

The impact of next-generation sequencing on bioinformatics in Australia

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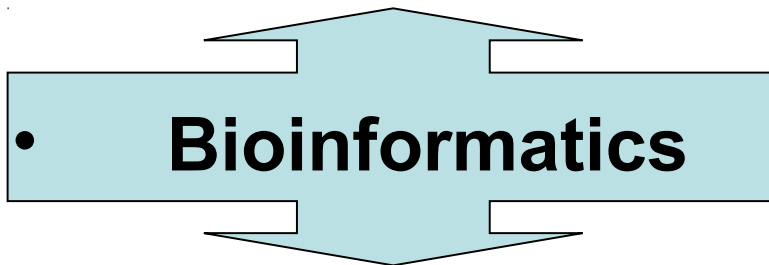
What is “next gen seq”?

- It's not just genome sequencing!
- DNA-omes
 - genomes, meta-genomes, cDNA
- RNA-omes / transcriptomes
 - mRNA-Seq, small RNAs, ncRNA, tag profiling
- CHiP-Seq
 - DNA-protein interactions, methylation, ...
- SNP/oligo chips
 - May be considered “next gen”

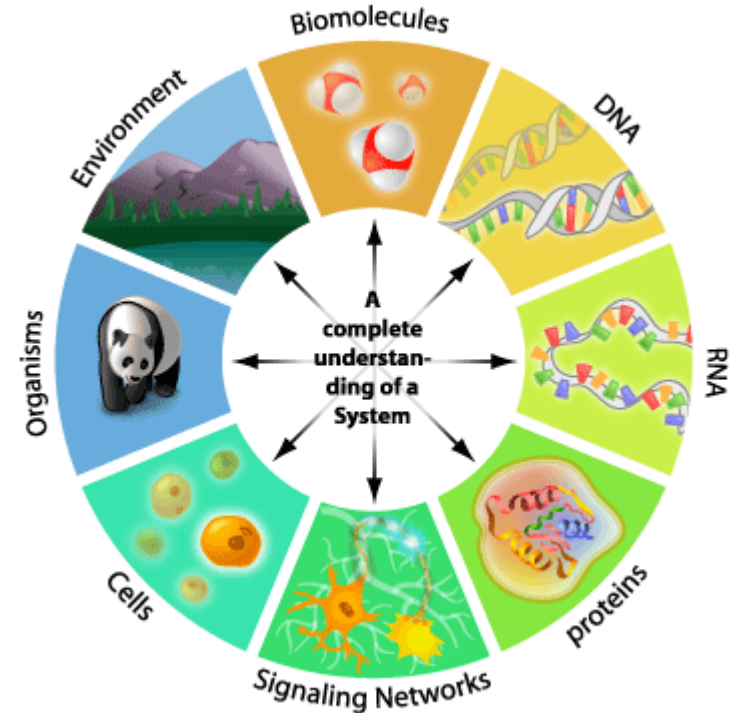


What is bioinformatics?

- Computer science
- Software engineering
- Mathematics / statistics



- Biological sciences
- Medical sciences



Where is .au poised?

- Sciences - we punch above our weight
- Funding
 - NCRIS, ARC, NHMRC
- Infrastructure
 - ARCS, ANDS, VLSCI, APAC
- Dedicated groups
 - QFAB, CCG, ABF, ARC CoE, VBC, WEHI
- On par with the big players?



Typical bioinformatician

- System administrator
 - Install and test software & databases
- Software engineer
 - Coding tools, writing scripts, services
- Statistician
 - Analysing data sets, gimme a p-value!
- Scientist (*if any spare time!*)
 - Tackling novel, useful research problems



NGS challenges (1)

- Hardware
 - Data storage
 - Archiving, distribution, meta-data, searching
 - Computation
 - CPU, GPU, Cloud, Grid, Cluster
 - Bandwidth (I/O speed)
 - disk, memory, network, fast interconnects
- Growing too slow?
- Bandwidth not keeping up with CPU & storage



NGS challenges (2)

- Algorithms
 - Prefer brains to brawn in the NGS battle
 - Reduce space complexity (fit in X Gb RAM)
 - Lower time complexity (finish in my lifetime)
- Tools
 - Empower the biologist wherever possible!
 - Share code, don't re-invent wheels
 - Open source, multi-platform applications

NGS challenges (3)

- Current staff – self taught
 - Computing savvy biologists and medicos
 - “Reconfigured” computer scientists *et al*
- Future staff – trained?
 - Bioinformatics re-training options
 - University courses having bioinformatics
 - In-house, on-the-job training
 - Pair up non-bio newbie with biologist mentor

Contact us

<http://bioinformatics.net.au/>