

REAL-TIME TRACKING OF ANTIBIOTIC RESISTANCE

Superfriends Against Superbugs

Brisbane HealthHack

14-16 October 2016

Fast DNA sequencing can change the way we treat infection

- minION
 - Transforms a 48+ hours process to a real-time one
 - Paradigm shift
- Previously developed online platform
 - Determine species, strain and antibiotic resistance
- However



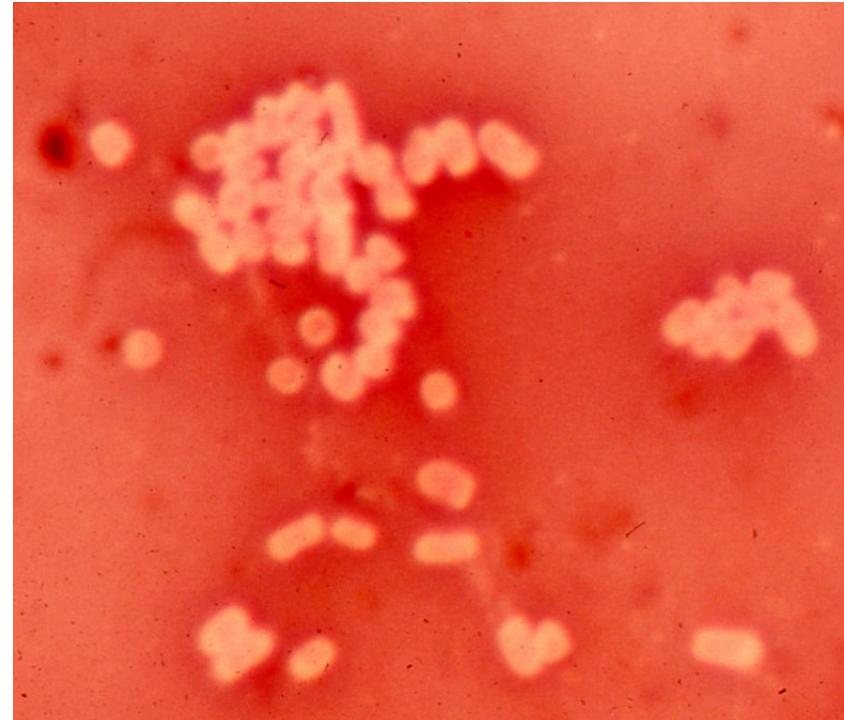
Problem:

Bringing the power of this application to superbugs

- Improve accessibility
- Use clinically significant patient data
- Store de-identified results from multiple patients at multiple sites in a centralized repository
- Real-time analysis of a superbug outbreak

Brisbane Outbreak

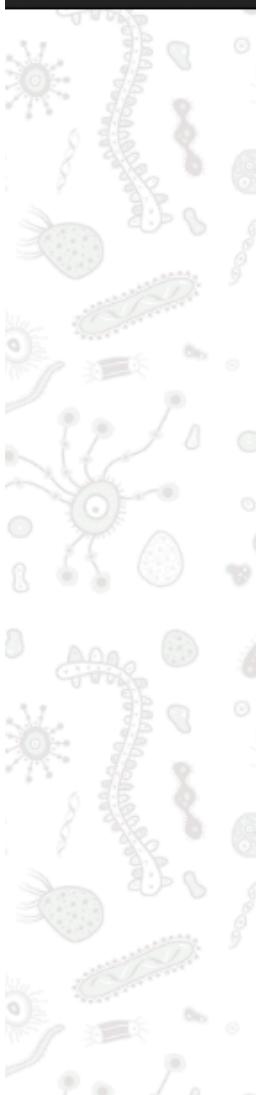
- Built a data set mirroring an outbreak of a real antibiotic resistant bacteria
 - *Klebsiella pneumoniae*
 - Known Australian superbug
 - Serious issue for the immunocompromised
 - Greater 50% mortality rate



Solutions: A web-interface

- Easy input of clinically relevant data
- Interfaces with existing analysis pipeline
- Delivers real-time reports to clinicians
- Stores de-identified data in central database

Epidemy Monitoring System Register Sample Results Preview

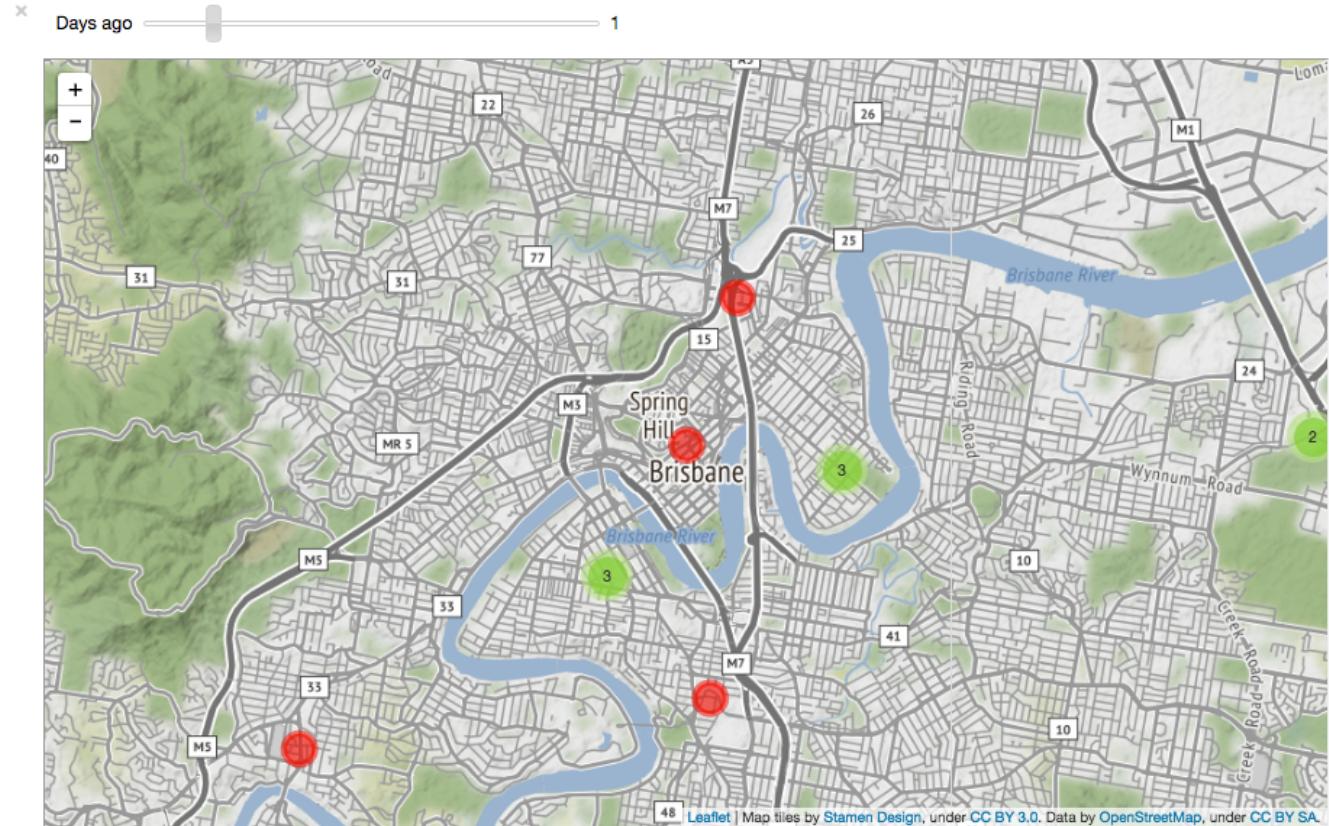


Last added sample

Date:	2016-10-16
Hospital:	Hospital 101
Ward:	002
Doctor:	12
Gender:	2
Age group:	9
Postcode:	4006
Country:	AU
Traveled recently:	AG
Condition:	back pain
Allergies AB:	Beta_lactamase_class_D Cycloserine Elfamycin
Current AB:	Beta_lactamase_class_C Bleomycin Cycloserine Ethambutol Aminoglycoside_vancomycin Viomycin
Species:	Klebsiella pneumoniae
Strain:	ATCC_BAA-2146_STST_27

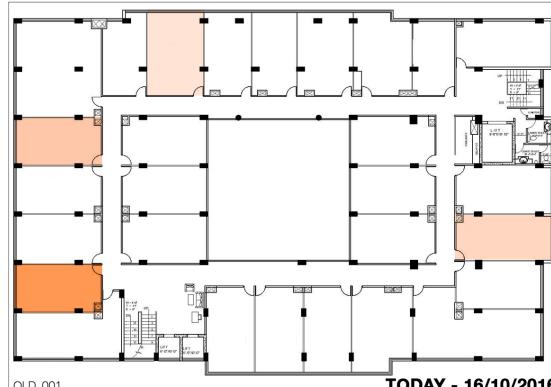
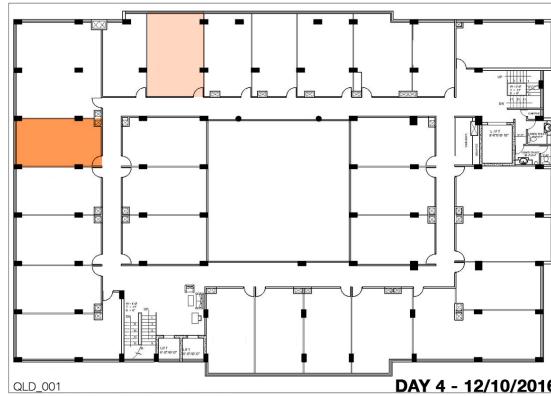
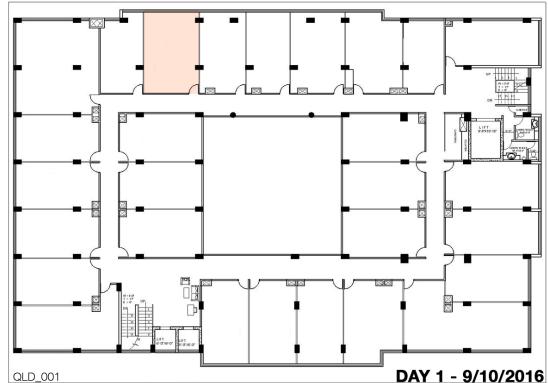
Real-time tracking of an antibiotic resistant bacterial outbreak

- Visualize outbreak information in **real time**
- Shows how disease spreads
- Mapping is the only the start



Future directions

- Visualize an outbreak within hospital
- Phylogenetic analysis of an outbreak
- Compare current to previous outbreaks
- **Expand the diagnostic capacity of approach**
 - Focused on superbugs
 - Viruses
 - Parasites
 - Fungi



Achievements

- Solved our problem
 - Improved accessibility
 - Report bacterial profile in the context of a specific patient
 - Store de-identified results from multiple patients
 - Provide real-time information to healthcare workers at epidemiology level
 - Best choices for individuals and groups of populations
- Web app that anyone can use
 - Online at: <http://superbugs.ovh>



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Resistances:	["beta-lactamase", "sulphonamide", "aminoglycoside", "quinolone", "tetr

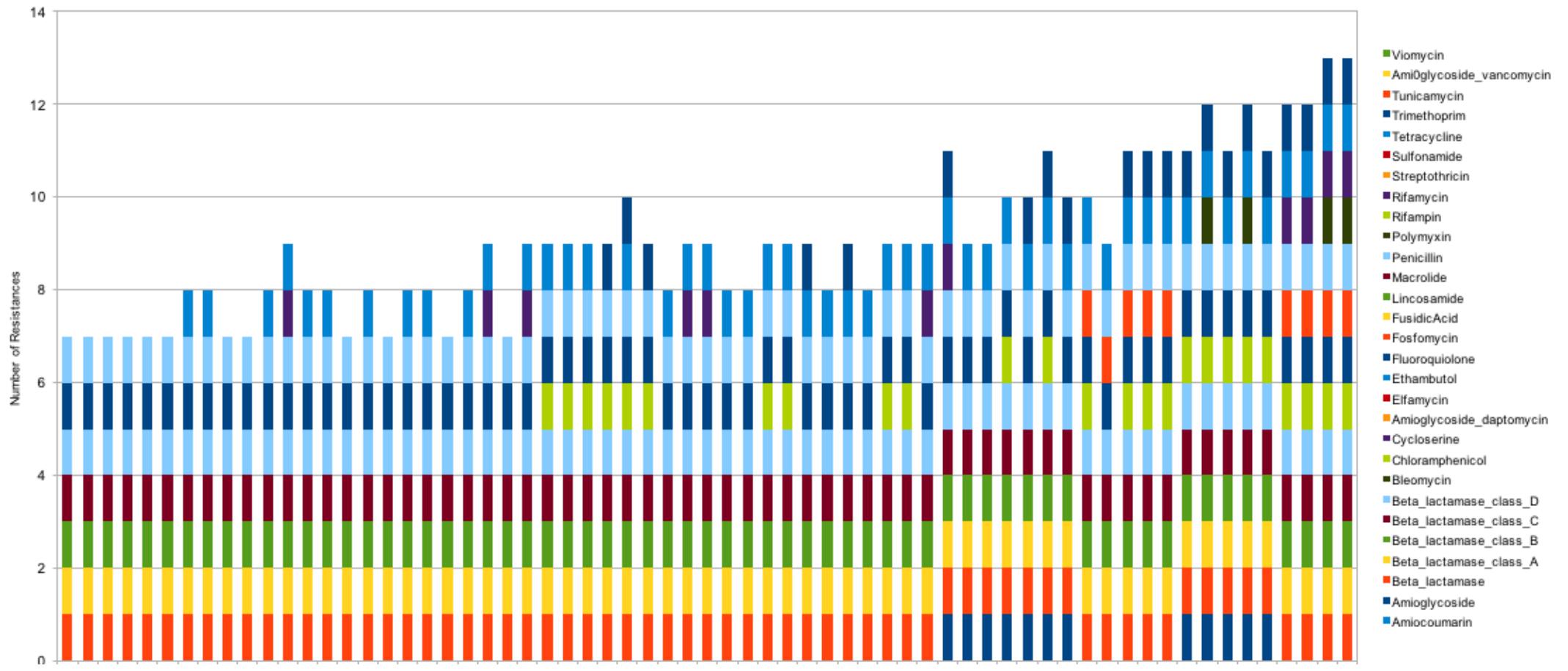
Samples List

SuperFriends Against SuperBugs

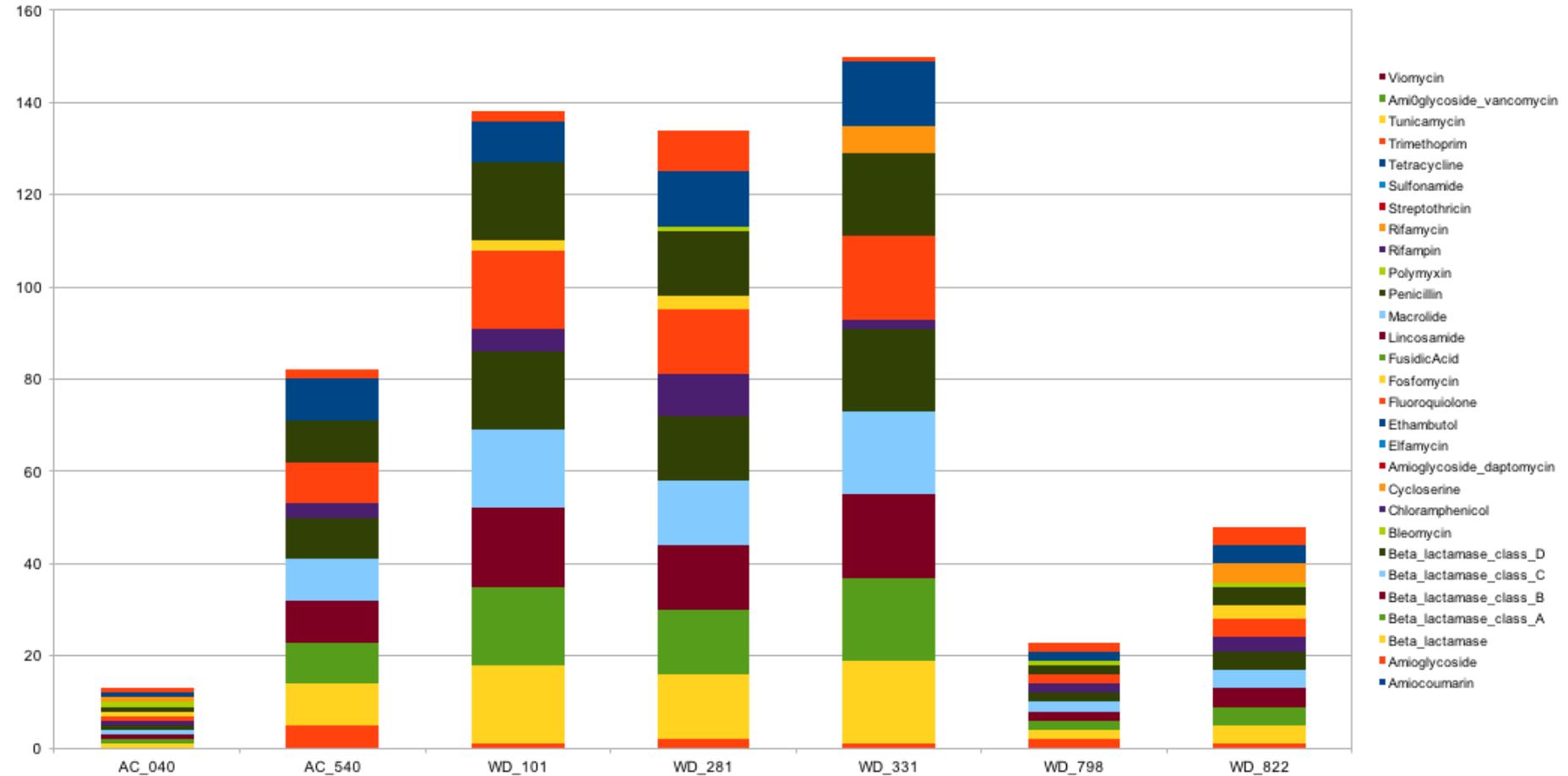
- Problem Owners
 - Alan Robertson
 - [@actually_alan](#)
 - Michael Hall
 - [@mbhall88](#)
 - Jake Parker
 - [@ingeneousmachin](#)
 - Miranda Pitt
 - [@No, I have better things to do, and like, my email is out there if people want to contact me](#)
- Superstars
 - Lisa P
 - [@Yes, a real live person without twitter](#)
 - Jacek S
 - [@JackSokolowski](#)
 - Jacek S
 - [@jserafinski](#)



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