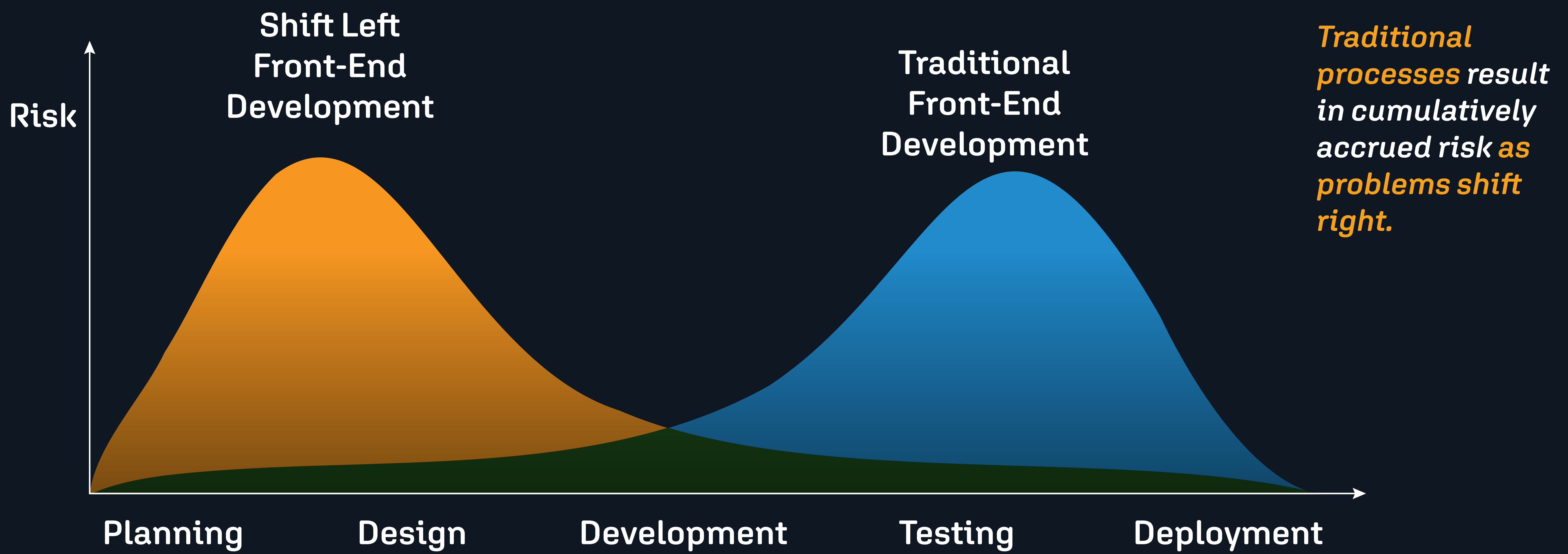


Shifting Left: The Front-End Engineer's Role in De-Risking Ground System Development

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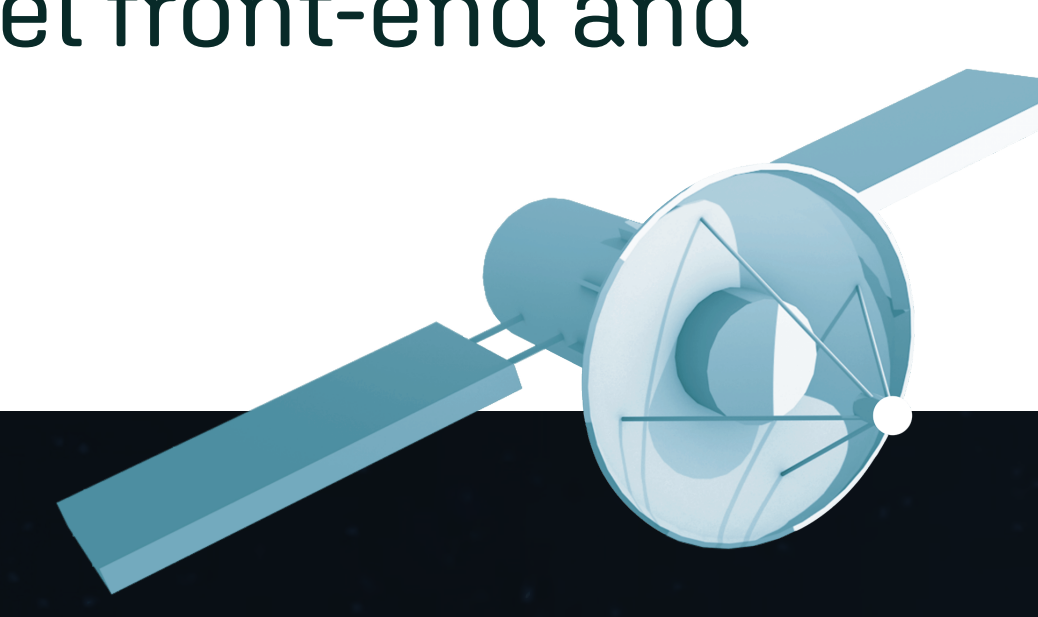
Front-End Engineers provide expertise from planning through deployment.

Early front-end planning and design ensures:

- A component based front-end architecture and UI framework that meets MOSA standards.
- The use of high-fidelity prototypes to find problems with complex interactions as early as possible.
- Technical input into the feasibility of UI designs.

Downstream benefits include:

- Less rework due to late calls for data structure changes or requirements reinterpretations.
- Easier system maintenance due to reusable and modular UI components.
- Finding gaps or problems with data points well before integration through parallel front-end and backend development.



Modern Front-End Development

Front-load the Front-end

The UI-after-backend approach of legacy waterfall models leads to systems that do not meet modern operators' expectations. We suggest that teams instead, bring the front-end to the front of the process where their expertise in UI architectures and frameworks, negotiating technical feasibility, and bridging the gap between design and system capabilities can provide the best support for the program.

Prototypes Find the Flaws

Static mock-ups are helpful for early designs but they don't reveal possible problems with latency, data complexity, or responsiveness. High-fidelity prototyping with frameworks like React, Angular, or Vue expose performance and accessibility issues early.

The Test Database

Older processes often scheduled the backend to be finished before front-end development. From our experience a better route is to build in parallel where the front-end team uses mocked data from pre-agreed upon API contracts to help populate

and test the UI. This enables early conversations about data structures and provides validation of the data structure. The result? Integration with less friction and earlier alignment between the front-end and backend.

The Economics of Front-End Expertise

Modern component-based frameworks deliver long-term dividends by creating reusable components that make future updates modular and manageable. Early front-end involvement also reduces risk and cost by validating requirements and data needs, testing performance limits, and ensuring the application can scale and grow as missions change.

Early front-end integration ensures tools are battle-ready and optimized for high-stress environments where failure isn't an option.



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