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## The high luminosity Large Hadron Collider project: from project to reality at CERN

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The High Luminosity Large Hadron Collider (HL-LHC) project is an upgrade of the LHC aiming to increase by a factor 10 the harvested integrated luminosity foreseen early 40s. During Long Shutdown 3, scheduled to begin at the end of 2025, nearly 1.2 km of accelerator components, including a range of services spread across surface and underground facilities, will be replaced with new equipment deploying innovative key technologies. Two 300-meter-long tunnels, with access shafts and large service caverns, were excavated in parallel to the LHC machine tunnel to house the new power converters, cryogenics, and other key systems. Ten buildings were constructed on the surface to house all the necessary new services. The civil engineering design, the system definition and equipment design phase have been managed in close synergy with the HL-LHC Integration Team, responsible for optimizing the allocation of volumes between the different stakeholders in order to guarantee the efficiency of installation, the maintainability, and the operability of the different systems. This work describes the process and the challenges that had to be overcome in the integration studies to meet the targets of maturity of the project, allowing the installation phase to start on a sound and solid basis.

### Funding Agency

CERN

### Footnotes

### I have read and accept the Privacy Policy Statement

Yes

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