



Motivation

Existing web development tools either provide easy-to-use interfaces intended for novice users, sacrificing expressiveness, or advanced interfaces intended for developers who already know web technologies, but inaccessible by ordinary users.

Loom aims to **bridge the gap** between these categories, giving novice users the full power of web technologies such as HTML and CSS without the need to write code, while also giving developers a powerful tool for rapid prototyping.

In addition, Loom aims to impart the basics of HTML and CSS to users as they work with the tool, **teaching valuable concepts** about these technologies that can be carried over to other web development tools.

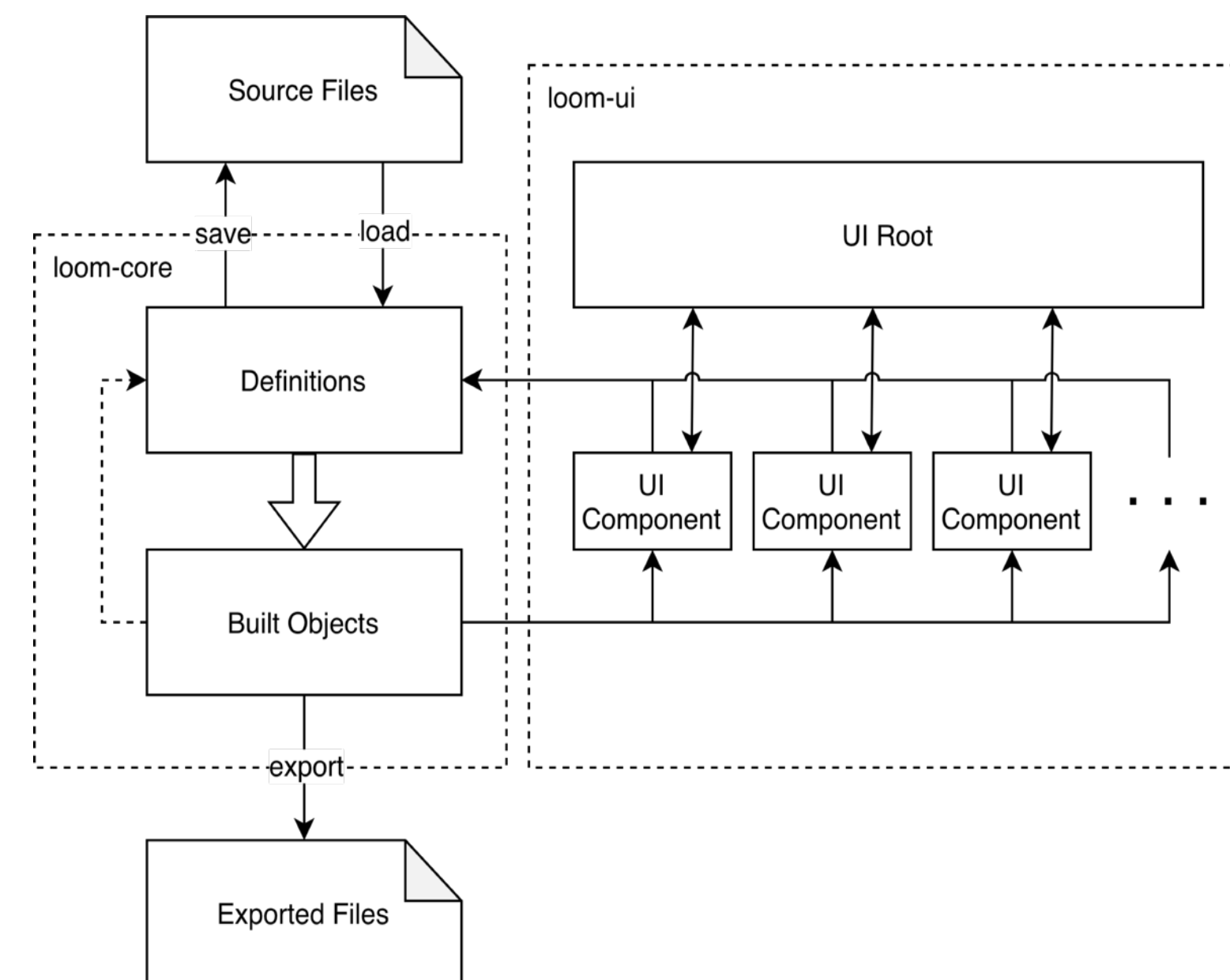
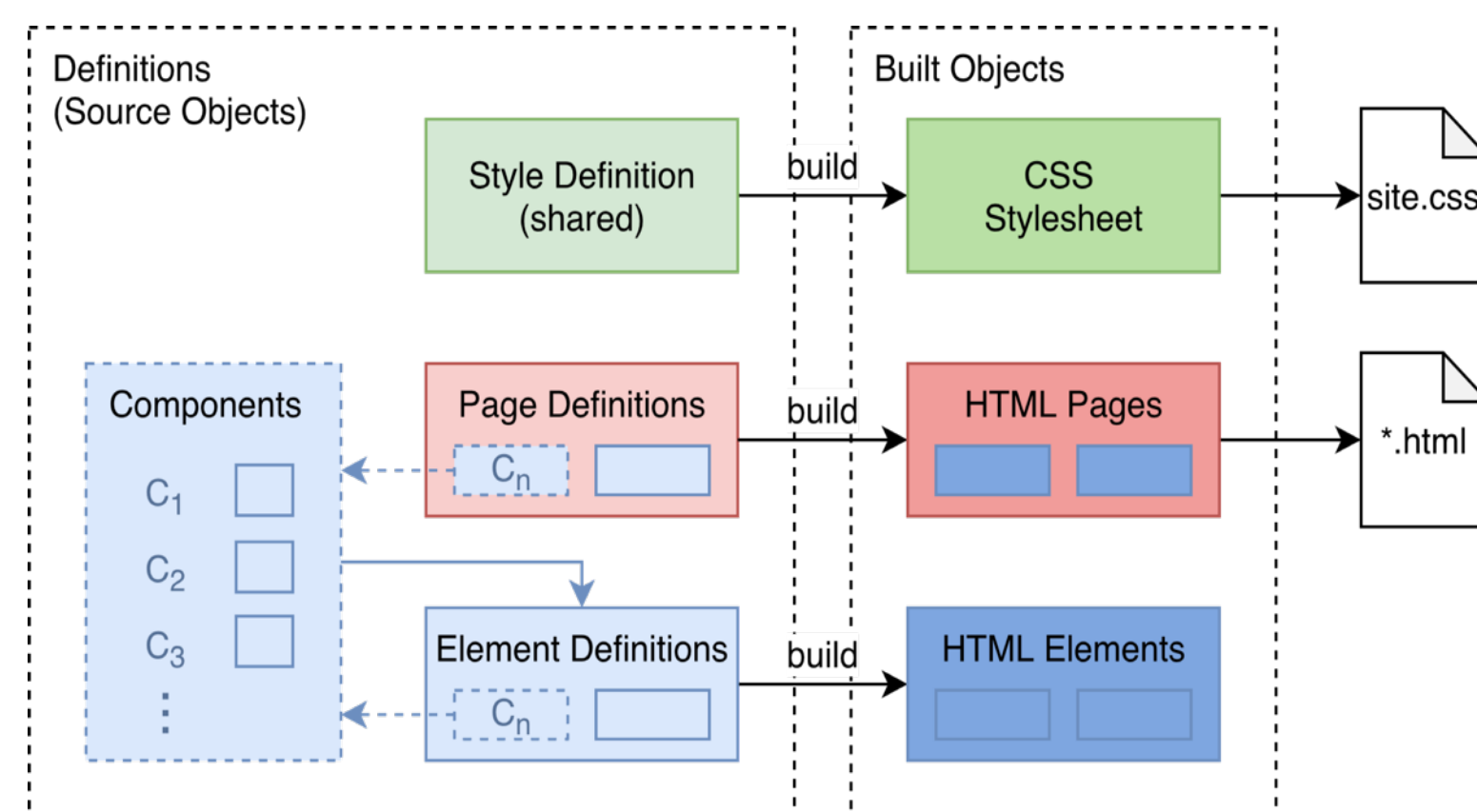
Solution Design

Working directly with web technologies can be frustrating, even for developers. Loom provides a handful of **simple, but useful, abstractions** over these technologies to make working with them easier.

Components are an example abstraction defined by Loom. Components enable reuse of HTML elements across several pages, such as a site header and footer. This is not possible in standard HTML.

To support these abstractions, Loom differentiates between Definitions and Built Objects. Definitions contain the data which users directly modify. Built Objects result from building Definitions, and correspond directly to **standard HTML and CSS**.

A **Project** in Loom can consist of several pages and one stylesheet which contains styling information for the entire project.



The build process to transform Definitions into Built Objects is **reactive**. That is, if any value within a Definition changes, any associated Built Objects will update appropriately as well. The Built Objects will also themselves emit events in order to trigger additional actions such as UI updates. This process enables immediate feedback to user actions.

Loom makes heavy use of **event-driven programming**. A collection of event-driven data structures has been created specifically for Loom, enabling a high level of code reuse. These data structures include key-value dictionaries, lists, and wrappers around single values, as well as several helper classes for performing reactive operations such as mapping, filtering, key lookup, and more.

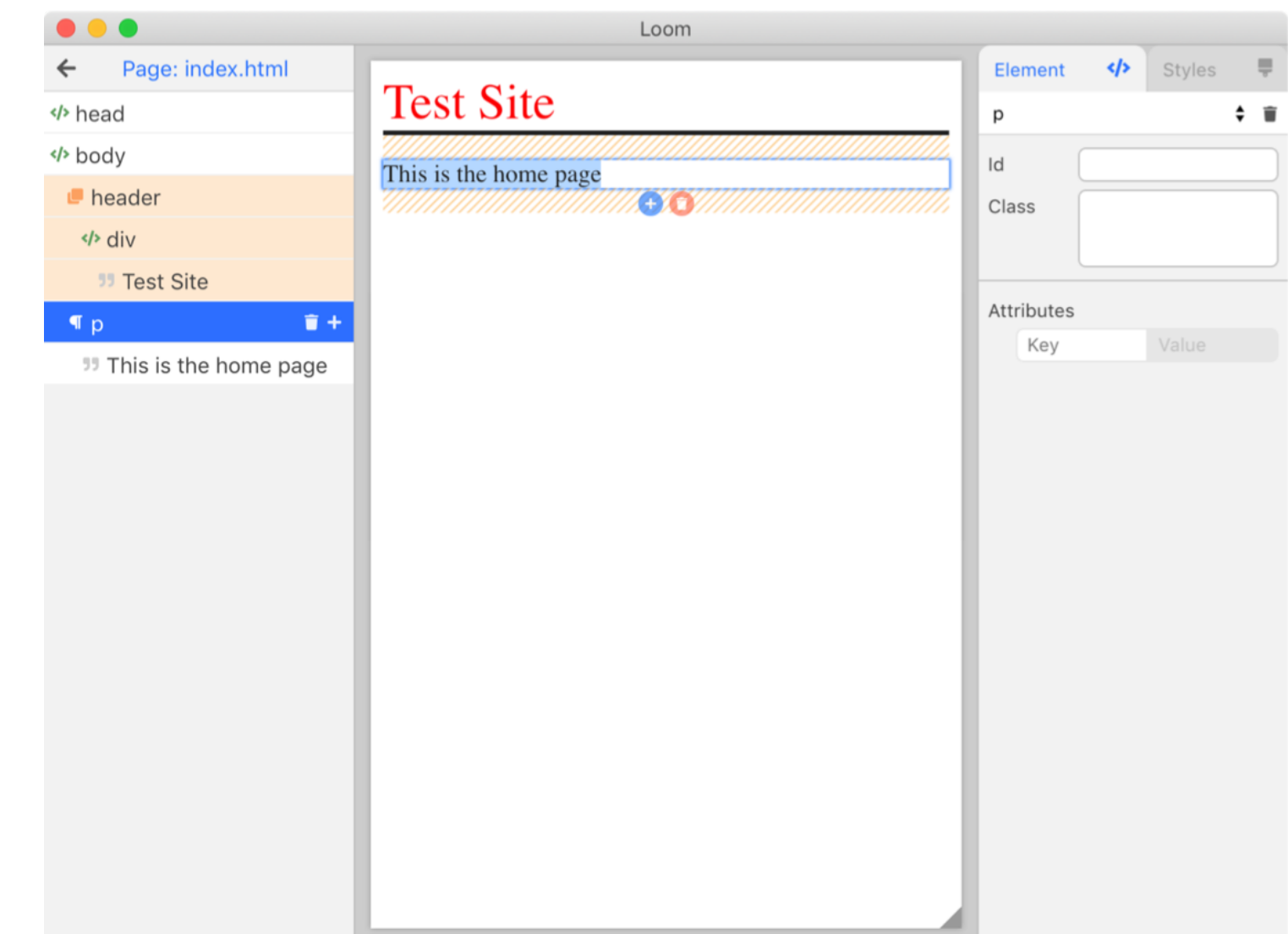
Interface Design

The UI of Loom is divided into three main sections: the Navigator, the WYSIWYG (What-You-See-Is-What-You-Get) Editor, and the Properties Editor.

The **Navigator** (left) allows the user to select the page or component to edit, and then a data item within.

The **WYSIWYG Editor** (center) shows the user a live preview of the page and selected data, and allows them to edit the page contents via direct text entry, keyboard shortcuts, and floating controls.

The **Properties Editor** (right) gives the user control over properties of the selected data such as HTML attributes and styles.



Results

To evaluate Loom, we evaluate how well it meets the needs of target users: Novices, Developers, and Designers.

Novices

- ✓ Create / Delete Pages
- ✓ Create / Delete Elements
- ✓ Associate Visuals with HTML
- ✓ Save Project as Static Files
- Bold / Italic / Underline Text
- ✗ Create Images / Links

Developers

- ✓ Set Custom HTML Attributes
- ✓ View Element Properties
- ✓ View Element Styles
- Set Custom CSS Properties
- Create Custom CSS Rules
- ✗ Create and Edit Scripts

Designers

- ✓ Create Content Quickly
- ✓ Live View of Output
- Layout Content Quickly
- Modify Font Styles
- ✗ Copy and Tweak Pages
- ✗ Standard Color Palette

There is clearly room for improvement even among this small subset of use cases. Nonetheless, this demonstrates the potential for Loom to accommodate a wide variety of users with different needs.

Future Work

UI Improvements

- Drag-and-drop to create and move content
- Additional controls within WYSIWYG Editor
- Improved interface for editing style properties
- Additional context clues, help text
- More...

Additional Features

- Parameterized components
- Support for media files, scripts
- Import existing websites
- Post-processing of output content
- More...