

MS-CC Science and Research Technology Workshop
Lightning Talk

**The impact of CI on my
research/teaching/outreach.**

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Why CI support is crucial to my research, teaching and outreach?

- CI is an ecosystem of **computing, data, software, and networking resources**.
- It enables researchers to tackle problems that can't be solved on a single laptop or in a small lab.
- It is the "research superhighway" that combines:
 - **High Performance Computing (HPC)**: supercomputers, clusters, and cloud systems.
 - **Data resources**: storage, sharing platforms, and curated databases.
 - **Advanced software tools & workflows**: optimized algorithms, modeling/simulation frameworks, workflow automation.
 - **Networking & collaboration tools**: high-speed research networks, portals, and science gateways.
 - **Expert support services**: training, consulting, and communities of practice.

How do I leverage CI in my areas of work?

1. Genomics & Microbiome Research

- large-scale read mapping,
- genome assembly and metagenome annotation

2. Shotgun microbiome sequence analysis.

- Use CI resources to build **workflow pipelines** (e.g., integrating Prokka annotation, EggNOG functional assignments, ML feature extraction, and primer validation).
- Access **community-supported libraries** and benchmarking datasets hosted on CI platforms.

How do leverage CI in my areas of work?

3. Education

In BIOL 512 Bioinformatics for NGS data analysis:

- I use science gateway resources like **Jetstream2**, **EDGE-Bioinformatics-Gateway** to provide **hands-on cloud-based computing environments** for students with no prior computing background.
- Offer students access to HPC “sandbox” resources where they can run small-scale genomics or bioinformatics workflows safely

How do leverage CI in my areas of work?

4. STEM Outreach

In collaboration of the ECSU Biology Club and Local high school biotechnology chapters,

- I have developed an **interactive biotechnology self-learning hub** that:
- Uses AI/ML to generate adaptive content from a pool based on student progress.
- It is a work in progress but a prototype can be seen [here](#):

Summing up

- CI is very essential
 - to keep up with the accelerated rate of growth in all fields of biology,
 - to attract, engage and retain the digital generation in STEM fields such as:
 - Bioinformatics
 - Biotechnology
 - Genetics and
 - Molecular biology.

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