Synergizing global R&D Antimicrobials Databases?

Interactive session

Synergizing global R&D Antimicrobials Databases

➢ Combating Antimicrobial resistance (AMR)

➢ Databases & AMR

➢ Provider perspective:

      ➢ WHO

      ➢ CO-ADD

➢ User perspective:

      ➢ Global R&D Hub

      ➢ JPIAMR

      ➢ AMR Centre

➢ Synergizing databases

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➢ **Combating Antimicrobial resistance (AMR)**

➢ **Databases & AMR**

➢ Provider perspective:
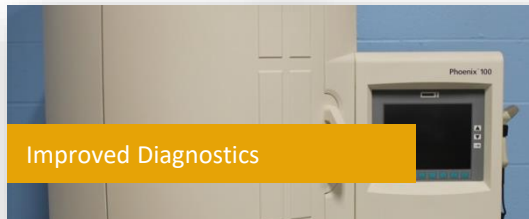
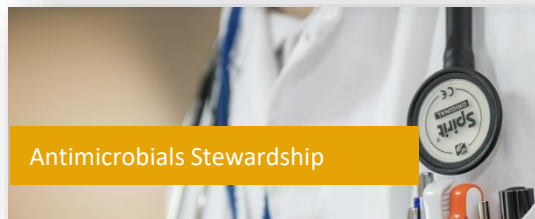   ➢ WHO

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Key strategies to combat AMR

Prevention Infectious Diseases

Novel Antimicrobials

Antimicrobials Stewardship

Improved Diagnostics

Other Antimicrobial Strategies

Key strategies to combat AMR

Prevention Infectious Diseases

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Other Antimicrobial Strategies

LOWER USE
EXISTING AMs

TARGETED USE
EXISITING AMs

NEW AMs
NOVEL APPROACHES

Currently available databases AMR

Key strategy	R&D	Antimicrobials usage	Antimicrobial resistance
Prevention Infectious diseases			
Antimicrobial Stewardship			
Improved Diagnostics			
Novel Antimicrobials			
Other Antimicrobial Strategies			

Currently available databases AMR (1)

Key strategy	R&D	Antimicrobials usage	Antimicrobial resistance
Prevention Infectious diseases			
Antimicrobial Stewardship			GLASS, NARMS, Surveillance Atlas, CARD, MARAN, Nethmap, EARS-Net, Pfizer Atlas etc
Improved Diagnostics			
Novel Antimicrobials			
Other Antimicrobial Strategies			

GLASS
Global Antimicrobial Resistance Surveillance System (WHO)

-> Extent & burden of AMR globally
-> Emerging resistance & int. spread
-> Assess impact interventions

NARMS
National Antimicrobial Resistance Monitoring System for Enteric Bacteria (CDC)

-> Emerging bacterial resistance
-> Spreading resistance
-> Differences susceptible infections

Surveillance Atlas
Surveillance and disease data for antimicrobial resistance (ECDC)

CARD
Comprehensive Antibiotic Resistance Database (CAN)

-> Bioinformatic db resistance genes, their products and associated phenotypes

Currently available databases AMR (2)

Key strategy	R&D	Antimicrobials usage	Antimicrobial resistance
Prevention Infectious diseases			
Antimicrobial Stewardship		AWaRe, OAPR, ESAC-NET	
Improved Diagnostics			
Novel Antimicrobials			
Other Antimicrobial Strategies			

AWaRe
Access, Watch, Reserve (WHO)

-> Tool for antibiotic stewardship
-> Tool for antibiotic monitoring & use
-> Setting performance targets

OAPR
Outpatient Antibiotic Prescription Report (CDC)

-> Outpatient Antibiotic Prescription Report by Year and Interactive Database

ESAC-NET
European Surveillance of Antimicrobial Consumption Network (ECDC)

-> European reference data on antimicrobial consumption
-> Monitoring progress EU & EEA/EFTA prudent use antimicrobials

Currently available databases AMR (3)

Key strategy	R&D	Antimicrobials usage
Prevention Infectious diseases	**Vaccine Pipeline Tracker**	
Antimicrobial Stewardship		
Improved Diagnostics	**Diagnostics Pipeline Tracker**	
Novel Antimicrobials	**WHO Antib.Clinical Development, Antibiotic DB, SPARK, PEW Abx pipeline, DB Acc.to Medicine Fnd, ECC Clin. Trials Register, CO-ADD**	
Other Antimicrobial Strategies		

Vaccine Pipeline Tracker

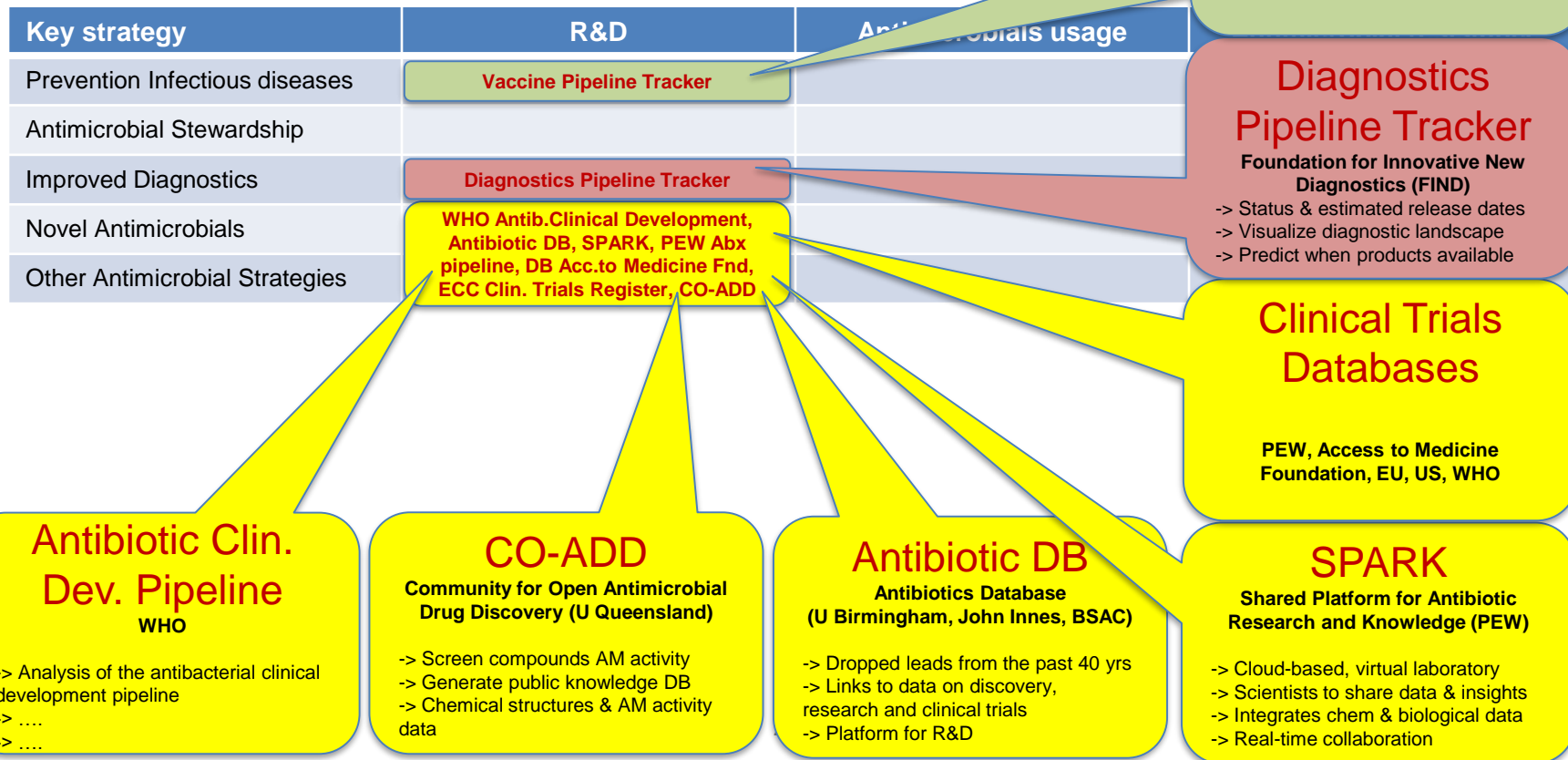**World Health Organisations (WHO)**
-> Candidate vaccines in development
-> List will be expanded in future

Diagnostics Pipeline Tracker

Foundation for Innovative New Diagnostics (FIND)
-> Status & estimated release dates
-> Visualize diagnostic landscape
-> Predict when products available

Currently available databases AMR (3)

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Clinical Trials Databases

PEW, Access to Medicine Foundation, EU, US, WHO

Antibiotic Clin. Dev. Pipeline

WHO

-> Analysis of the antibacterial clinical development pipeline
-> ....
-> ....

CO-ADD

Community for Open Antimicrobial Drug Discovery (U Queensland)

-> Screen compounds AM activity
-> Generate public knowledge DB
-> Chemical structures & AM activity data

Antibiotic DB

Antibiotics Database (U Birmingham, John Innes, BSAC)

-> Dropped leads from the past 40 yrs
-> Links to data on discovery, research and clinical trials
-> Platform for R&D

SPARK

Shared Platform for Antibiotic Research and Knowledge (PEW)

-> Cloud-based, virtual laboratory
-> Scientists to share data & insights
-> Integrates chem & biological data
-> Real-time collaboration

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- **Provider perspective:**
    - **WHO**
    - **CO-ADD**

- User perspective:
    - Global R&D Hub
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- Synergizing databases

WHO's work on antimicrobial stewardship (AMS)

A strategy and coherent set of actions to promote using antimicrobials responsibly

Tools

- WHO EML AWaRe classification
- A practical toolkit for AMS in health-care facilities in LMICs
- E-learning - AMS: A competency-based approach
- Methodology for AMC and PPS at facilities
- Training of trainer materials: AMS/IPC

Network: Launch of a global online network on AMS

- Database of tools and e-learning resources
- Community of practice, information sharing, mentoring etc.

1st Global AMS partners meeting, 24-26 Feb 2020

- Prioritization and development of further tools

Link to the WHO toolkit:
https://apps.who.int/iris/bitstream/handle/10665/329404/9789241515481-eng.pdf

WHO Pre-clinical antibacterial pipeline

- **Phases:** Lead optimization – IND enabling studies

- Biennial WHO online data call supplemented with information from different stakeholders

- 1st report to be published in Dec 2019

  - **145** individual entities & **252** products

  Data: WHO Global Observatory on Health R&D

Location of Activity

Number of Entities (y-axis: 0, 10, 20, 30, 40, 50, 60)

Categories: South Africa, Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Italy, Netherlands, Portugal, Russia, Spain, Sweden, Switzerland, United Kingdom, Israel, Canada, USA, India, Australia, China, Japan, Singapore, Republic of Korea

Number of products (y-axis: 0, 20, 40, 60, 80, 100, 120)

Categories: Direct acting small molecule, Antimicrobial peptide, Novel combinations, Repurposed agents, Non-traditional approaches

Legend: ■ Lead Optimization ■ Pre-clinical Candidate ■ IND-enabling

WHO Clinical antibacterial pipeline

- ➤ Annual analysis of the clinical pipeline

- ➤ WHO Advisory group

- ➤ Assess:

  - ➤ **Antibiotics and biologicals:** phase I–III clinical trials with activity against WHO priority pathogens, TB and *C. difficile*

  - ➤ **Innovation:** absence of cross-resistance to existing antibiotics; new chemical class; new target; or new mechanism of action.

  - ➤ **Data:** WHO Global Observatory on Health R&D

    - ➤ https://www.who.int/research-observatory/monitoring/processes/antibacterial_products/en/

2019: 50 new antibacterials targeting PPL, TB and *C. difficile*:
- **32** targeting PPL:
  - **6** innovative – 2 active against critical gram-negatives: taniborbactam (ph3), VNRX-7145 + ceftibuten (ph1)
- **12** targeting TB and nontuberculous mycobacteria
  - **7** innovative
- **6** targeting *C. difficile*
- **11** biologicals

3

Public release of data - https://db.co-add.org

→ **ChEMBL**

ChEMBL
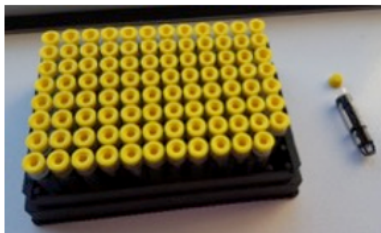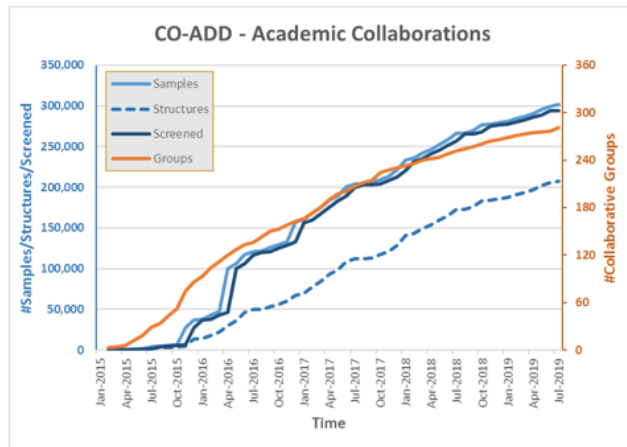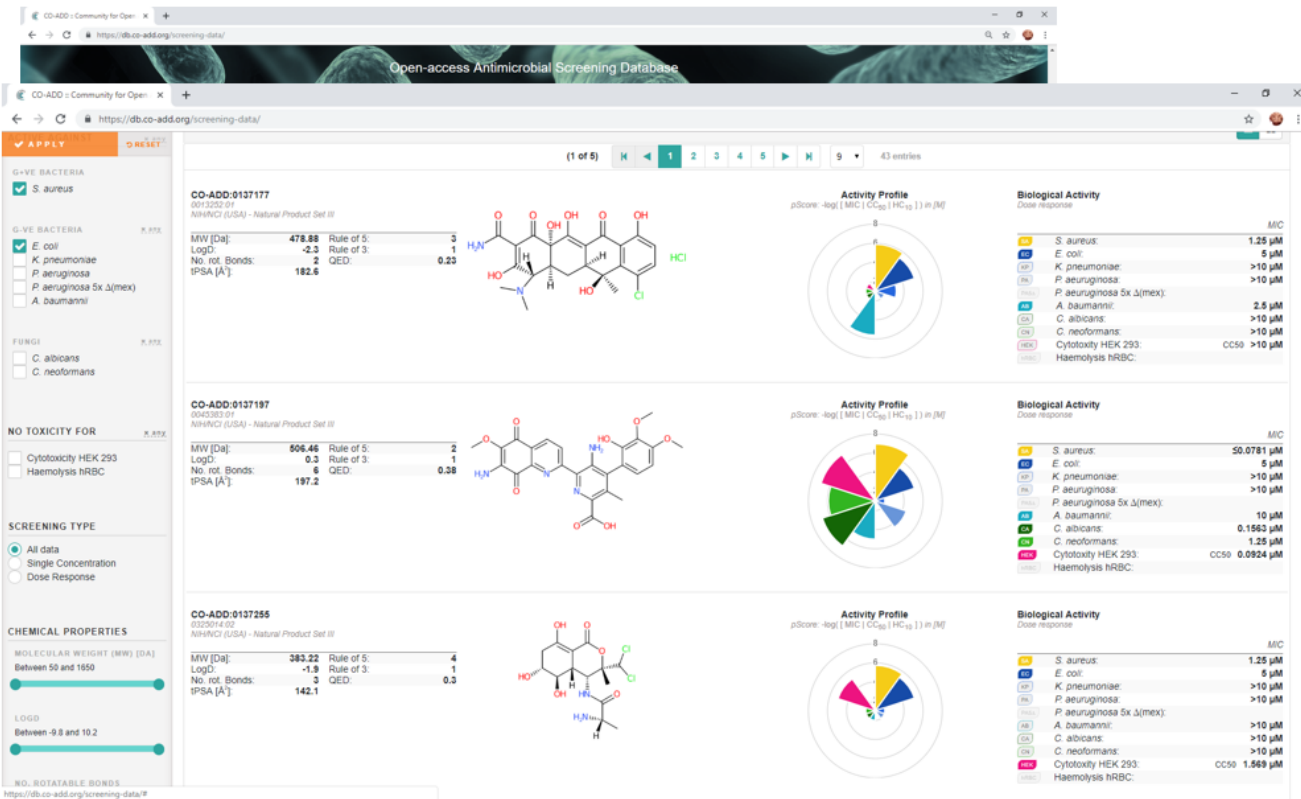
https://www.ebi.ac.uk/chembl/

→ **SPARK** G-ve data only

THE PEW CHARITABLE TRUSTS

CDD.VAULT Complexity Simplified

https://www.collaborativedrug.com/

→ **AI – DeepLearning**

Predicting Antibiotic Activity

To be published on co-add.org

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Global AMR R&D Hub's Dynamic Dashboard

- Collects and presents AMR R&D projects and investments from across the world and all One Health sectors (but not results of research)

- Also displaying pipeline information and the incentive landscape

- Updated as close to real time as possible

- High-level analysis and access to project level information

Global Coordination of Antimicrobial Resistance Research and Development

Coming Quarter 1 2020

| 200 funders | 11,000,000 invested | 400 research organisation | 17,500 projects | Across 4 One Health Sectors | Happening in 25 countries |

Enter

Numbers presented are fictitious

The Dashboard: AMR Research Funding and research projects

58% of the total investment is in Therapeutics

22 countries + European Commission & Wellcome Trust

1 939 Total projects

1 794 M€ Total investment
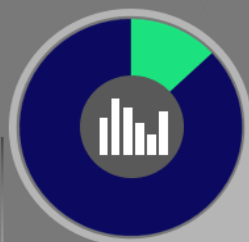
87% Projects in antibiotic resistance

236 M€ — Diagnostics
1033 M€ — Therapeutics
68 M€ — Environment
134 M€ — Transmission
120 M€ — Surveillance
203 M€ — Interventions

jpiamr

About JPIAMR   Activities   JPIAMR VRI   Supported Projects   News   Resources
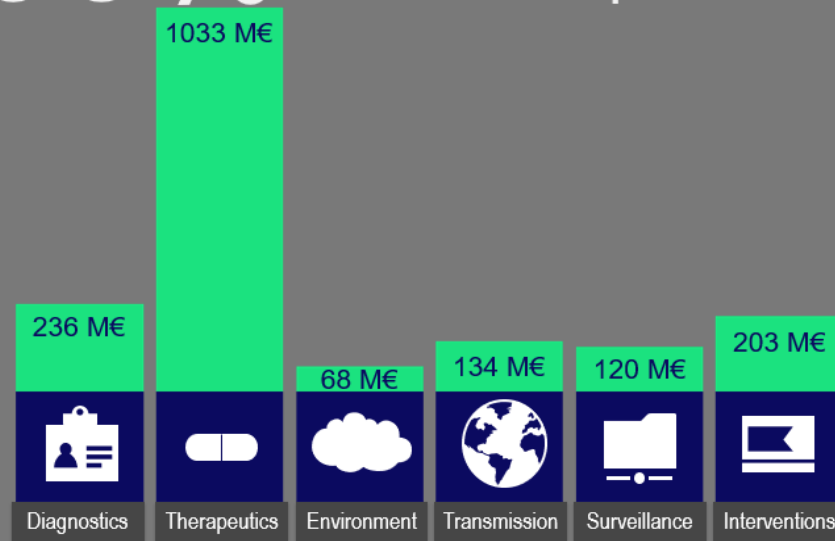
AMR Research Funding Dashboard

Welcome to the JPIAMR AMR R&D investments dashboard, an interactive tool for exploring public investments in antimicrobial resistance (AMR) research from 22 JPIAMR member countries, the European Commission and Wellcome Trust for the year 2017. The dashboard allows users to examine national competitive grants data (institutional funding is not included) by agency, country, AMR research priorities (as defined in the JPIAMR Strategic Research Agenda) and individual research projects.

- Report of the Mapping of AMR Research Funding (2017) is available here.
- Article on the previous Mapping of AMR Research Funding (2014) is available here.
- Export data from the excel file here.
- Read more on mapping of AMR research funding here.

Search: JPIAMR member countries	Search: Funders	Search: Projects	Clear filters

Total investment (M€)
1 794

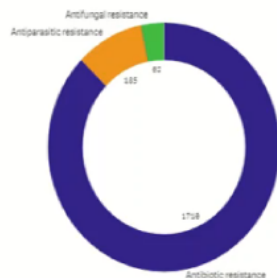### Total number of projects
1 939

Data reflects only reported total national investment in AMR research.
Investment data from Amed (Japan) and Agroscope (Switzerland) is not represented as specific funding of each AMR project could not be obtained.
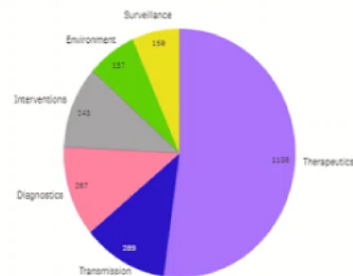
Projects per resistance area

Click to Search: Resistance area

Antifungal resistance
Antiparasitic resistance
82
185
1718
Antibiotic resistance

Select the specific resistance area to see detailed information.
Projects involving multiple areas may be duplicated.

Projects per priority area

Click to Search: Priority area

Surveillance
Environment
Interventions
Diagnostics
Transmission
158
137
143
267
289
1108
Therapeutics

Select the specific research area to see detailed information.
Projects involving multiple areas may be duplicated.

jpiamr

The JPIAMR-Virtual Research Institute Digital Platform

Search Engine · **Tools** · **Services** · **Online discussion forums** · **Capacity Building** · **Information** · **Data**
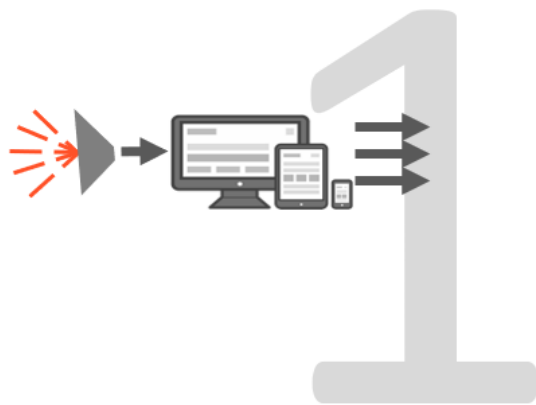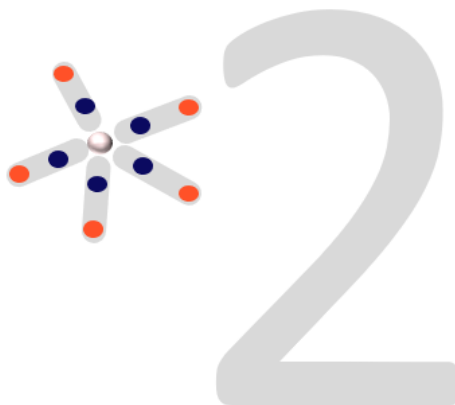
Connection to data

- Aggregate data
- Facilitate data and information mining
- Connect users to resources
- Hub-like functionalities

Connection to people

- Facilitate people-people interactions
- Connect individuals to communities
- Relationships and Networking building
- Visibility

Call to action

- Facilitate mobilization around issues
- Achieve shared goals
- Outcomes

www.jpiamr.eu   twitter.com/JPIAMR   facebook.com/JPIAMR

jpiamr|vri

The user perspective: AMR Centre

➢ **User friendly**
- Large spreadsheet like data difficult to navigate => **searchable!**
- Achievable with a comprehensive database?

➢ **Structures**
- Medicinal chemists always like to see chemical structures if possible.

➢ **Open source**
- Possible to create a completely Open Source database that doesn't infringe on IP?

➢ **Consistency**
- Different names used for enzymes => made uniform for a database

➢ **All data is good data**
- 'Negative' data needs to be reported more often and included in databases. Why did a project fail? Why might one target be better than another?
- Much information on why projects fail is often 'soft' information. Is there a way for this knowledge to be shared?

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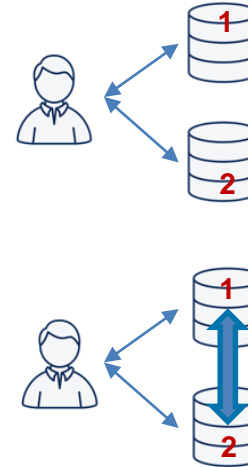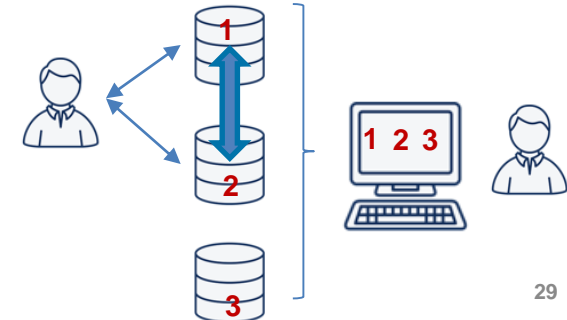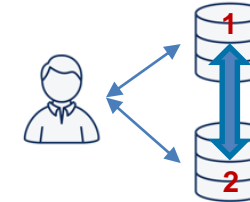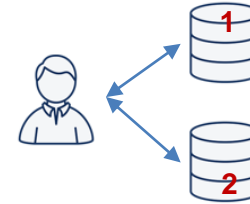   ➢ AMR Centre

➢ **Synergizing databases**

Synergizing R&D Databases

➢ Combined use of databases?

➢ Linking / enriching databases?

➢ A Dashboard for databases?

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