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Maintainable web interfaces at beamlines

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Development of web-based applications for beamline controls and data analysis has become increasingly common as labs seek to take advantage of modern browser capabilities and improved user experience. Implementing any new controls interface comes with challenges, but web-based applications present even more unique considerations that can hinder the transition.

This talk focuses on strategies implemented at the Advanced Light Source (ALS) to create a maintainable, scalable web-based controls application. Our approach centers on creating modular library components that address specific requirements shared across multiple beamlines. A combination of modern tooling and packaging systems has enabled a development framework that encourages reuse, consistency, and long-term maintainability.

Various technologies are used for this effort, including prototyping tools (Figma), live component viewers (Storybook), and package managers (npm) for seamless integration of modular components into applications. These strategies form the foundation of a web development framework that magnifies developer output, reduces redundant work, and simplifies long-term maintenance. The investment in tooling and library creation pays off as new features are added and existing ones evolve. These practices are applied at the ALS in preparation for its upgrade to a fourth-generation synchrotron, where browser-based controls and analysis will be the standard across all new beamlines.

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