The CARE collection of foodborne bacteria: A new resource for food safety research and innovation

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Annual meeting EURL *Campylobacter*,

Sigtuna, Sweden, 28 sep 2022

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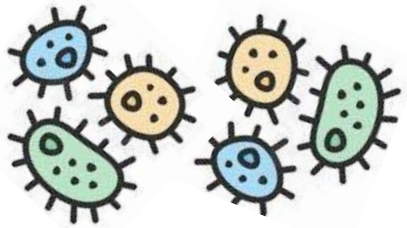
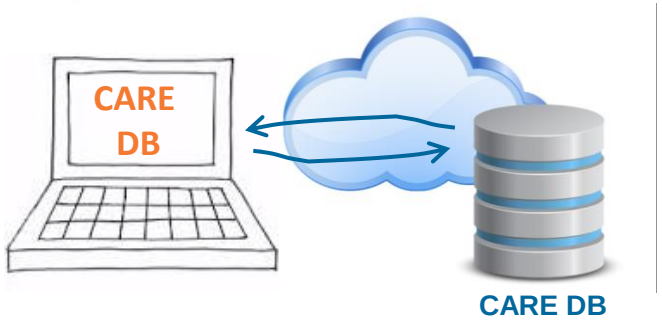
The CARE collection of foodborne bacterial pathogens

3 objectives:

1. Build up a physical collection of FB bacterial pathogens

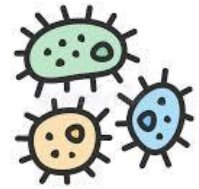


2. Build an IS: database and online portal for querying and ordering strains



3. Ensure the sustainability of the CARE collection

Why a collection of foodborne pathogenic bacterial strains ?



Statement

- Building a set of microbial strains of interest for experimental work can be a daunting task (Not everything can be done *in silico* ☺ *)*
- Specialized and trusted microbial collections are important tools for research and methods development in microbiology

Examples of uses in the food safety sector

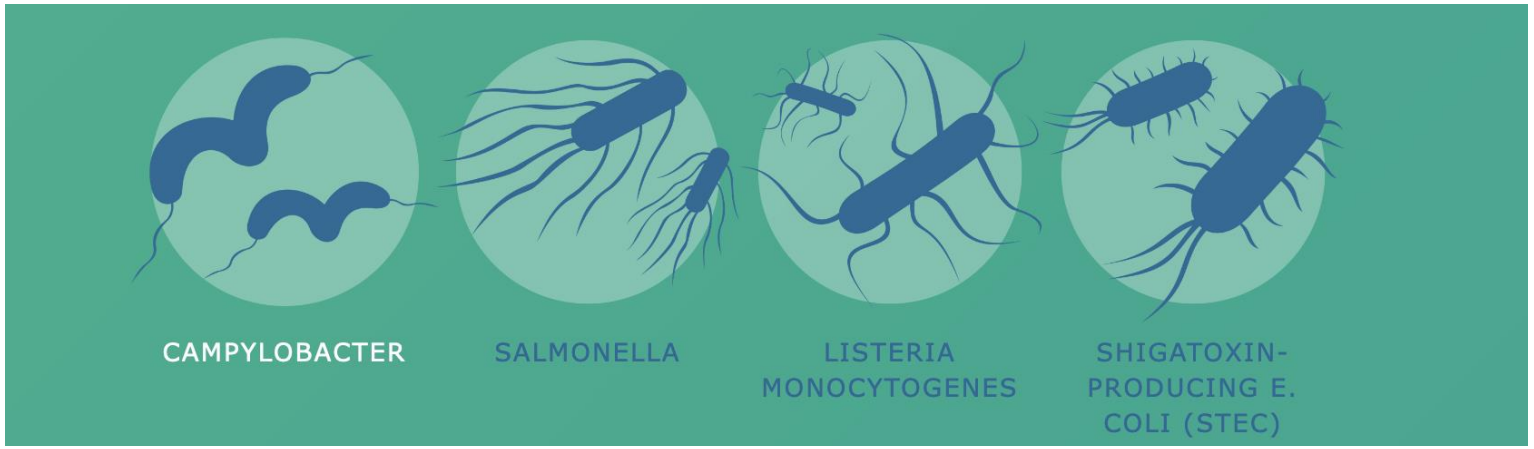
- Set of strains of interest for phenotypic studies / validating hypotheses from *in silico* analyses
- Evolution of pathogens / retrospective studies / access to FBO strains
- Development and validation of new methods (detection, characterization …)
- Cross-sectorial proficiency tests

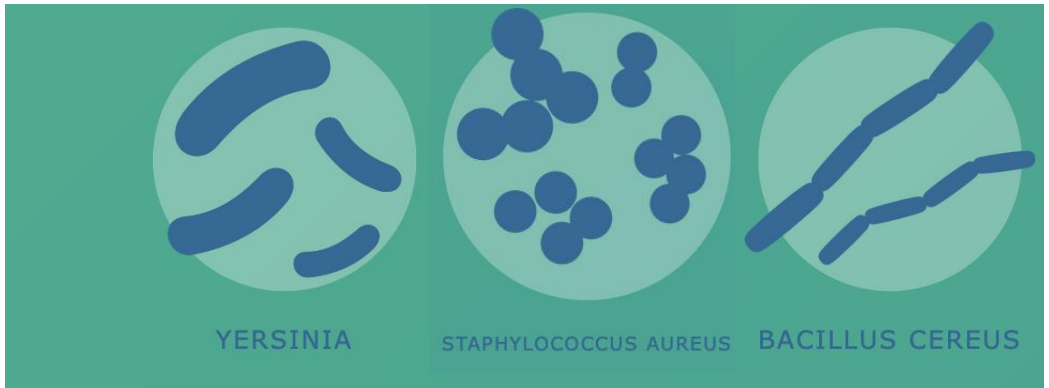
Exploit the microbiological resources sampled in the EU

- A lot of sampling are performed each year (private & official, control, surveillance, FBO investigations …) but not visible/accessible for R&D

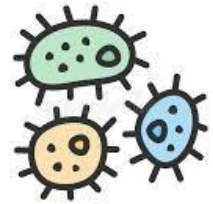
Bacterial species included in the CARE collection

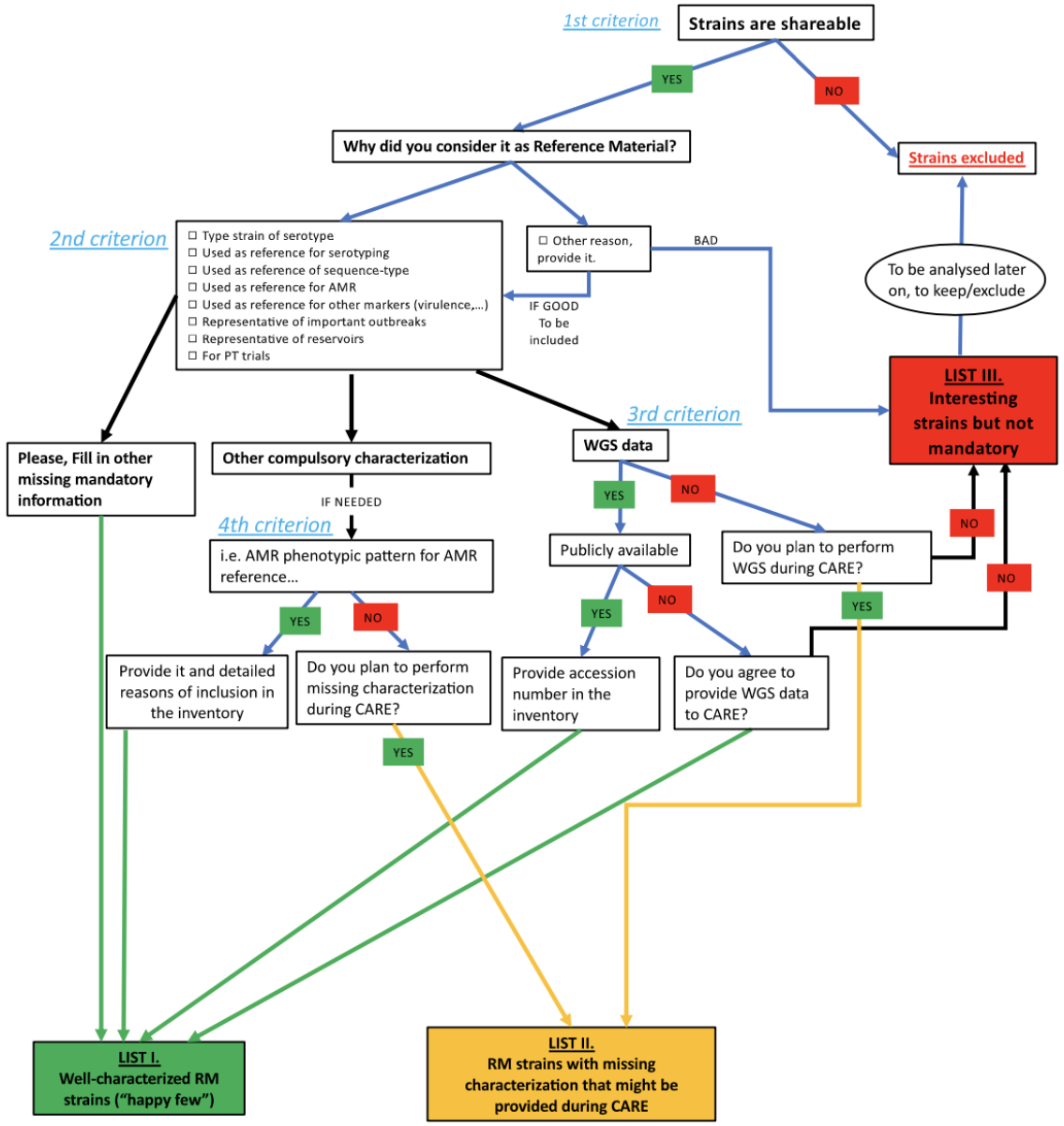
WP2 Experts: 7 bacterial genus representing the main bacterial foodborne threats were chosen for Round1 of CARE collection





Inclusion of strains in the CARE collection





List of criteria of interest

- Minimum set of metadata
- Food safety relevance
- AMR phenotype
- Availability of WGS data (amr, virulence, ST, plasmid prediction … DB)
- Shareable

Keepers of the CARE collection

Entrust the CARE collection to 3 Biological Reference Centres (BRCs) :

CIP (IP) / BVR (IZSLER) / CIRM (INRAE)

- Principles of operations of mBRCs: **Quality assurance** systems for reception / validation-characterization / storage and distribution of biological resources (OECD charter)
- Compliance with **international regulation**
- Expertise in long-term **conservation** and **distribution** of strains
- **MDAs** between mBRCs and strain providers
- **MTAs** between mBRCs and strain users
- **Sustainability**: Commitment of the 3 institutions (INRAE, IP, IZSLER) to support their BRCs, part of the internal strategy of these institutions for **Open Science**, a **guarantee for the CARE collection future**

Important

- **Providers keep ownership** on strains for any kind of development that could have commercial value

Providers of the CARE collection

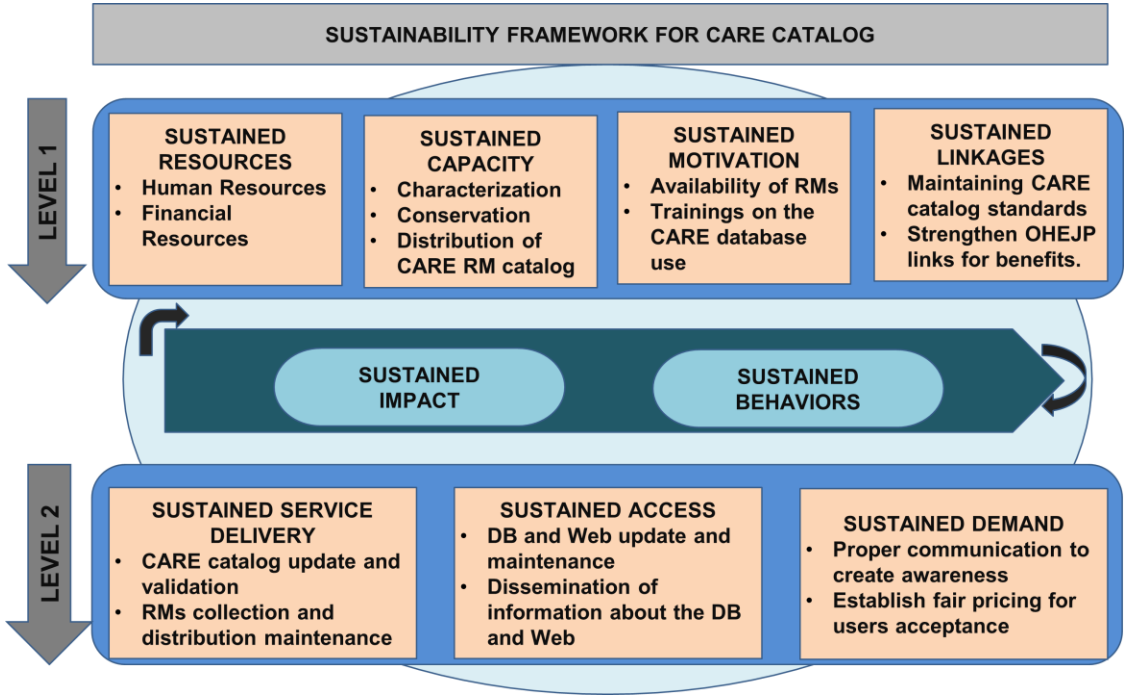
15 institutes from 9 countries are contributing strains to the CARE collection

CARE training session on microbial collection management
PARIS (IP-CIP) – **RENNES** (CIRM-INRAE)
3-4 May 2022

Sustainability of the CARE collection

Design of a sustainability plan

Shared with the OH-EJP overarching project (Dr Karin Artursson, Dr Dolores Gavier-Widen)



1. Make potential users aware of the collection > **Communication strategy**
2. Ensure that the collection fits the present and *future* needs of users > **Extend** and **update**
3. Maintain **experts groups** activity > **Gouvernance** & **coordination**

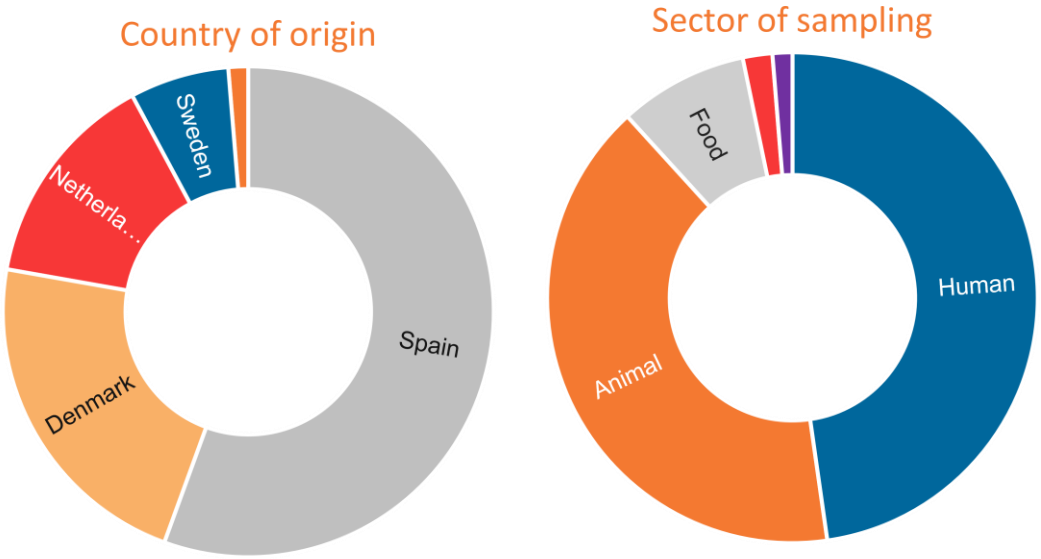
Present state of the CARE collection

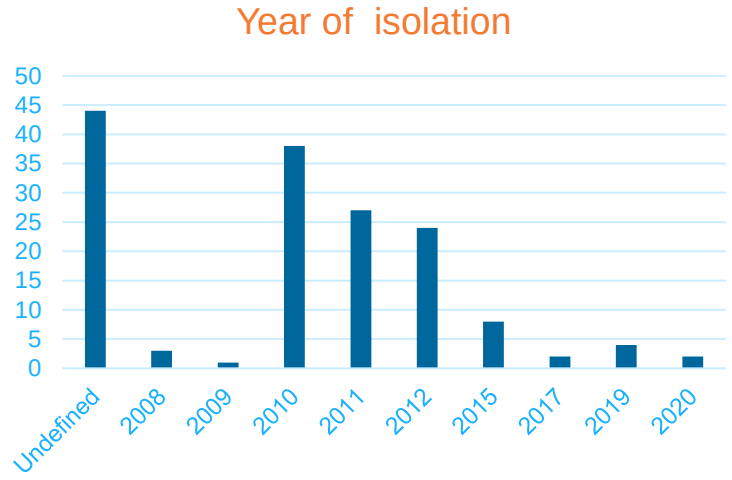
Round 1:

- 688 strains in the DB
- 16 countries / 4 sectors of sampling
- ~60% transferred to mBRCs
- Integration to the catalogs of mBRCs and Gap analyses on going
- Unexpected Nagoya-related issues: transfer cancelled for 110 strains

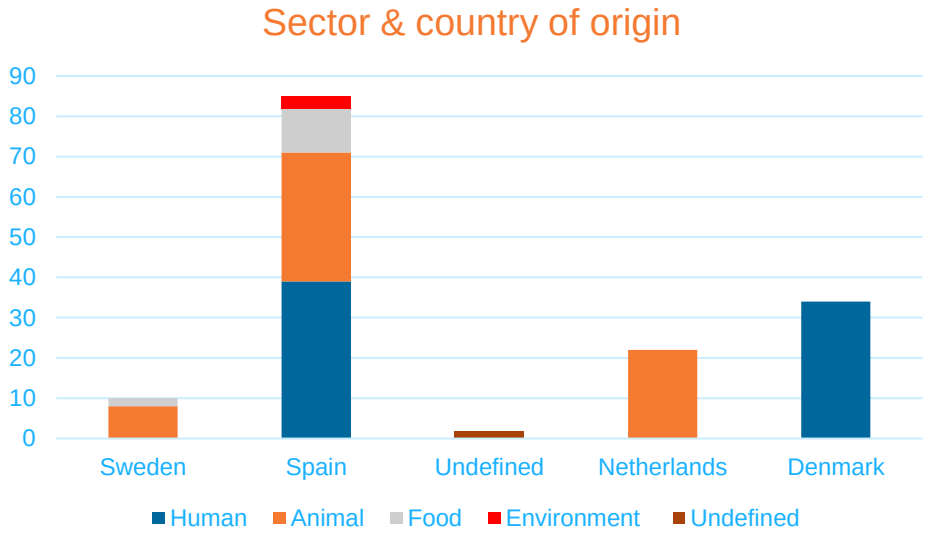
Dashboard of the CARE *Campylobacter* collection

CARE DB August update



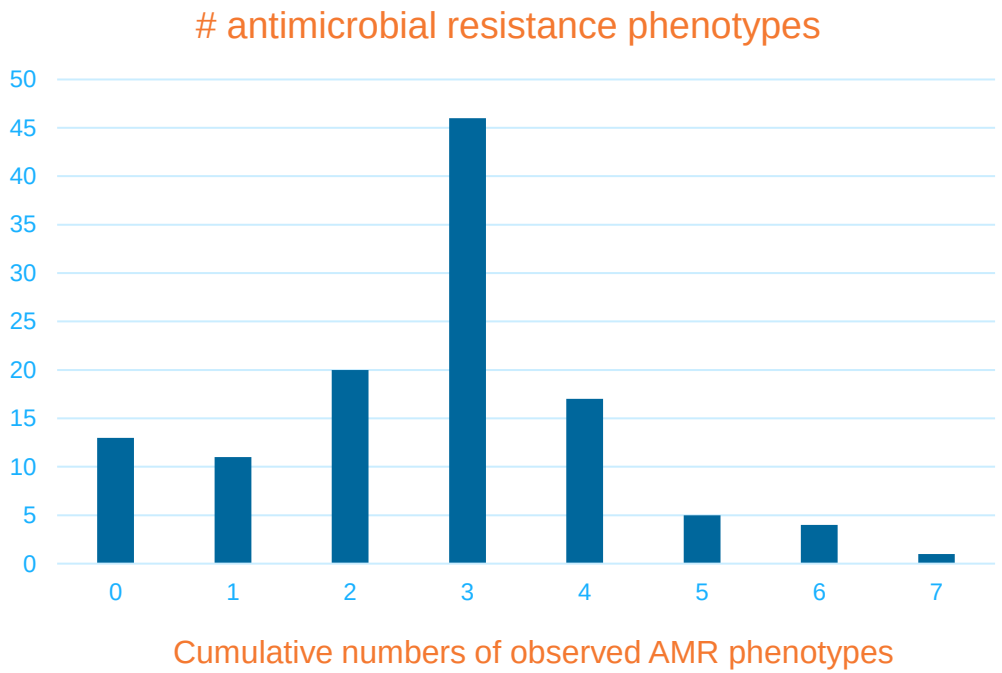


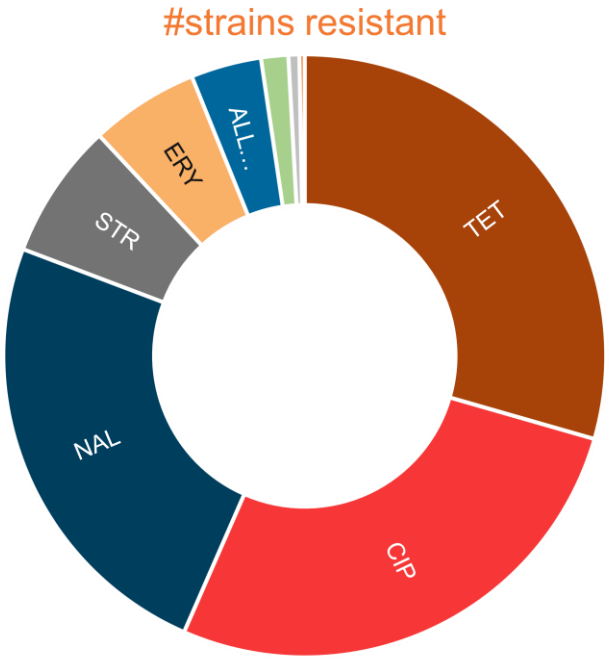
- 153 strains
- 4 countries of origin
- 77 ST types in the DB
- Predicted amr genes & antibiograms



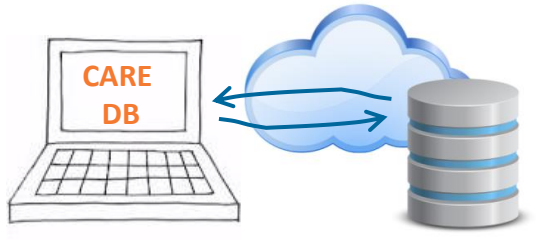
AMR & CARE *Campylobacter* collection

CARE DB August update

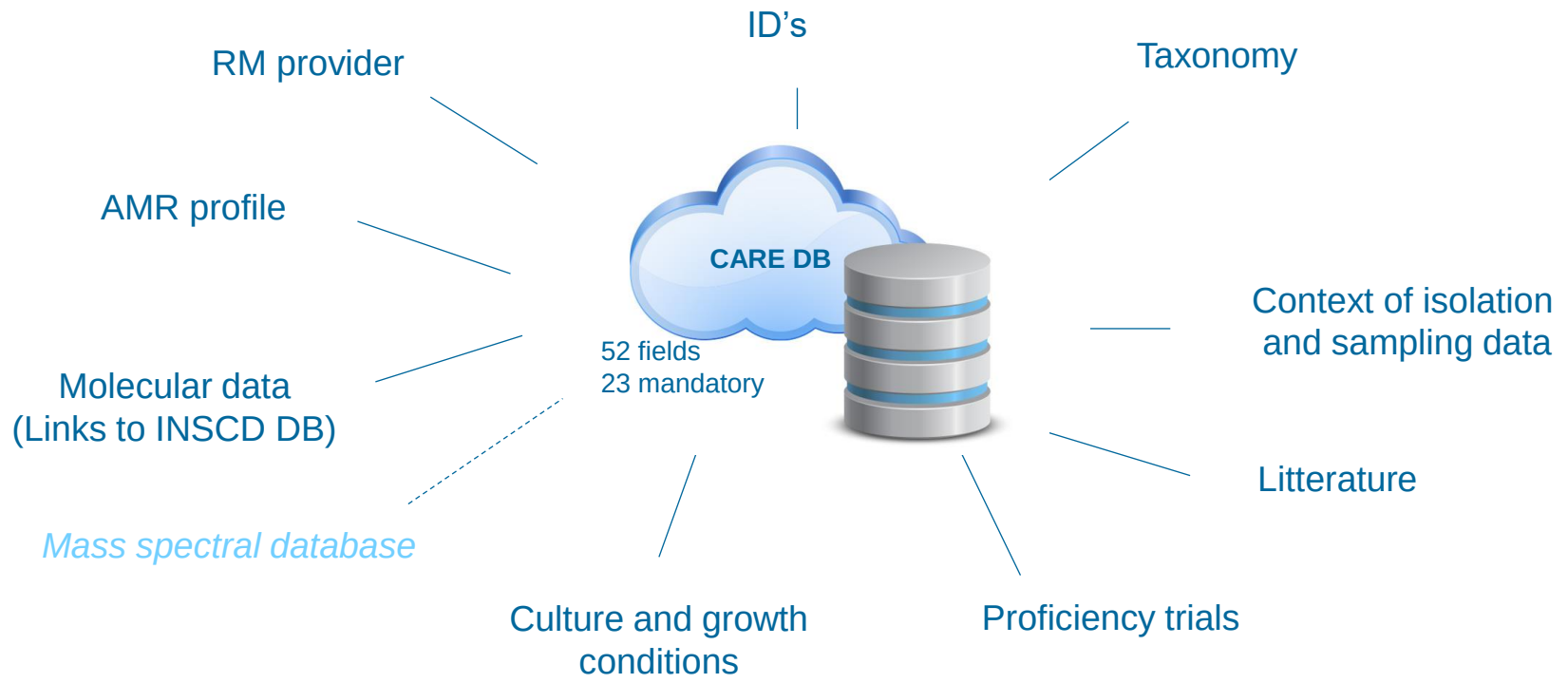




The CARE information system



Development of a dedicated database (Biolomics)



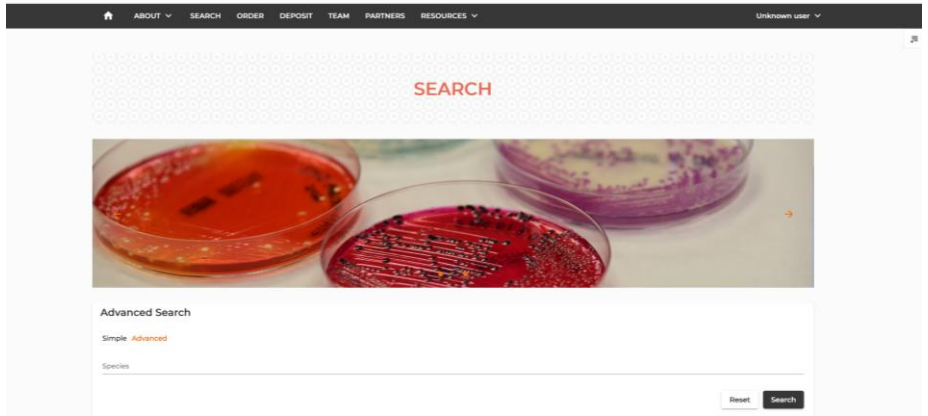
- ✓ Links to WGS raw data
- ✓ Date / location sampling / Sector of isolation
- ✓ Laboratory of origin
- ✓ Integration of predicted AMR / virulence genes
- ✓ Antibiograms data

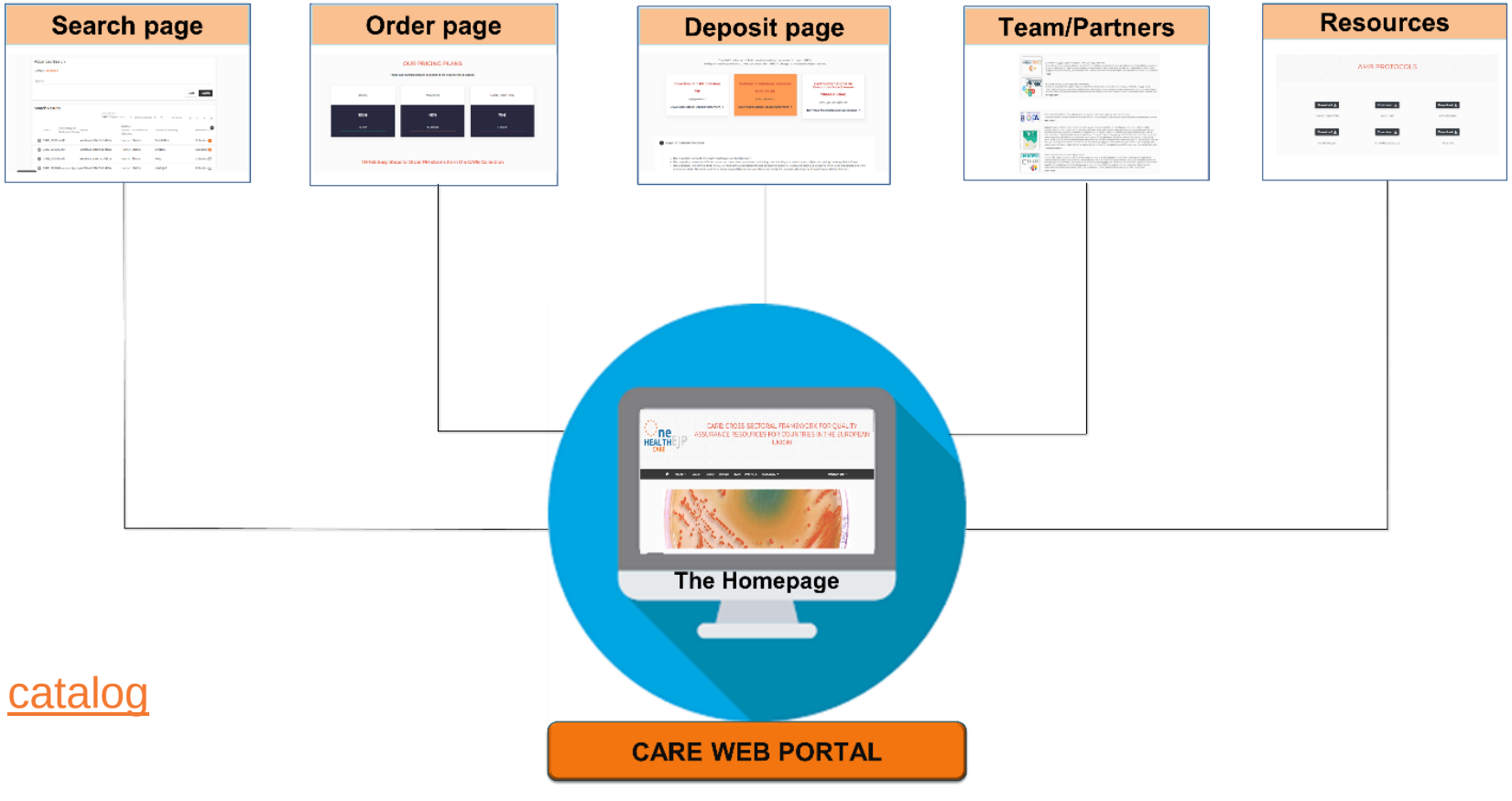
Forum Shah

A rapid survey of the CARE portal

The CARE portal is organised around five entries

- **Searching** the catalog
- **Deposit** strains
- **Order** strains
- CARE **team**
- Documentary **Resources**





Access to the CARE catalog

Warm aknowledgement to all the WP2-WP3 partners

Who discussed in expert groups and shared information and strains

anses

BIOR
INSTITUTE OF FOOD SAFETY, ANIMAL HEALTH AND ENVIRONMENT

DTU Technical University of Denmark

INRAE
science for people, life & earth

Institut Pasteur

ISTITVTO SVPERIORE DI SANITA

IZSAM G.CAPORALE TERAMO

ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA LOMBARDIA E DELL'EMILIA ROMAGNA
"BRUNO UBERTINI"
ENTE SANITARIO DI DIRITTO PUBBLICO

National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

PIWet

STATENS SERUM INSTITUT

SVA NATIONAL VETERINARY INSTITUTE

VISAVET
UNIVERSIDAD COMPLUTENSE
MADRID

WAGENINGEN
UNIVERSITY & RESEARCH

Livsmedelsverket
National Food Agency

Thank you for your attention!

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This presentation is part of the European Joint Programme One Health EJP. This programme has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 773830.

Example of the gap analysis made by V. Michelacci (ISS) for *E. coli* collection :

Good to have in a complete DB of Diarrheagenic E. coli reference strains :

- STEC O145 (top 5) & O146 (top 13)
- ETEC with sta2 (human variant)
- EIEC