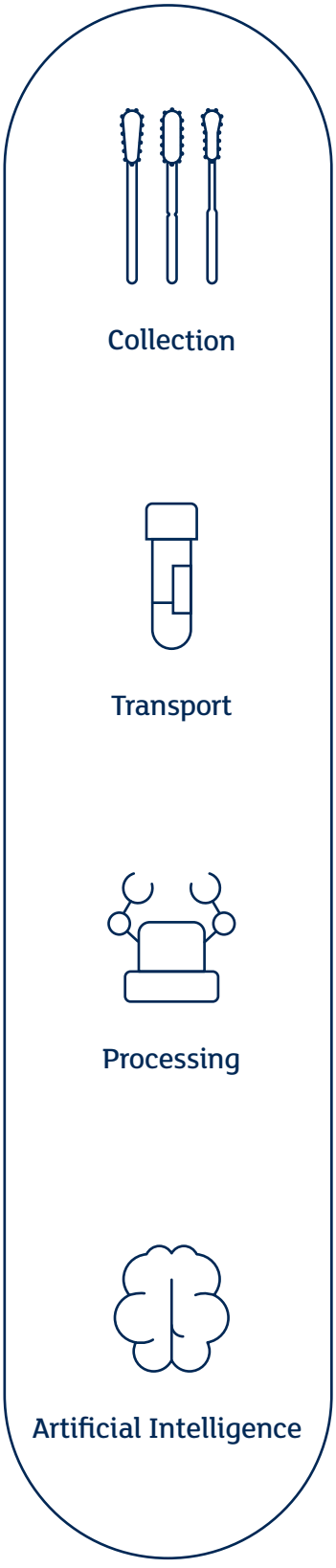
Digital Microbiology

The key to microbiology 4.0

Envisioning a Full microbiology Lab Automation

Copan
innovating together



Our comprehensive approach to preanalytics

From Mechanization to Artificial Intelligence

Microbiology 4.0

Three distinct revolutions shaped modern industry: the 18th-century proto-industrialization, the one driven by late 19th-century chemistry and electricity discoveries, and the third one marked by electronics, telecommunications, and computers.

The **fourth "digital" revolution** - or 4.0, in modern language - characterized by **AI, robotics, and machine-to-machine interactions** has made its way into clinical laboratories, transforming physical objects into a continuous intelligent data stream connecting preanalytical and analytical platforms.

Digital Microbiology

Microbiology digital transformation

Microbiology lab workflow includes delicate and time-consuming tasks that need maximum accuracy and reliability. To date, many laboratories still perform these tasks by an unpractical routine: pen-written dishes, paper-based collection of data coming from different platforms with different languages, manual handling and eye-based interpretation, and space-consuming plate storage.
By exploiting data digitization and digitalization, **digital microbiology takes over these daily tasks, supporting your diagnostic decisions and maximizing lab efficiency.**

The intrinsic values of digitized data

Intangible and mighty

Many are the advantages of digital information: it has no weight and does not take up physical space. In just a handful of bytes, it condenses an exorbitant amount of data that can be **analyzed, copied, and transferred at the speed of light.**

- ***Accesibility***

  Digital data can be accessed and consulted everywhere with just a computer and a net connection.

- ***Integration***

  Digitization translates dissimilar objects into a universal common language shared between different by softwares, platforms and LIS for **trouble-free data exchange and communication.**

- ***Storage and safety***

  Hundreds of thousands plates stored in a book-sized hard drive, protecting sensitive information and patients' privacy through specific software.

The vision

A standard for a global healthcare data network

Sharing

We believe in a future where laboratories data **can be easily shared and combined** in a global healthcare network that unlocks many diagnostic and epidemiologic opportunities

Digitization

Converting data to 0s and 1s

Despite being similar, digitization and digitalization have distinct meanings[1].
Digitization is the **pure analog-to-digital conversion of existing objects, data, and documents.**
Encoding data in a binary digital format, digitization is the gateway to data accessibility, processing, and interpretation optimization.

Digitalization

Making sense of digitized data

According to Gartner's IT glossary[2], digitalization uses digital technologies to change a business model and provide new revenue and value-producing opportunities.
Transposed to the microbiology labs scenario, digitalization can be described as the **employment of digital technologies to monitor and optimize processes, improve results quality, and even lower operative costs.**

WASPLab®

PhenoMATRIX®

PhenoMATRIX® TAG

Radian®

MicroHub®

Microbiology digitalization

From the plate image to the plate interpretation

Appropriate software, AI systems, and interpretation algorithms are the key to make the most from digitized data.
To date, the Copan WASP automation ecosystem includes **several modules designated to perform specific activities** with extreme reliability and minimum effort:

- Track your lab plates from check-in to final result, and archive the images according to your preferences with ***WASPLab®***.
- Combine results and clinical data using your custom rules to segregate your plates automatically with ***PhenoMATRIX®***.
- Automatically detect and tag the best colonies to be picked by ***Colibrí™*** to perform the designated tasks according to your rules, thanks to ***PhenoMATRIX® TAG***.
- Automate Antibiotic Susceptibility Testing and interpret sensitive, intermediate, or resistant results in a click, with ***Radian®***.
- Boost data accessibility and integrate mass-operation features, connecting WASPLab® and other instruments to the laboratory LIS with ***MicroHub®***.

WASPLab®

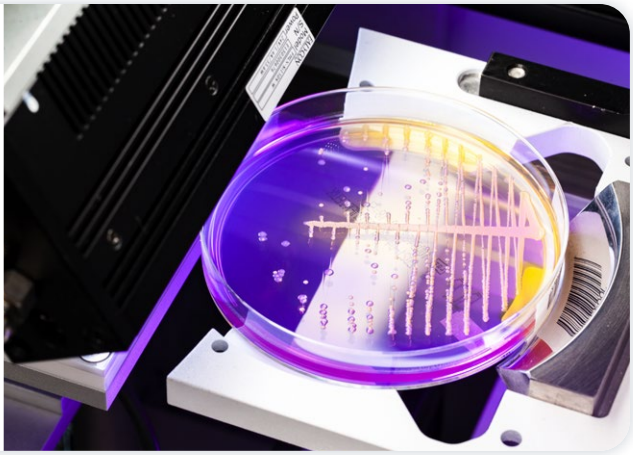
Our approach to digitization

WASPLab® redefines the state-of-the-art of Full Lab Automation (FLA), bringing your lab into the world of Digital Bacteriology. WASPLab® takes care of the incubation/imaging of the plates, standardizing optimal incubation conditions for better and faster results[4]. Its unique vision system acquires **high-quality digital images on which a technologist can perform the reading phase.**

Image acquisition system

Technology that boosts image analysis

Reduce eye strain!
WASPLab® sophisticated imaging system acquires the image of each plate clearly and accurately.



>1000	1600 pixel/mm	9 mm	24 BIT	48MP
Lighting combinations	Resolution	Depth of field	Color depth	RGB telecentric Trilinear camera

WebApp

Centralize your workflow

WebApp - WASPLab® user interface - is designed to be the main access point to all your tasks, ensuring an **easy and user-friendly interaction.**

Sitting at the workstation, you can perform all the actions you usually perform by rushing from one side of the lab to another, without touching dangerous samples anymore!

Image analysis, A.I. and Expert System

Our take on digitalization and image interpretation

Several modules have joined the WASPLab® ecosystem, offering **top-notch technologies for image interpretation and workflow management.**

PhenoMATRIX ®

Microbiology brain

PhenoMATRIX® uses artificial intelligence in combination with the lab custom rules and information from the LIS to automatically read, interpret, and segregate bacterial cultures with the click of a button. Adding PhenoMATRIX® suite of AI algorithms to WASPLab® **eases the interpretation of patient results and gives microbiology labs the ability to shorten their time to results[5,6].**

PhenoMATRIX® advanced image analysis algorithms break down the plate's key features:

- Counts the number of colonies on the plate using differential analysis
- Detects the target color of colonies on chromogenic plates
- Counts the number of colonies per color and morphology on non-chromogenic plates
- Detects hemolysis

Lab connection

LIS connection

WASPLab® ensures a flawless interaction and data exchange with your laboratory LIS.
All the information you need is at your fingertips:

- Patient's demographics
- Patient's clinical results
- Diagnostic results from other platforms (e.g. White Blood Cells count)
- Data from WASPLab® ecosystem

Your game, your rules

Image Analysis software

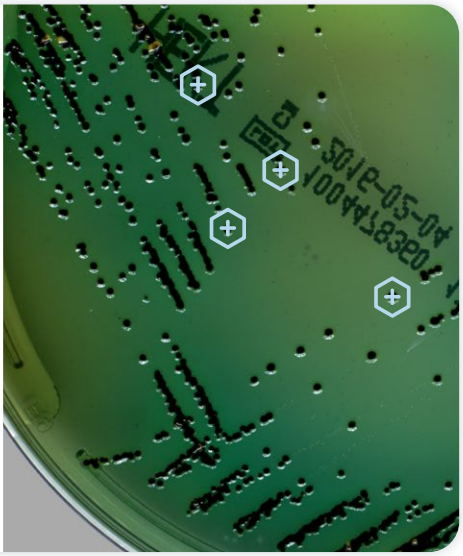
PhenoMATRIX® software combines and analyzes data from AI algorithms and LIS, applying your lab's custom rules for a flexible and tailored workflow.

Colony spotter

PhenoMATRIX® TAG + Colibrí™

Understanding the isolates coordinates and morphology, PhenoMATRIX® TAG **automatically detects and tags the best colonies to be picked** by Colibrí™, to perform the designated tasks according to your custom rules.

Tag *Pick* *Connect*



Radian®

Automated AST

Radian® is the WASPLab® module dedicated to the **automation and interpretation of Disk Diffusion Antibiotic Susceptibility Testing**, composed of an In-Line Carousel that takes care of the ATB disk dispensation, and an Expert System for an accurate S.I.R. interpretation.

Radian® Expert System

Being connected with the WASPLab® WebApp Halo Recognition algorithm and communicating with the lab LIS, Radian® Expert System is a fully integrated solution for AST automated interpretation in your lab.

- *Expert system hints:* Keep everything in sight while working directly on the plate
- *Halo-reading interface:* With direct communication to the rules database
- *Rule editor:* Adapt or write from scratch your own interpretation rules

Act fast!

Rapid system advantages: RAST

A fast time to result is crucial in the treatment of critical conditions as sepsis. That's why we conceived a rapid **direct AST (4h)** compliant with the new eucast protocols and available on Radian® Expert System for blood culture*.

- *Cost reduction*
- *Early antibiotic therapy*
- *High patient value*

MicroHub®

Microbiology string

MicroHub® is your patient-centric interface.
Connecting WASPLab® to LIS and other instruments, MicroHub® represents the next step into a new way of managing lab data, allowing you to **handle patient data, test orders, results, and the entire lab workload in real-time.** MicroHub® is the perfect tool to boost data accessibility, centralize the final validation step, and keep the lab's productivity under control.

Automatize processes

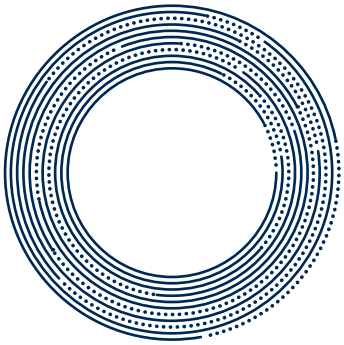
Integrate workflows ***in one contol hub***

Enhance data ***accessibility***

The digital microbiology mark

The key to Microbiology 4.0

This circle identifies all the automation modules which exploit digital technologies to accelerate your workflow, maximize lab efficiency, and support your diagnostic decisions through improved treatment indication. Look for the mark in all our printed material and online content!



Microbiology 4.0

What we are aiming for

Combining processes automation with data digitalization represents the finest level of Full laboratory Automation. The lab will be the first to benefit from the use of AI algorithms: your staff will **not need to handle plates anymore**, being able to process, track and analyze everything from a computer screen. Stored data will always be **accessible and safe**, and your results will **reach unparalleled quality and celerity**.
Outside the laboratory, improved quality digital data will help to personalize diagnostics and treatments, supporting the **reduction in healthcare costs**. Digital microbiology may also substantially **impact global public health**, enabling world-based pathogen surveillance and epidemiological studies[3]. In a nutshell, **reengineer your lab to digital, accelerate your workflow, and improve treatment indication and patient outcomes**.

Scientific references

All the independent studies we cited in this product focus are listed here.

1. https://www.forbes.com/sites/jasonbloomberg/2018/04/29/digitization-digitalization-and-digital-transformation-confuse-them-at-your-peril/?sh=4304ef652f2c
2. https://www.gartner.com/en/information-technology/glossary/digitization
3. Egli A, Schrenzel J, Greub G. Digital microbiology. Clin Microbiol Infect. 2020.
4. A. Cherkaoui, G. Renzi, N. Vuilleumier, et al. Copan WASPLab automation significantly reduces incubation times and allows earlier culture readings. Clinical Microbiology and Infection, 2019.
5. Justin Baker, Karen Timm, Matthew Faron, et al. Digital image analysis for the detection of Group B Streptococcus from ChromID StreptoB Media using a PhenoMatrix Artificial Intelligence Software Algorithm. Journal of Clinical Microbiology, 2020.
6. Tam T. Van, Kenneth Mata, Jennifer Dien Bard. Automated Detection of Streptococcus pyogenes Pharyngitis by Use of Colorex Strep A CHROMagar and WASPLab Artificial Intelligence Chromogenic Detection Module Software. Journal of Clinical Microbiology, 201

Notes

Please consult Copan for the availability of these products in your Country

*The simultaneous application of Rapid Rules to multiple types of sample will be commercially available soon

Copan
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Code: MMWB-GEN03 Rev.00 Date 2021.06

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