

# WHONET Introduction

Julhas Sujan  
Researcher, IVI





- Describe WHONET concept and purpose
- Describe and locate available WHONET resources
- Create a WHONET lab configuration and enter AMR data manually
- Conduct AMR data analysis (Part 1: %RIS Statistics, isolate filters, isolate listings, summary statistics, cumulative antibiograms, annual trends)
- Conduct AMR data Analysis (Part 2: Macros, Enhanced CA, Scatterplot analysis, resistance profiles, MDR/XDR/PDR, isolate alerts, cluster alerts/outbreak detection, automated reports)

# Objectives - Cumulative Antibigrams (CA)



- Describe basics and pitfalls of cumulative antibigrams (CA)
- Generate routine and enhanced CAs with WHONET



- Describe BacLink concept and purpose
- Practice AMR data export/import of VITEK-2 files and import of Excel files



## **Surveillance of antimicrobial resistance and microbial populations**

Clinical, public health, and research microbiology laboratories generate a richly-detailed window into evolving microbial populations in real-time. Yet this resource remains largely untapped and underutilized.

The use of a common software supports local, national, regional, and global collaboration and analyses to support:

- recognition, tracking, and containment of emerging threats (including outbreaks) in real-time
- cost-effective patient care through antimicrobial stewardship, including locally-relevant standard treatment guidelines
- public health awareness, policy, interventions, and assessment of interventions
- Local and national capacity for quality laboratory testing
- Basic science and operational research

# WHO Consultation on Surveillance of Antimicrobial Resistance



WORLD HEALTH ORGANIZATION

ORGANISATION MONDIALE DE LA SANTE

SURVEILLANCE OF ANTIMICROBIAL RESISTANCE REPORT OF A CONSULTATION

Geneva, 22-26 November 1982

## CONTENTS

BVI/PHA/ANT/82.2

ENGLISH ONLY

CONSULTATION

LEVEL

OBSERVATION

USE

LOCAL

Frequency of resistance to each antibiotic

Aid selection of antibiotics for individual patients.

Frequency of resistance to each combination of antibiotics

Identify cross-infecting strains, locally endemic resistance plasmids

Local trends in resistance

Aid reevaluation of local antibiotic usage and infection control practices

NATIONAL

More resistance to one antibiotic than usual in other countries.

Decrease use of the antibiotic, introduce alternative agents.

Variation in antibiotic resistance in different regions of the country.

Seek regional differences in usage, vehicles of resistance spread, e.g. food or water, hygienic practices.

General level and trend of national resistance overall in comparison with other countries

Review, revise national antibiotic usage strategy to increase its effectiveness, reduce costs and resistance.

Regional

Global trends in resistance to various antibiotics, prevalence of different bacterial genera.

Guide development, use of new antibiotics, ways of preserving efficacy of older ones. Compare practices in different countries.

GLOBAL

Early detection of new resistance to an antibiotic in a particular strain in a particular area.

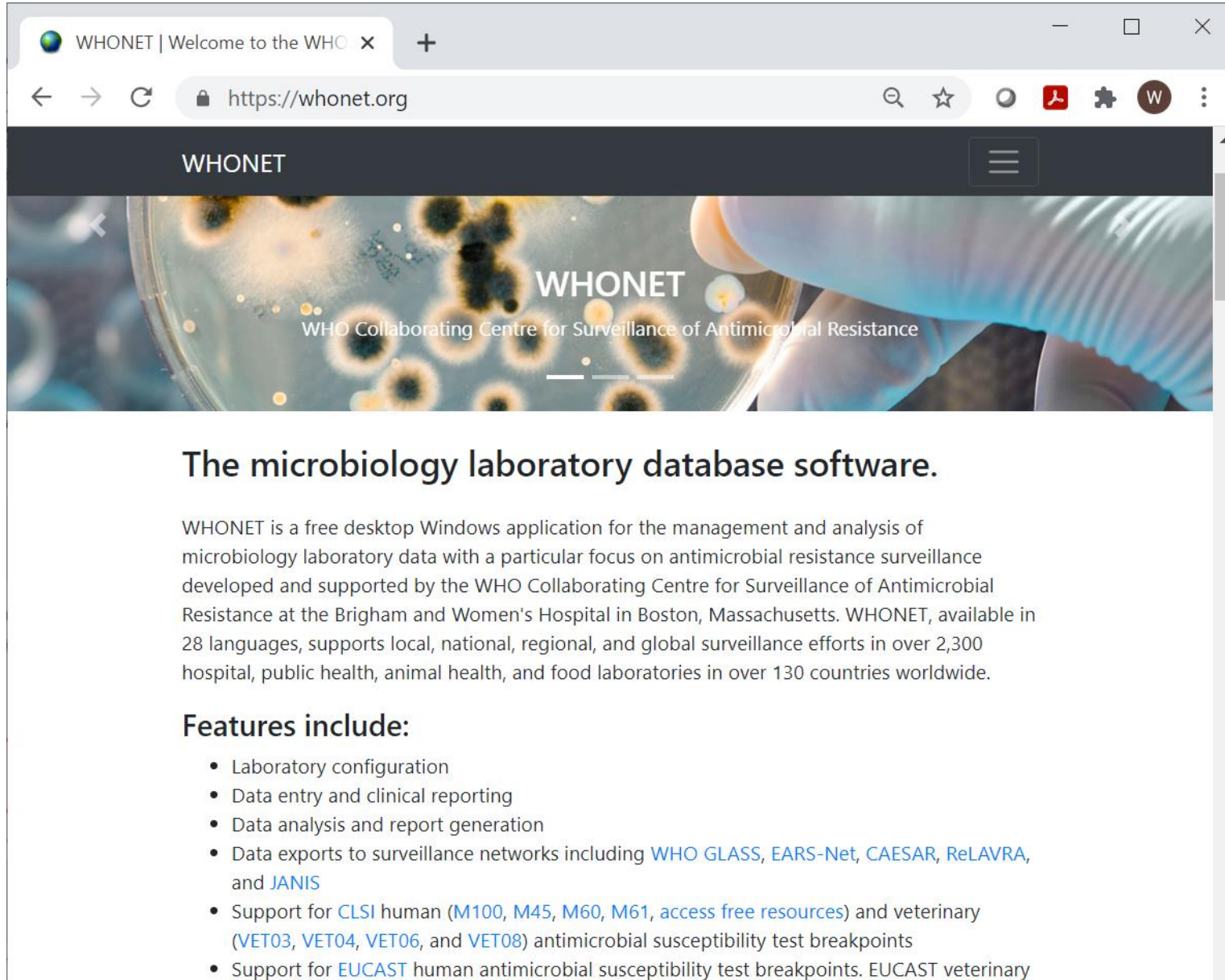
Global warning to detect, contain treat the emerging strain, examine circumstances preceeding its emergence.

Global trends in prevalence of distinctive combinations of resistance or resistance genes

Detection, prevention of international spread of particular resistance plasmids or resistant strains.

WHO Consultation on Surveillance of Antimicrobial Resistance – 1982  
-- Emphasis on the local, national, and global needs for surveillance and for action



A screenshot of the WHONET website in a web browser. The browser's address bar shows 'https://whonet.org'. The website has a dark header with the 'WHONET' logo and a hamburger menu icon. Below the header is a large banner image showing a petri dish with bacterial colonies and a gloved hand. The text 'WHONET' and 'WHO Collaborating Centre for Surveillance of Antimicrobial Resistance' is overlaid on the banner. The main content area has a white background and contains the following text:

**The microbiology laboratory database software.**

WHONET is a free desktop Windows application for the management and analysis of microbiology laboratory data with a particular focus on antimicrobial resistance surveillance developed and supported by the WHO Collaborating Centre for Surveillance of Antimicrobial Resistance at the Brigham and Women's Hospital in Boston, Massachusetts. WHONET, available in 28 languages, supports local, national, regional, and global surveillance efforts in over 2,300 hospital, public health, animal health, and food laboratories in over 130 countries worldwide.

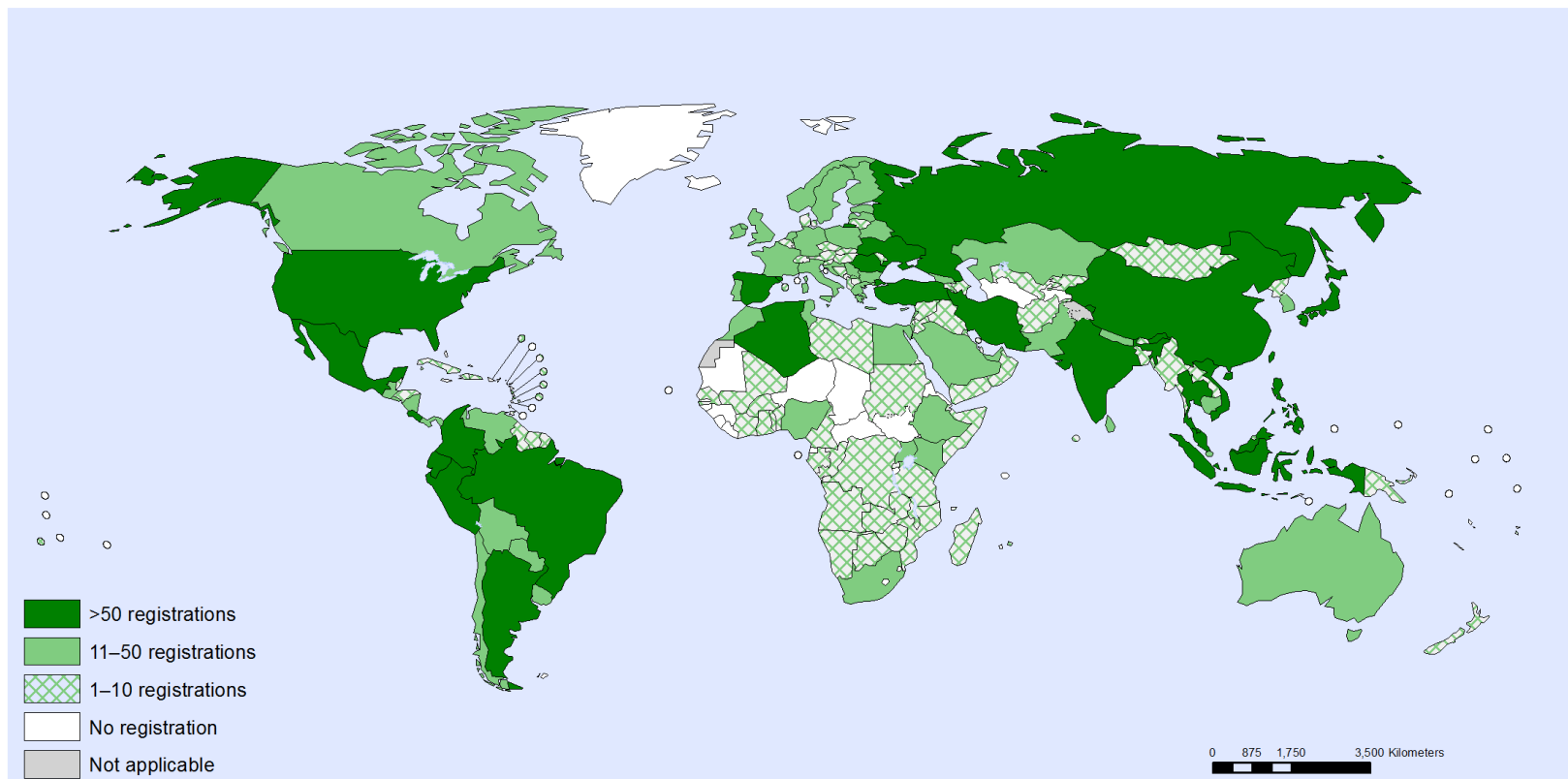
**Features include:**

- Laboratory configuration
- Data entry and clinical reporting
- Data analysis and report generation
- Data exports to surveillance networks including [WHO GLASS](#), [EARS-Net](#), [CAESAR](#), [ReLAVRA](#), and [JANIS](#)
- Support for [CLSI](#) human ([M100](#), [M45](#), [M60](#), [M61](#), [access free resources](#)) and veterinary ([VET03](#), [VET04](#), [VET06](#), and [VET08](#)) antimicrobial susceptibility test breakpoints
- Support for [EUCAST](#) human antimicrobial susceptibility test breakpoints. EUCAST veterinary

# WHONET Registrations around the world



Registered WHONET users, 2013



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization  
Map Production: Health Statistics and  
Information Systems (HSI)  
World Health Organization

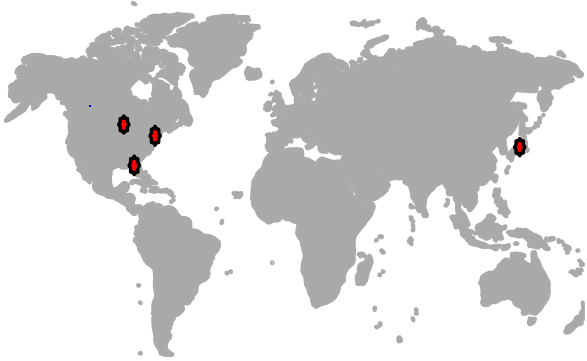


© WHO 2013. All rights reserved.

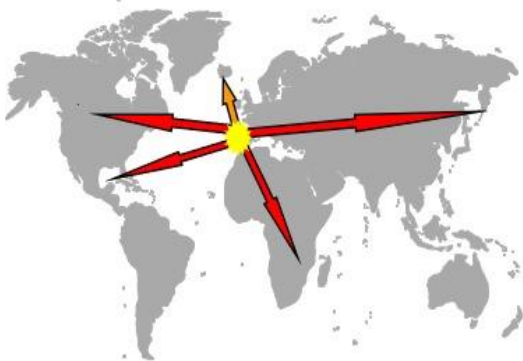




Appearance

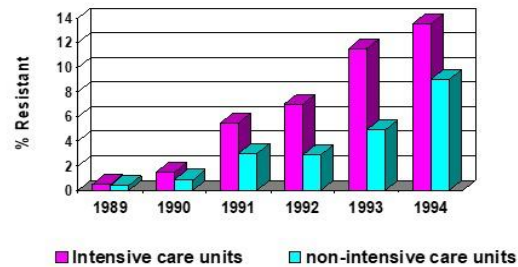


Dissemination

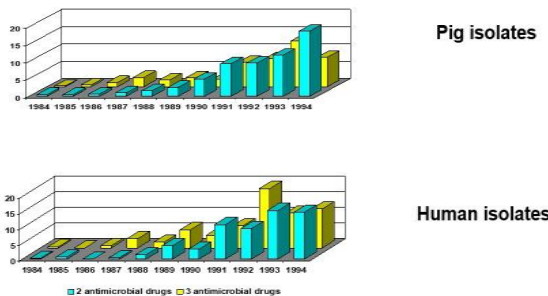


EMERGEN  
CE OF  
ANTIMICR  
OBIAL  
RESISTAN  
CE

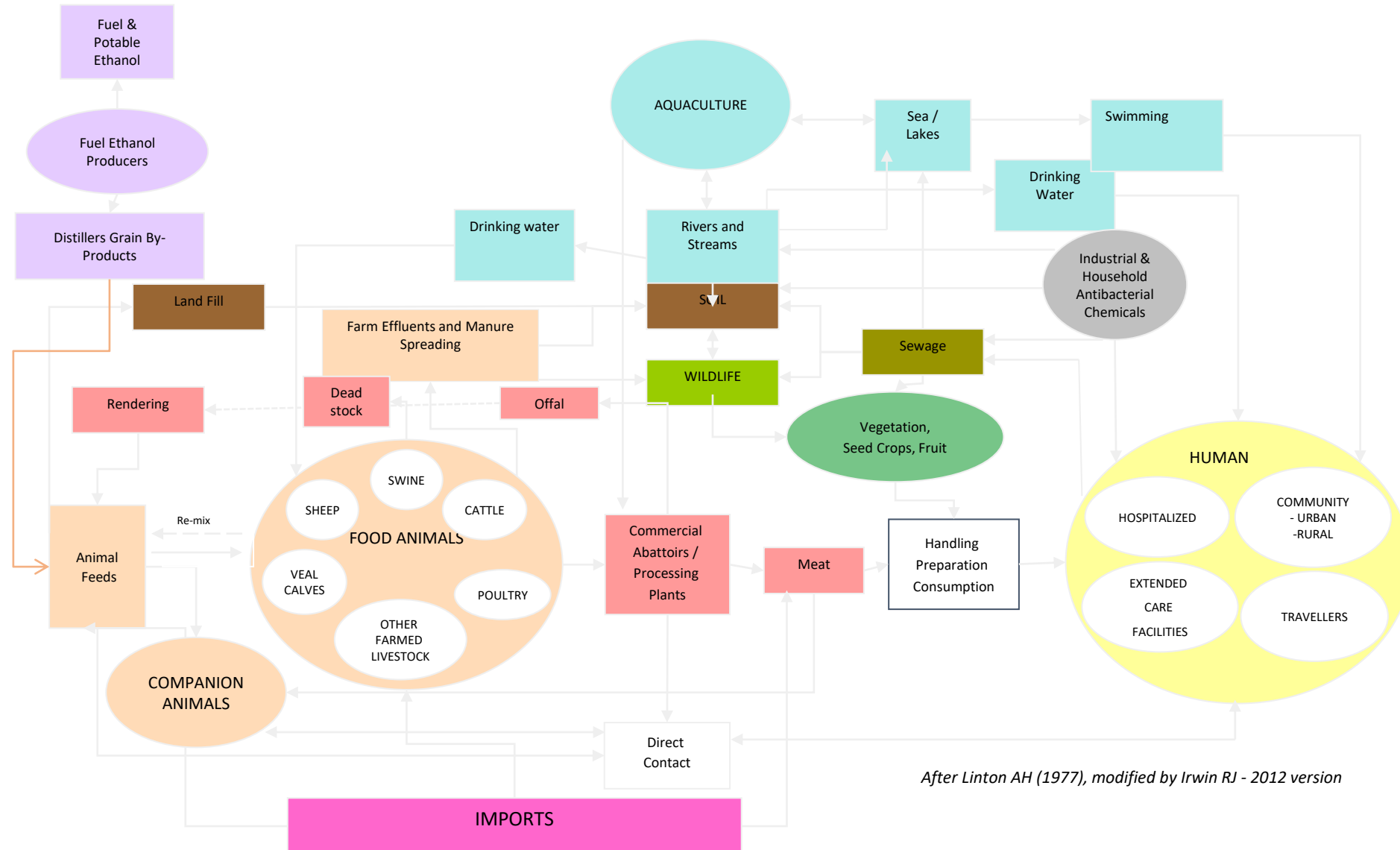
Establishment



Transfer between sectors



# One Health view of antimicrobials and resistance



After Linton AH (1977), modified by Irwin RJ - 2012 version

# AMR Surveillance objectives



Objectives	Local	National	Regional	Global
<b>Policy and advocacy</b>				
Priority setting and funding	X	X	X	X
Awareness and education	X	X	X	X
Legislation and regulation			X	X
<b>Epidemiology of resistant microbes</b>				
Pathogen and resistance trends	X	X	X	X
Recognition of emerging threats	X	X	X	X
Disease burden	X	X	X	X
Benchmarking		X	X	X
<b>Resistance containment</b>				
Treatment guidelines	X	X		
Response to emerging threats	X	X	X	X
Assessment of interventions	X	X	X	X
New diagnostics and therapeutics			X	X
<b>Capacity-building</b>				
Laboratory capacity	X	X	X	X
Epidemiological capacity	X	X	X	X



- High-Level Meeting on AMR - 2016
- Inter-Agency Collaborative Group on AMR (IACG)
- One Health Global Leaders Group on AMR (GLG)
- Sustainable Development Goals
  - New indicators for MRSA and ESBL *E. coli* in blood



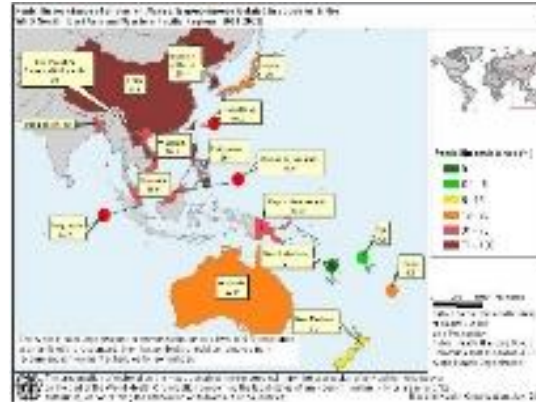
**NO TIME TO WAIT:**  
SECURING THE FUTURE  
FROM DRUG-RESISTANT  
INFECTIONS

**REPORT TO THE  
SECRETARY-GENERAL  
OF THE UNITED NATIONS**

**APRIL 2019**

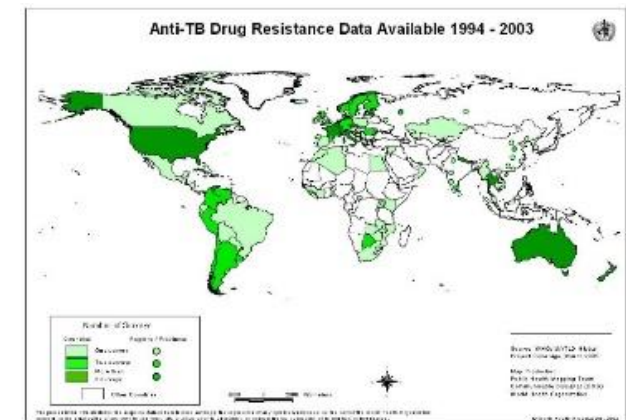


- WHO GLASS modules
  - Core AMR surveillance
  - Core AMC surveillance
  - EAR – Emerging Antimicrobial Resistance
  - EGASP – AMR in *Neisseria gonorrhoeae*
  - AMR in Candidemia
  - Attributable mortality in bacteremia
  - Hospital Antimicrobial Use Point Prevalence Study
  - ESBL *E. coli* TriCycle
- Pathogen- or subject-specific programs
  - AGISAR (Advisory Group for Integrated Surveillance of Antimicrobial Resistance)
  - Global Foodborne Infections Network (GFN)
  - WHO/IUTLD TB
  - HIVResNet
  - Malaria



Global Antimicrobial  
Resistance and Use Surveillance  
System (GLASS) Report

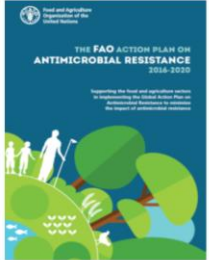
2021



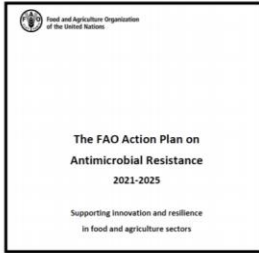
# Food and Agriculture Organization of the UN



The FAO Action Plan on AMR 2016-2020



Draft proposal for the Action Plan on AMR 2021-2025



- FAO AMR Surveillance guidelines
  - Published: AMR in healthy animals
  - Advanced draft: AMR in diseased animals and in aquiculture
  - In development: AMR in animal environment and Antimicrobial use
- FAO-ATLASS: FAO Assessment Tool for Laboratories and AMR Surveillance Systems
- FAO-PMP-AMR: FAO Progressive Management Pathway for AMR
- FAO Technical Working Group on AMR Data Management

## Outcome 2



Strengthened evidence through multisectoral **surveillance** and **research** on AMR, AMU and antimicrobial residues

- Laboratory capacity for generating high-quality data and metadata on AMR and antimicrobial residues is improved
- Surveillance, monitoring, and research for AMR, AMU and antimicrobial residues is supported
- Epidemiology resources and capacities are developed





## WHONET 2022

- AMR data entry, data analysis, and sharing
- 26 languages, incl. Arabic
- Supports CLSI 2022 breakpoints (M100, M45, M60, M61)
- Supports EUCAST 2022 breakpoints




## BacLink

- For the capture and standardization of data from existing systems
  - Simple data files: Text-, MS Excel-, MS Access-data files
  - Laboratory instruments: e.g. Vitek™, BD Phoenix™, MicroScan™, ..
  - Laboratory information systems (LIS): Commercial, or locally developed
- Included as part of the WHONET package



# Laboratory configuration



 Laboratory configuration X

Country  WHO

Laboratory name

Laboratory code  Configuration file: labwho.tst  
Maximum 3 letters

☐ Human  
☒ Human, Animal, Food, Environment

Required: Enter the antibiotics tested in your laboratory.

Optional: Enter your patient locations, departments, and institutions.

Optional: Select the fields to include in your data files.

Optional: Define alert rules

# Data entry – Manual



**Sample origin**  
**Human/animal/  
food/environment**

**Location**

**Specimen**

**Organism**

**Antibiotics**  
**Disk, MIC, Etest**

**Other**

Data entry: C:\whonet5\Data\W16WHO.TST

Origin: Human

Origin: Identification number: Date of birth: First name: Age: Last name: Age category: Sex: Date of admission:

Location: Location: Location type: Institution: Department:

Specimen: Specimen number: Specimen type: Specimen date: Reason:

Microbiology: Organism: Serotype: Beta-lactamase: ESBL:

Antibiotic panel: All antibiotics

☒ Disk ☐ MIC ☐ Etest

AMK	AMC	AMP	ATM
CRB	MAN	CTX	FOX
CAZ	CZX	CMX	CEP
CHL	CIP	CLI	DOX
ERY	GEN	IPM	MEZ
MNO	NIT	NOR	NOV
OXA	OFX	PEN	PIP
RIF	SSS	TEC	TCY
TIC	TCC	TOB	SXT
VAN			

Other: Comment:

Save isolate  
View database  
BacTrack summary  
Print  
Exit  
Caliper  
Clear

Search  
Extended list

TESSy name = Pathogen

- aba Acinetobacter baumannii
- bfr Bacteroides fragilis
- pce Burkholderia cepacia
- cco Campylobacter coli
- caj Campylobacter jejuni ss. jejuni
- cal Candida albicans
- cfr Citrobacter freundii
- cdp Corynebacterium sp. (diphtheroids)
- cmv Cytomegalovirus
- eae Enterobacter aerogenes
- ecl Enterobacter cloacae
- eav Enterococcus avium
- efa Enterococcus faecalis
- efm Enterococcus faecium
- ent Enterococcus sp.
- ebv Epstein-Barr virus
- eco Escherichia coli
- 157 Escherichia coli O157:H7
- hin Haemophilus influenzae
- hxb Haemophilus influenzae (not type b)
- hib Haemophilus influenzae (type b)
- hav Hepatitis A virus
- hbv Hepatitis B virus
- hcv Hepatitis C virus
- hsv Herpes simplex virus
- hs1 Herpes simplex virus 1
- hs2 Herpes simplex virus 2
- hhv Human herpesvirus
- hpv Human papillomavirus
- iva Influenza A virus
- ivb Influenza B virus
- kpn Klebsiella pneumoniae ss. pneumoniae
- lmo Listeria monocytogenes
- mix Mixed bacterial species present
- hpa Moraxella (Branche) Lactobacillus

# Data entry – Import with BacLink



Most laboratories in the medium- and high-resource world already have computer systems for managing their microbiology data... and also many in low-resource settings.

- Simple desktop systems: Excel, Access,...
- Laboratory instruments: Vitek, Microscan, BD Phoenix, etc.
- Laboratory information systems: Commercial or in-house

This is an obstacle because they are not directly compatible.

But it is also an opportunity! The electronic data have been stored.

The goal of BacLink is converting data from existing incompatible systems into common WHONET files.



Incompatible Local systems

BacLink



WHONET

Standard WHONET files

# Data analysis



WHONET 5.6 WHO Test Hospital

Data analysis: WHO Test Hospital

Analysis type

Study - RIS and test measurements  
All antibiotics

Options

One per patient?

Organisms

Isolates

sau Staphylococcus aureus ss. aureus  
eco Escherichia coli

Specimen type: ur

Data files

w0195who.tst

Output to: Screen

Macros

Begin analysis

Exit

# Data analysis, alert, and report features



## Clinical reports

WHO Test Hospital

Identification number = 12345  
 First name = John  
 Last name = Smith  
 Date of birth = 1-Jan-1980

Location = ICU East  
 Specimen number = 67890  
 Specimen date = 20-Jul-2021  
 Specimen type = Blood

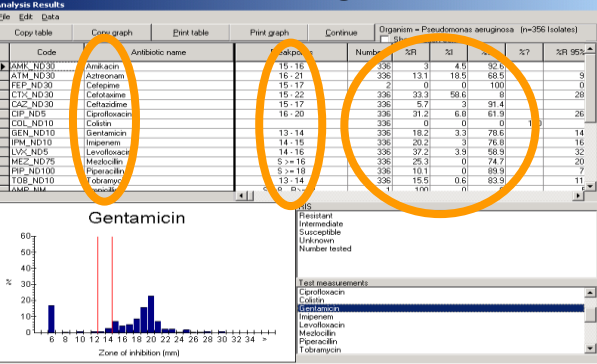
---

Organism = *Escherichia coli*

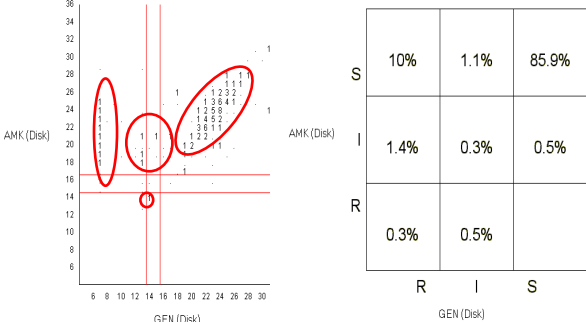
Ampicillin	R 6 mm	Aztreonam	R 10 mm
Cefotaxime	R 20 mm	Ceftriaxone	S 30 mm
Ceftazidime	I 20 mm	Cefuroxime	R 10 mm
Cephalexin	S 20 mm	Ciprofloxacin	R 6 mm
Gentamicin	R 6 mm	Imipenem	I 20 mm
Meropenem	R 6 mm	Trimethoprim/Sulfamethoxazole	S 16 mm

29-Jul-2021 08:42 R = Resistant I = Intermediate S = Susceptible NS = Non-susceptible

## %RIS and histograms

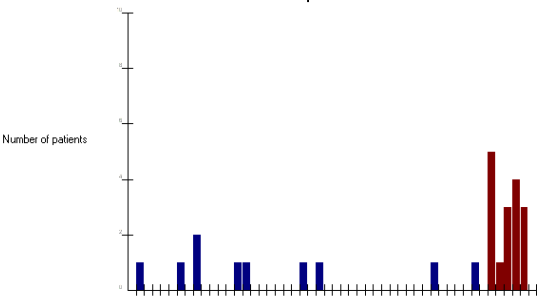


## Scatterplot



## Outbreak detection

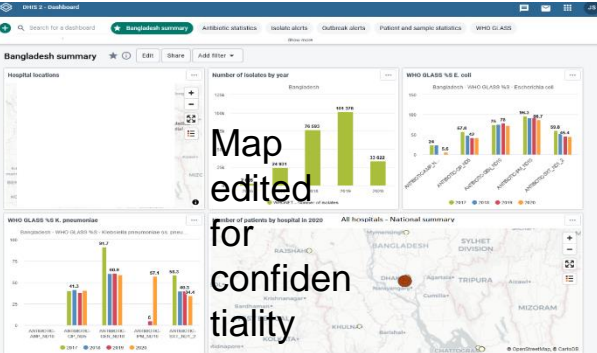
*S. sonnei* non-susceptible to SXT



## Microbiology alerts

CHL	CIP	CLI	COL	ERY	GEN	IPM	LVX	M
S	R		?		I	R	R	R
I	R		?		I	R	R	R
I		R		R	S	R	R	R

## DHIS2



## MicroReact

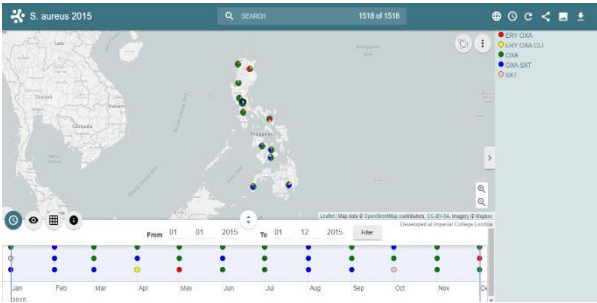


Figure 4: Screenshot of Microreact File for *S. aureus* 2015

## WHO GLASS





WHONET is for the surveillance of evolving microbial populations  
One focus is on annual surveillance of priority resistance trends – trends, treatment guidelines, advocacy  
But there are many other applications of greater value in real-time to support the recognition and containment of emerging threats including novel resistant strains and possible outbreaks to improve laboratory capacity and data quality

# What's new in WHONET 2023?



## Migration from WHONET 5.6 with Microsoft Visual Basic 6 (1998) to WHONET 2017+ with Microsoft Visual Studio 2022 .NET 4

- Some advantages of Visual Studio
  - Modern, compatible, comprehensive set of programming tools
  - Multi-threading to support faster and multiuser performance
  - Expanded debugging details (partially implemented)

## Data management

- Migration from DBF files to SQLite – but both are supported
- SQLite is more modern, faster, smaller, fewer restrictions, more secure (and suitable for web platforms), support multiple users

## Automatic language translations (but requiring validation)

- If there is any need, these options exist in Google Translate. Bengali, Gujarati, Kannada, Malayalam, Marathi, Nepali, Oriya, Punjabi, Sindhi, Sinhala, Tamil, Urdu



# Adaptations for non-human health sectors



Introduced in 2002, gradual improvements over time in collaboration with FAO, OIE, US FDA and USDA

## Expanded WHONET data field and code lists

- Animal species, production type, food type, etc.
- Pathogens, antimicrobials, specimen types, etc.
- AGISAR and TriCyle *E. coli* ESBL projects
- Integration with SILABFA and DHIS2

## Breakpoints

- CLSI: Human (M100, M45, M60, M61) and Veterinary (VET01, VET06, VET03, VET04) clinical breakpoints
- EUCAST: Human clinical breakpoints and Epidemiological Cutoff Values (ECOFFs/ECVs). Veterinary breakpoints are in development
- Integration of WHONET with ECOFFinder

## One Health Sample data

- 100 human, 100 animal, 100 food, and 100 environmental isolates

# Installation and configuration



Laboratory

Country code	Laboratory code	Laboratory name
WHO	ECC	ESBL Ec Tricycle
WHO	AGI	WHO AGISAR Sample data
WHO	GLS	WHO GLASS Demonstration
WHO	TST	WHO Test Hospital

Laboratory

Country code	Laboratory code	Laboratory name
WHO	TST	WHO Test Laboratory

- Increasing number of pre-defined laboratory configuration templates
- Merged together 4 configurations into 1
- Merged 4 sample data files into two
  - One month of human health hospital data
  - One Health data set with human, animal, food, and environmental results (100 isolates of each)
- Expanded support for breakpoints and epidemiological cutoff values (more details later)
- Resistance profile auto-configuration feature





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New “View database” feature for SQLite files including more advanced searching, “find and replace”, result paging (valuable for large data files)  
Initial steps towards a “Patient lookup” record across multiple files



Modest improvements in clinical reports (but more to come)



- Reorganized “Analysis options”
- More WHONET-SaTScan features for cluster detection
- Dynamic and configurable breakpoint selection
- Quick analysis
  - Standard reports for Excel
  - Standard reports for Word
- Publications in PubMed
  - <https://pubmed.ncbi.nlm.nih.gov/?term=stelling+antimicrobial+resistance>
  - <https://pubmed.ncbi.nlm.nih.gov/?term=stelling+satscan>
  - <https://pubmed.ncbi.nlm.nih.gov/?term=stelling+resistance+genotype>



WHO  
GLASS

- WHO GLASS-AMR
- WHO GLASS-Candidemia
- WHO GLASS-Individual
- WHO EGASP (in development)

DHIS2

# New AST Interpretation engine



Converting “zone diameters” and “MIC values” to R, I, S (and other) categories is complex to implement, tedious to maintain over time, and often done incorrectly.

- Disease-specific (meningitis, nonmeningitis, UTI, etc.)
- Animal specific (human, horse, dogs, fish, etc.)
- Expert rules (MRSA, inducible clindamycin resistance, ESBL, BLNAR), intrinsic resistance rules, epidemiological cutoff values
- Because of these complexities, many LIMS only record RIS categories without test measurements
- There are also valuable public health alerts like “important species” and “importance resistance” and laboratory “data quality alerts”

Based on prior WHONET work and with support from MSF in 2021, we have developed a “table-driven” approach for linking all of the needed data together to convert an “organism”, an “antibiotic”, and a “measurement” into all relevant interpretations (and expert alerts)

These tables are currently used by WHONET and by MSF’s Mini-LIMS system. We are now collaborating MSF, Wellcome Trust, and many others to further validate develop “table-driven” interpretation so that this could be a common good for use by LIMS developers anywhere.



## WHONET Standard reports

WHONET Standard report
User-defined
DHIS2

Report name

- 1. DHIS2 - Isolate listing summary - Laboratory + Country by Week
- 2. DHIS2 - Isolate listing summary - Laboratory + Organism by Month
- 3A. DHIS2 - Susceptibility summary - Gram negative Organism + Laboratory by Month
- 3A. DHIS2 - Susceptibility summary - Gram positive Organism + Laboratory by Month

## WHO GLASS Export

Save as type:
WHO GLASS-AMR

Data year:
2020

Data set:
Data set 1

☒ Use a date filter
☒ Export to DHIS2

## Display of Data Set and Events – WHO GLASS Example

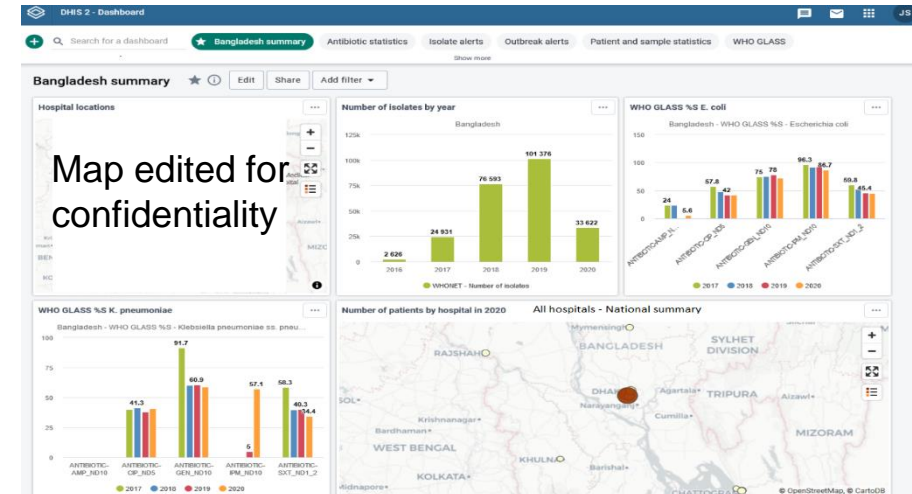
Organisation Unit: BGD - ALL
Data Set: GLASS - RIS
Period: 2018
ORGANISM: Escherichia coli
SPEC\_TYPE: Blood

BGD - ALL - 2018 - No Data Element Selected
Print form
Print blank form

Filter in section

	Community origin					
	01<04	05<14	25<34	55<64	65<74	<1
WHONET - Amikacin						
WHONET - Ampicillin			3	26	27	3
WHONET - Azithromycin						
WHONET - Carbapenems				1	2	3
WHONET - Cefepime			1	13	21	4

## Dashboard display







## The Fleming Fund Grants Programme



### Regional Grants

To support regional One Health approaches to improved surveillance of AMR and AMU



### Country Grants

To improve capacity for AMR and AMU surveillance systems using a One Health approach



### Fleming Fellowship Scheme

Individualised professional development, mentoring and leadership training for 4-8 Fellows per country

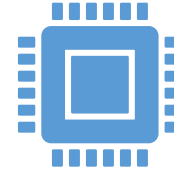
# Grant Objectives



## **Workstream 1: Training**



## **Workstream 2: Technical support**



## **Workstream 3: New software development**

Desktop application

“Web presence”



- Training resources
  - Training modalities: In-person, online, self-training; Basic/refresher, advanced, specialized; Demonstration versus hands-on
  - Training materials: Tutorials, PowerPoints (with facilitator notes), exercises, YouTube videos, course agenda... perhaps certification exam?
  - National and regional trainers
- Training strategies, priorities, and activities
  - Coordinate with WHO, FAO, national partners, others
  - Prioritized training and training-of-trainers



- Technical support resources
  - Technical support materials, Frequently Asked Questions
  - User group discussion forum
  - Technical support individuals
- National and regional technical support strategy, priorities, and activities
  - Coordinate and develop plan with WHO, FAO, countries, others
  - Tiered strategy for first-line, second-line, and third-line technical support

# Workstream 3: Software development

## WHONET Desktop application

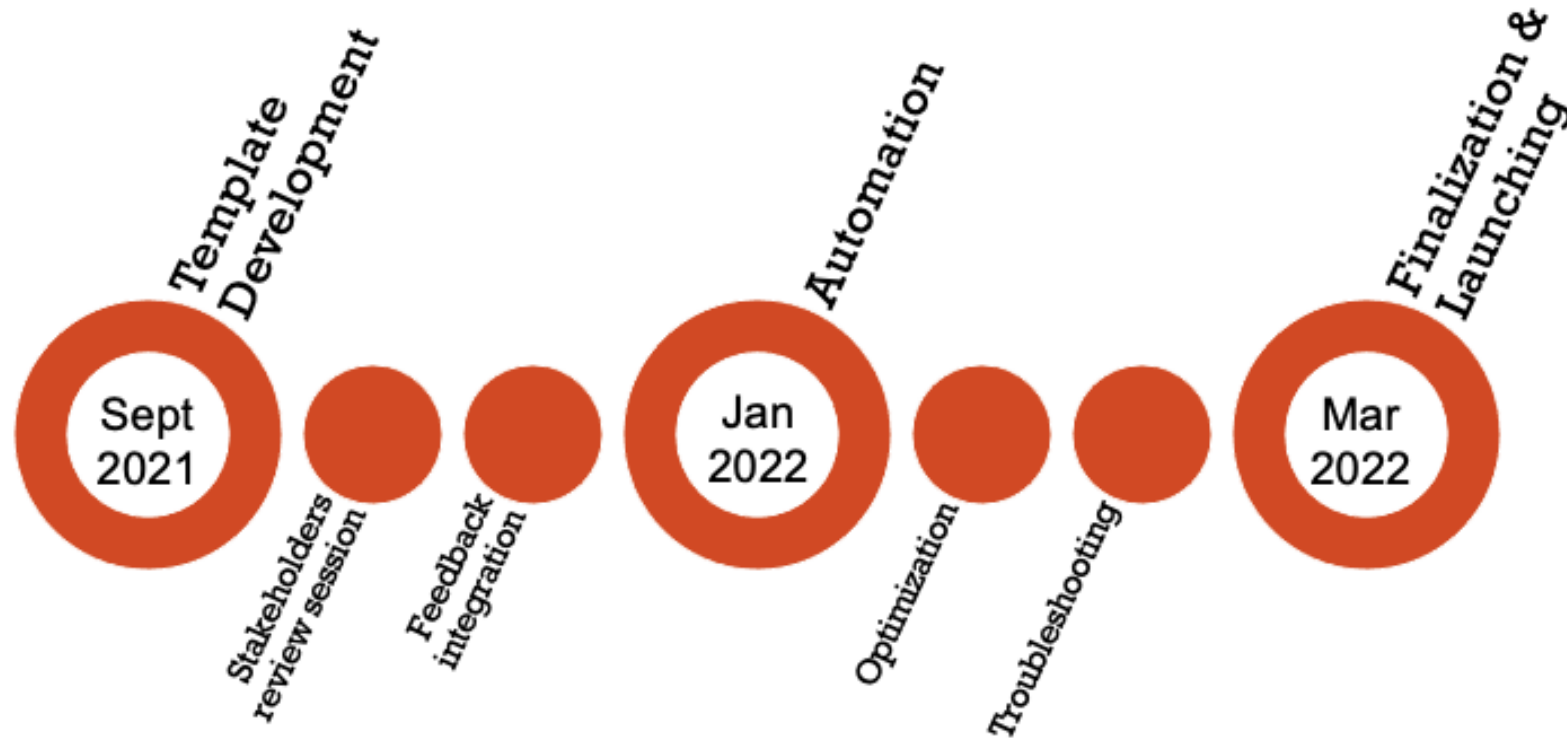


- BacLink interfaces
  - “Clean” versus “messy” LIMS data exports
  - Work with vendors, integrated into BacLink
- WHONET for national/network data managers
- WHONET Automation tool



- Desktop WHONET accessible through the Cloud
- WHONET for Web – priority features
  - Remote multisite data entry into network database
  - Data file upload feature into network database
  - Guidance on secure transfer of WHONET data files
- Integration with web surveillance platforms and nvisualization tools
  - DHIS2, GLASS, Microreact
- Migration from Microsoft Visual Studio from version .NET 4 to .NET 6

# Methodology for development of the Report

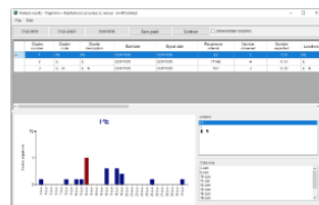






## Software

### WHONET 2022



WHONET 2022 is a modernized and expanded version of WHONET 5.6. This version supports 44 languages and includes new features for exporting to the **WHO GLASS** data structure. Further [information on GLASS](#) can be found using this link.

It includes support for CLSI 2022 M100, M45, M60, M61, as well as EUCAST 2022 bacterial breakpoints. Also included are the most recent CLSI VET01, VET03/04, and VET06 breakpoints.

#### Download

[32-bit installation](#) (88 MB)  
[64-bit installation](#) (88 MB)

**Build date:** 2022-05-13  
**Version:** 22.5.13  
[Release notes](#)

### WHONET 5.6



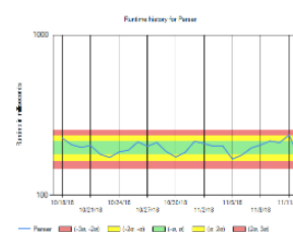
WHONET 5.6 is a desktop application with support for 24 languages and 2022 CLSI and EUCAST breakpoints.

#### Download

[32-bit installation](#) (60 MB)

**Build date:** 2022-04-20

### WHONET Automation Tool



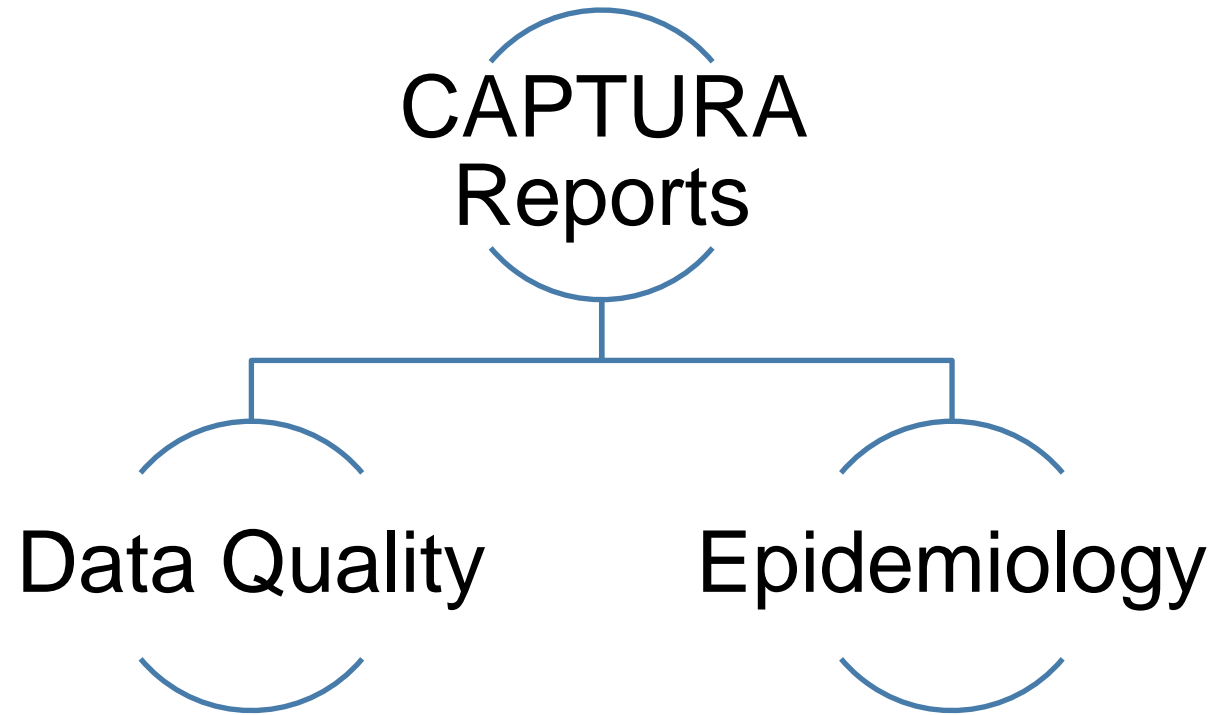
#### Download

[32-bit installation](#) (4.6 MB)  
[64-bit installation](#) (4.6 MB)

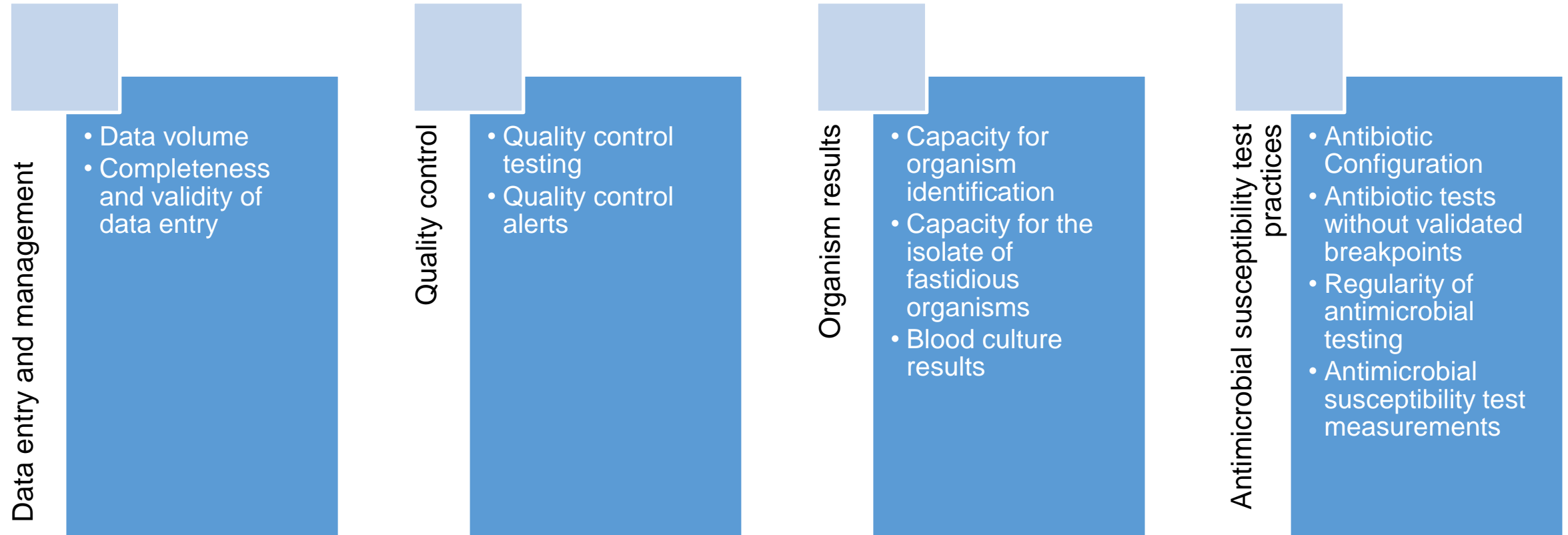
**Build date:** 2021-09-23  
**Version:** 21.9.23

The Automation Tool can be configured to execute an entire workflow of data processing, aggregation, and analysis steps. It includes optional services which either run on a set schedule, or are triggered in response to new files appearing in designated "watched" locations. You can configure any set of analyses you wish, from simple statistics to sophisticated outbreak detection. The system also has integrated process monitoring and email alerts for:

- Missing input files
- Duplicated input files
- Lower- or higher-than-expected row counts
- Lower- or higher-than-expected individual process runtimes
- Duplicated row counts per institution on successive days
- Error messages
- Daily reports



# Data Quality Report



# Data Epidemiology Report



## Patient and sample details

- Patient demographics
- Location details
- Sample details

## Organism statistics

- Organism frequencies
- Organism frequencies by specimen categories
- Organism trends

## Antimicrobial statistics

- Isolate alerts - Important resistance
- Multidrug resistance: ECDC definitions of MDR/XDR/PDR
- Multidrug resistance: Resistance profiles

## Reporting to the World Health Organization and the United Nations

- WHO Global Priority List of Antibiotic-Resistant Bacteria
- WHO GLASS results
- United Nations Sustainable Development Goals

## Cluster detection

- Cluster detection by species
- Cluster detection by resistance profile

## Antibiograms

# Reports



Quick analysis

A report is a collection of several analyses.  
You may define a new report or select one of the reports listed below.

WHONET Standard report User-defined DHIS2

Report name

1. WHONET Standard report
2. Patient and sample statistics
3. Organism and antibiotic statistics
4. Isolate alerts
5. AMASS AMR surveillance report
6. CAPTURA Epidemiology report
7. CAPTURA Data quality report
8. FAO

Edit

View

2 Data files

Dates

Output

3

Screen

Screen

Microsoft Excel

Microsoft Access

Microsoft Word

PDF

SQLite

4

Begin analysis

Exit



Thanks