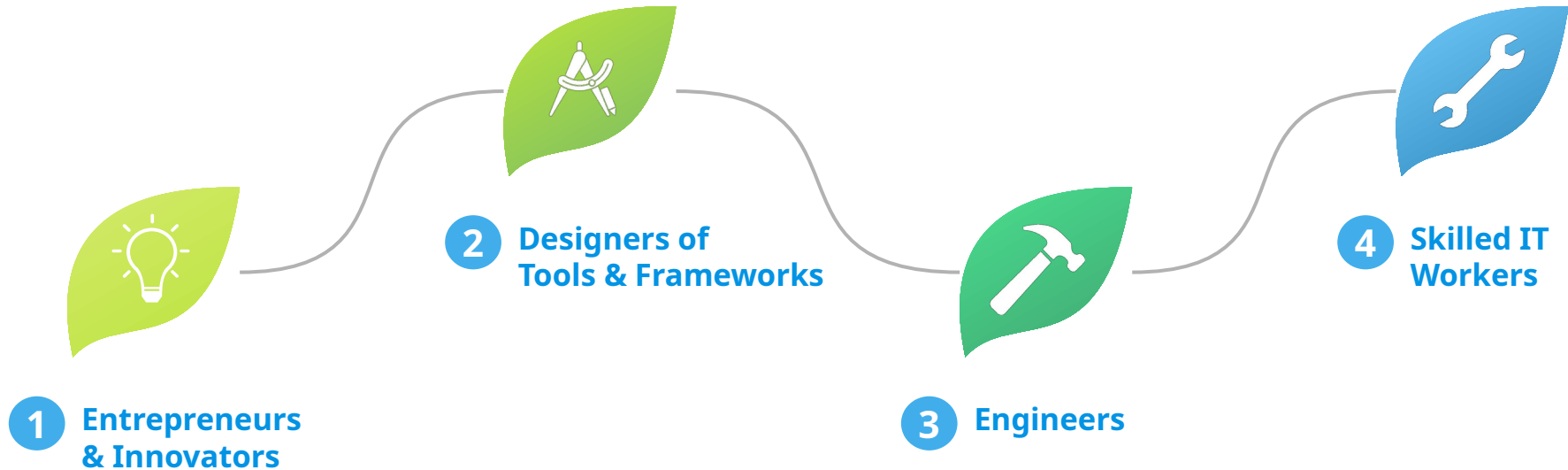




Which Digital Skills?

Need to target skills training
according to role in IT ecosystem

Different Technical Roles in IT Ecosystem



- Innovation moves from cutting edge to efficient production systems
- A healthy IT ecosystem requires all roles
- Each role has very different needs

Entrepreneurs & Innovators

Entrepreneurs
& Innovators

A few can go
a long way

Function: creates new tech,
creative designs,
start-ups,
new business ideas

Needs: broad technical
education, business skills,
connections with other
like-minded people,
practical experience
in area of interest

Designers of Tools & Frameworks

Function: Research & Development: making new tools, code libraries, frameworks, approaches, methods

Needs: advanced practical experience in area of interest, software engineering skills

Designers of Tools & Frameworks

Entrepreneurs & Innovators

Need more tool makers to translate cutting edge into tools

Engineers

Engineers

Designers of Tools
& Frameworks

Entrepreneurs
& Innovators

Need lots of
engineers to actually
make things

Function:
Making digital products
and processes

Needs: advanced
education in range of
technologies, software
engineering skills,
networking, dev-ops

Skilled IT Workers

Skilled
IT Workers

Engineers

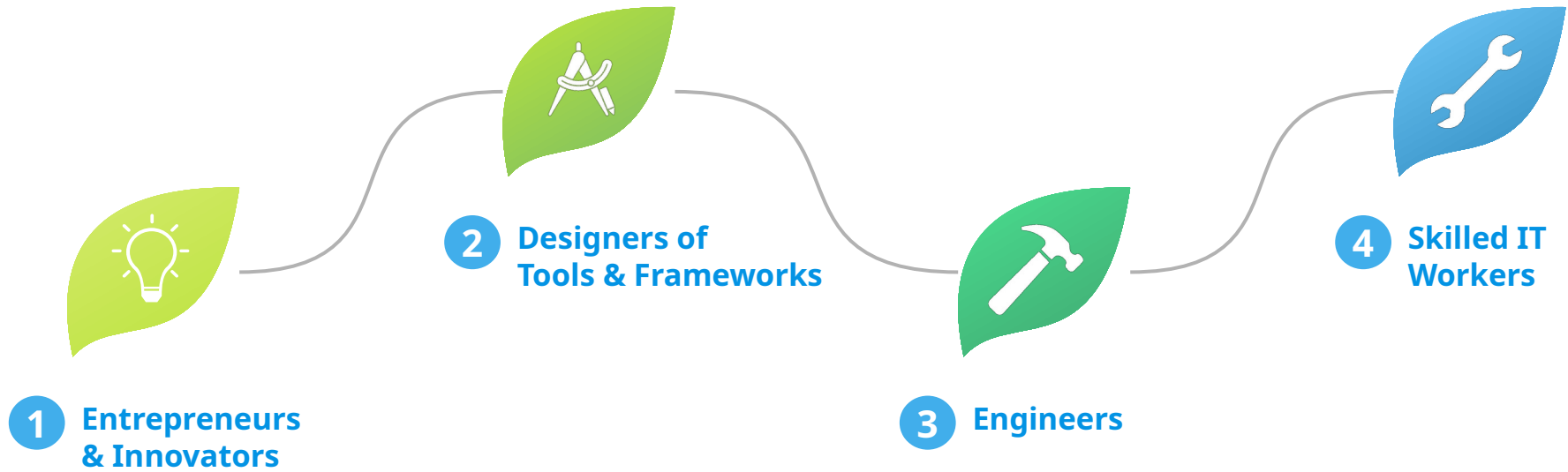
Designers of Tools
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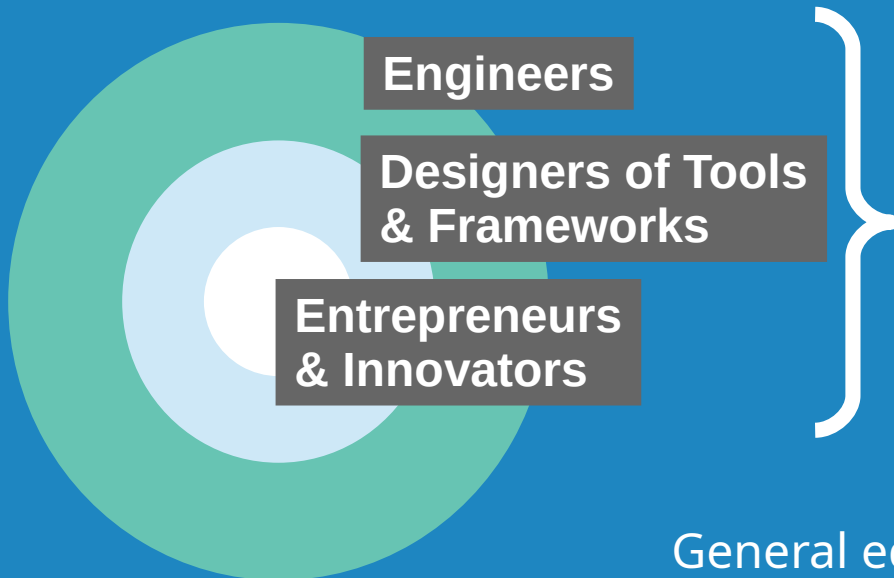
Function: learning,
installing, configuring, &
gluing together already-
designed systems

Needs: Generic
technical intelligence
& computer literacy

For efficiency & productivity
most IT work should rely on
routine, standardised work



Our skills strategy needs to take into account different roles and needs



Engineers

**Designers of Tools
& Frameworks**

**Entrepreneurs
& Innovators**

Appropriate focus
for digital skills initiative
(where the gaps are)

Skilled IT Workers

General education with
technical component
sufficient starting
point

Industry can already resolve the
additional training needs of
these staff with short-term
courses etc



Decentre Traditional Academic Degrees

Emphasise Short-Courses &
On-Job education & training



What we know

- 01 Graduates Lack Usable Skills**

Most graduates can't actually implement technical solutions to industry standards without continuous supervision and take years following graduation to reach this level
- 02 Opportunity Cost**

We could get a lot more value out of three years of focused learning if not misdirected into learning loosely related, overly generic, or overly specific information
- 03 Learning While Doing**

Learning IT is much easier when working on actual projects – there is no substitute for hands-on learning. Theoretical concepts make a lot more sense when connected to current work.
- 04 Traditional Degrees: a Golden Hammer**

Traditional degrees might be a good fit for some IT careers but we need to mix it up a lot more

Academic and Applied - Options

Academic degree

Papers, lectures,
exercises, tutorials



On-Job plus academic

Includes online courses;
mentors; tutorials;
apprenticeships;
micro-credentials;
standards etc



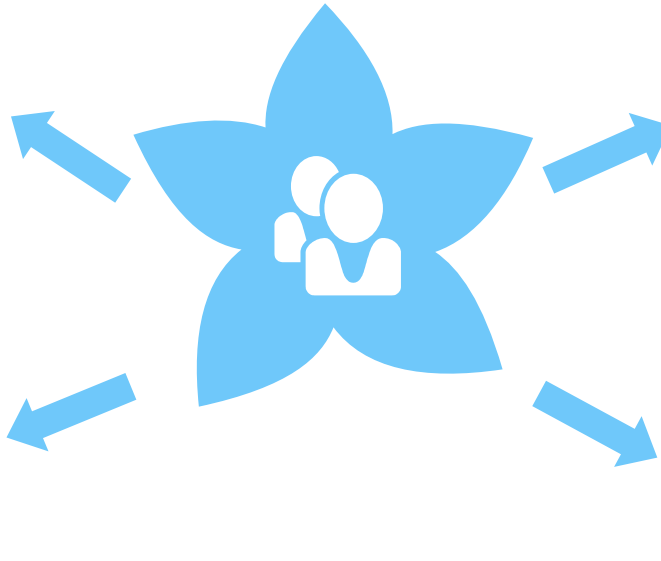
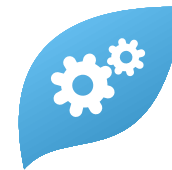
Academic plus On-Job experience

Includes holiday
placements

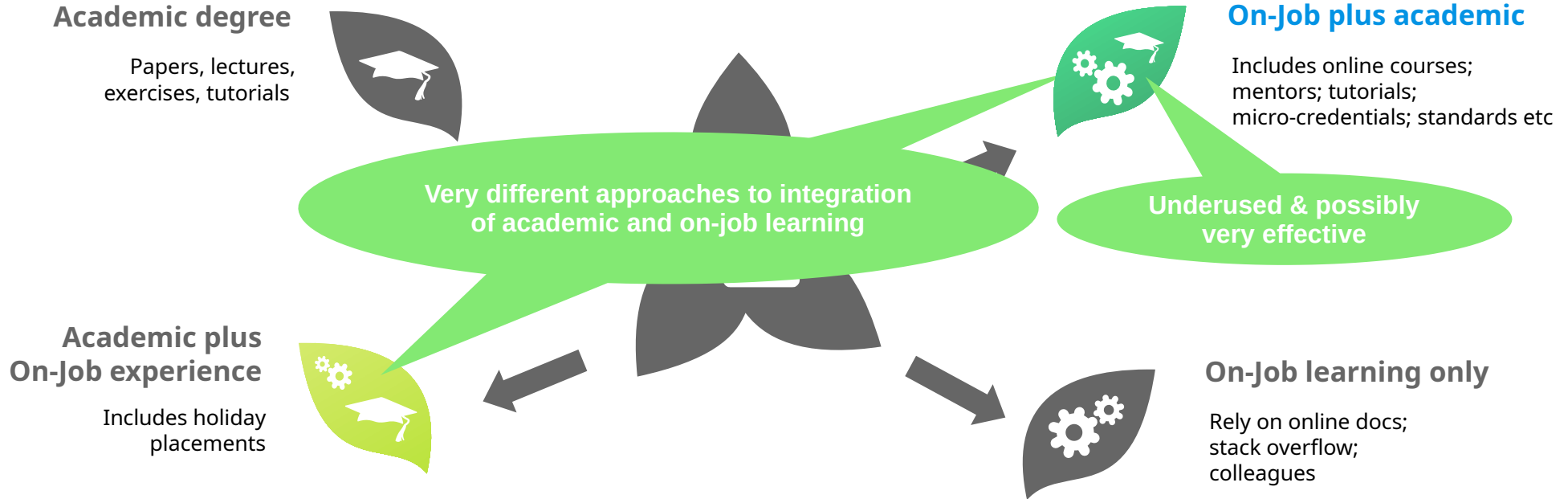


On-Job learning only

Rely on online docs;
Stack Overflow;
colleagues



Academic and Applied - Options



Academic Plus On-Job Experience



- The norm for Engineering Degrees, Medicine, etc
- Often weak integration of On-Job learning with academic content in IT space
- Commonly the On-Job experience is after most of the academic learning so too late to motivate or guide it
- Varying levels of input from tertiary institutions in placements process

On-Job Training Plus Academic



- Real, challenging problems
 - Employee highly motivated by business to work on the problem until success
 - Specific menu of training glues employee to business making the investment in human capital
 - Training has clear and immediate business value – less likely to be squeezed out
- Selecting matching micro-credentials / short courses
- Should include broad introduction to breadth of IT, Computer Science, software engineering
 - This part should be more academic
 - Education rather than training
 - Principles and concepts – not instructions

Smorgasbord – Driven by On-Job Needs

University

e.g. intro to CompSci,
software engineering,
functional programming
concepts

On-Line Tutorials

PostgreSQL Tutorial,
regex, ReactJS, git,
microcontrollers, VMs

Tech Institute

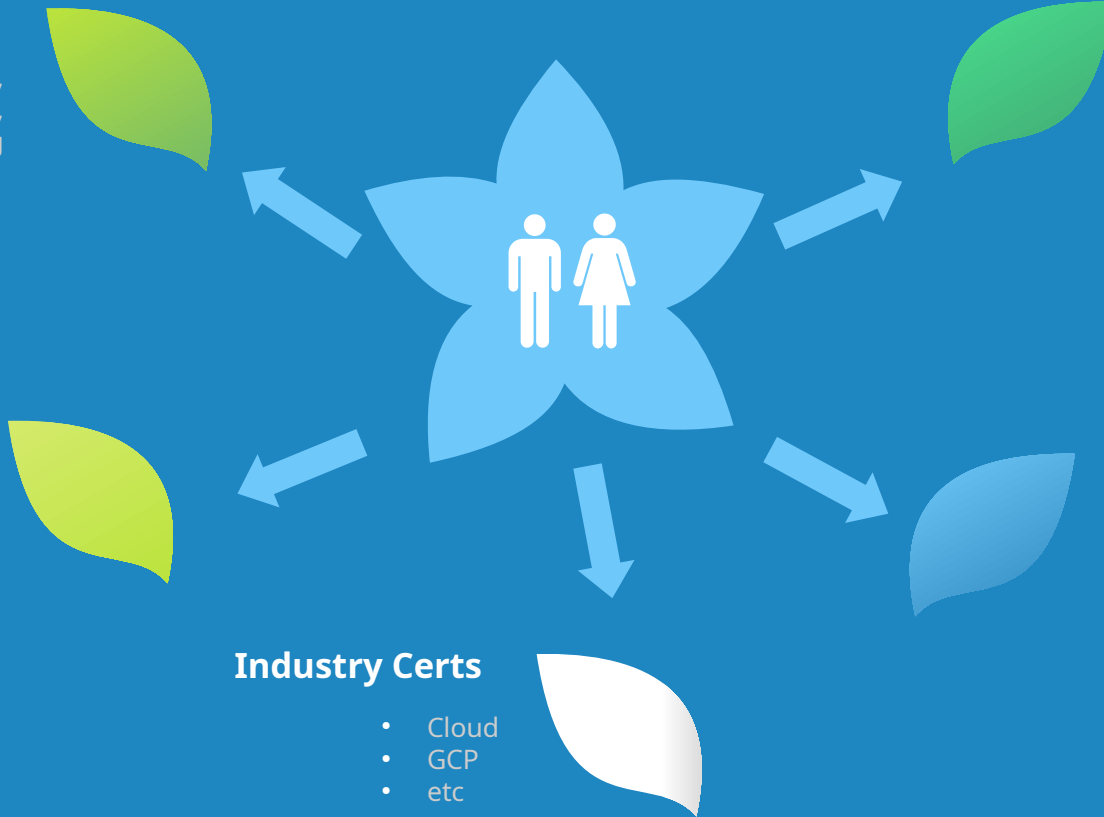
e.g. papers on security,
business analysis,
relational databases,
version control for teams

Misc

- Kiwi PyCon
- Catalyst Day Courses
- MRHQ
- Bootcamps
- Coursera / edX

Industry Certs

- Cloud
- GCP
- etc



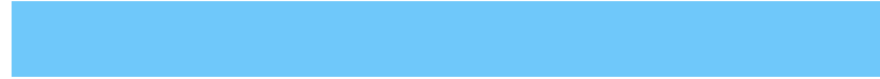
Example Individualised Time Table

	Mon	Tue	Wed	Thu	Fri	Sat
Early morning	On-Job	On-Job	Software engineering	On-Job	On-Job	
Late morning	SQL Theory	On-Job	On-Job	On-Job	On-Job	
Early afternoon	On-Job	On-Job	On-Job	On-Job	On-Job	Advanced Python
Late afternoon	On-Job	On-Job	On-Job	On-Job	On-Job	
Evening						

Career-Long Learning



On-Job



Tech Paper #1



Cert



Tech Paper #2



Business Paper #1



- **Mix of training and education**
- **Responsive to changing needs**
- **Individual credentials and experience matter, not overall qualification bundles**
- **Employers placing more weight on portfolios of work**



Making it Work

- 01 Learning Driven by Genuine Need**
Learning should serve a purpose beyond recruitment filtering – it should actually be useful in and of itself
- 02 Staff Retention / Loyalty**
Businesses that support learning will attract talent and retain it longer
- 03 Resources**
Government resources should follow students according to the educational services consumed
- 04 Industry / Education Liaison**
Liaison with industry / workplaces to identify useful projects and more project mentoring from industry
- 05 Internship Pathways**
Remove degree filter – look at actual work e.g. open source – on-job training and education



Realistic Goals for Digital Tech Teachers

Provide support from
external experts



What we know

- 01 Few Teachers Have Required Skills**

Digital Tech is too complex, broad, and changing for teachers to keep up (with notable exceptions)
- 02 This Will Not Change**

Unless Digital Tech teachers can earn as much as IT professionals this problem will be persistent
- 03 Pure Online Training Fails Many**

The pandemic showed the problem of relying excessively on impersonal teaching methods
- 04 Partnerships with IT Teaching Hubs Are Possible**

Schools can partner with tertiary providers (general or tech-specific) to teach aspects of Digital Tech e.g. Python programming, to students

Partnership Possibilities

Teach Popular Tech

Use popular technologies with supportive communities:
e.g. Python for learning programming

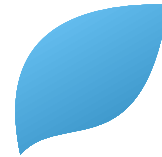


A New Normal Possible

Maybe we don't have to do Digital Tech the same way we have always delivered secondary school teaching

Online Resources

Online lessons supplemented by in-person teacher support and coordination



Giving Back

Many corporates have volunteer days where staff give something back – maybe they could be connected to schools, whether in person or online. Perhaps taking questions from students on life in the workforce.

Cross-School Team Work

Most individual schools are too small to allow students to work together in teams of similar ability and on topics of greatest interest to the students – perhaps cross-school teams could be part of the solution





Include Tech Community

Infectious enthusiasm for
tech, support, fun, giving
back, philanthropy

Partnership

Government

- Coordination
- Provide supportive context for schools to work within
- Provide centralised internship programme

Educators

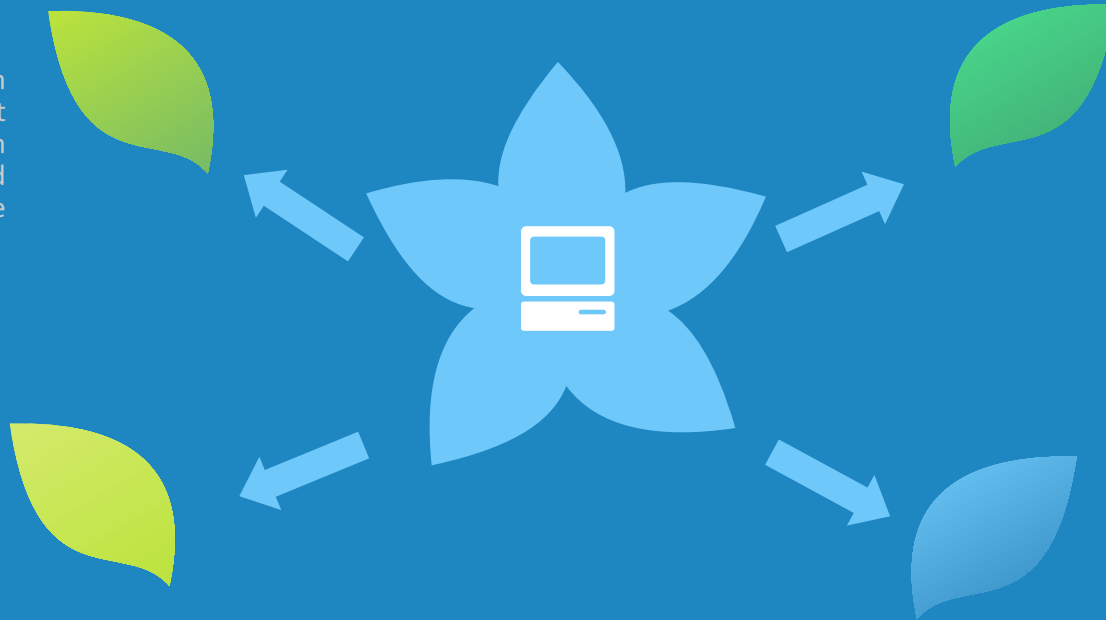
- Find new ways of integrating with on-the-job training
- Provide national support for senior secondary school students

Industry

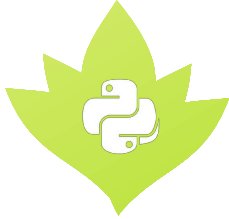
- Enable staff to undertake on-the-job & academic training
 - Allow staff to “give back” as their volunteer activity
 - Stronger support for internships

Community

Provide local, in-person and online opportunities to work with others, deliver presentations, meetups, conferences, unconferences etc



Community Groups



NZPUG

Meetings,
conferences, chat,
email, mentoring



NZOSS

Open source IT
resources including
online Computer
Science curriculum



Meetups

Available for most
technologies –
sometimes both in-
person & online

New groups might form
in response to the NZ
IT skills initiative



Parting Thoughts

- Any lessons from other countries e.g. Australia?
- Do we need an organisation or department to help industry and digital workers coordinate On-Job Plus training / education?
- How can we formally include the tech community?

Parting Thoughts

- Significant improvements are possible:
 - Education has been reformed in response to emerging needs in the past
 - The workplace has been changed significantly in the New Normal
 - There is an opportunity to significantly improve NZ IT education
- We can iterate as we go depending on what works

Thank you!

