

# Creating the New Face of Buildertrend

**Team:** sddec20-07

**Advisor:** Mai Zheng

**Client:** BuilderTrend

**Members:** Josh Bump, Dallas Evers, Melissa Hernandez,  
Mitchell Knoth, Kailyn Mann-Calaway, and Darnesha Randle

**Team Leader:** Darnesha Randle

**Website url:** <http://sddec20-07.sd.ece.iastate.edu/>

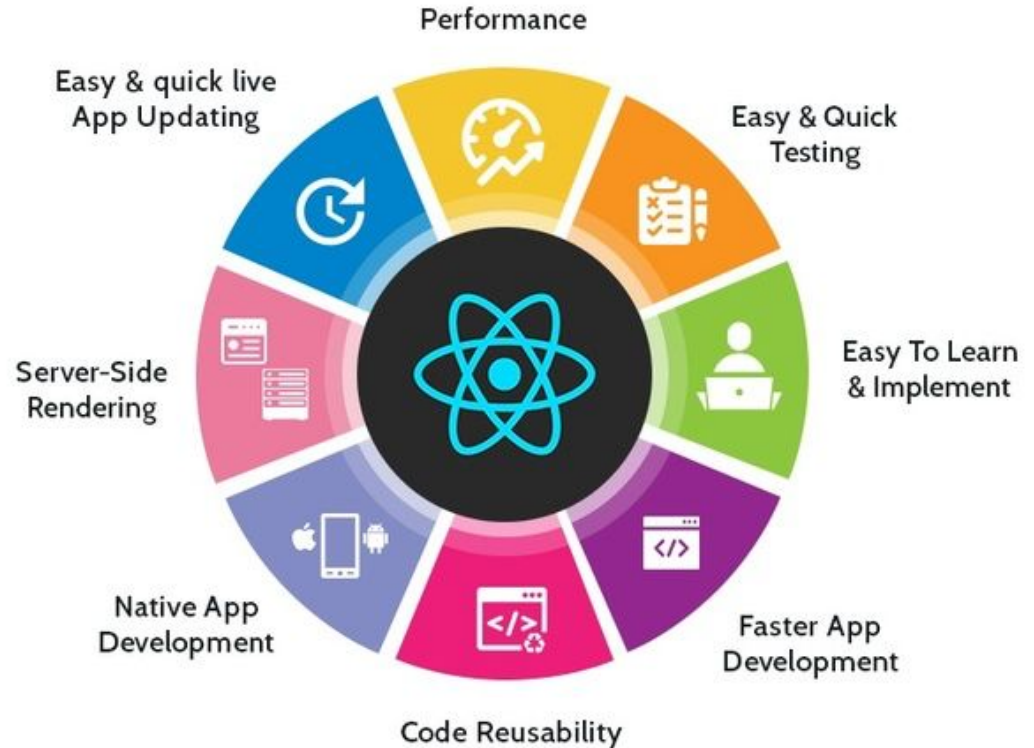
# Background of Project

- Buildertrend (BT) has been migrating their current web pages to React for the past year
- Migration has been costly and is straining BT's resources
- Until the migration is completed BT must
  - Maintain the current website
  - Complete the React migration
  - Support both outdated front end web pages and newer React pages



# Motivation of Project

- BT is converting outdated ASP.NET web pages to React
  - Modern UI
  - Faster and more efficient
  - Easier maintenance reuse of components
  - Faster rendering



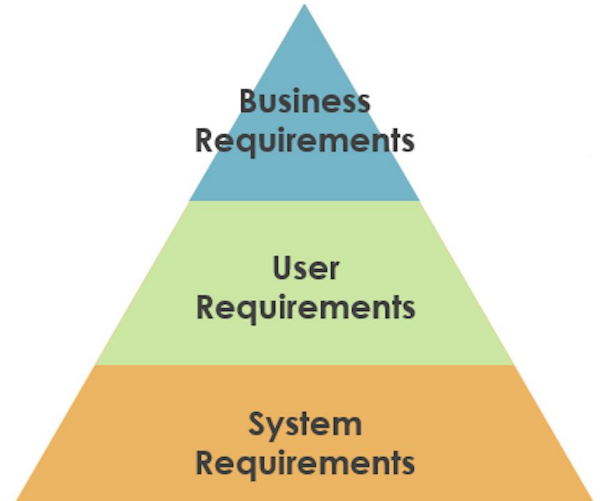
# Project Overview

- BT has turned to ISU students to help speed up the process of the React Migration
- Project Goal (Scope)
  - Responsible for reverse engineering a minimum of 3 pages into React
- Constraints
  - Time: Project completed by November 2020
  - Budget: There should be no cost to completing the project



# Requirements

- Complete tech discoveries prior to coding each web page
- Security
  - Adhere to all confidentiality agreements set by our client
  - Keep code on an internal Buildertrend repository
  - Implement solutions utilizing APIs Buildertrend already has in place
- User Interface
  - Utilize React components and Ant design library



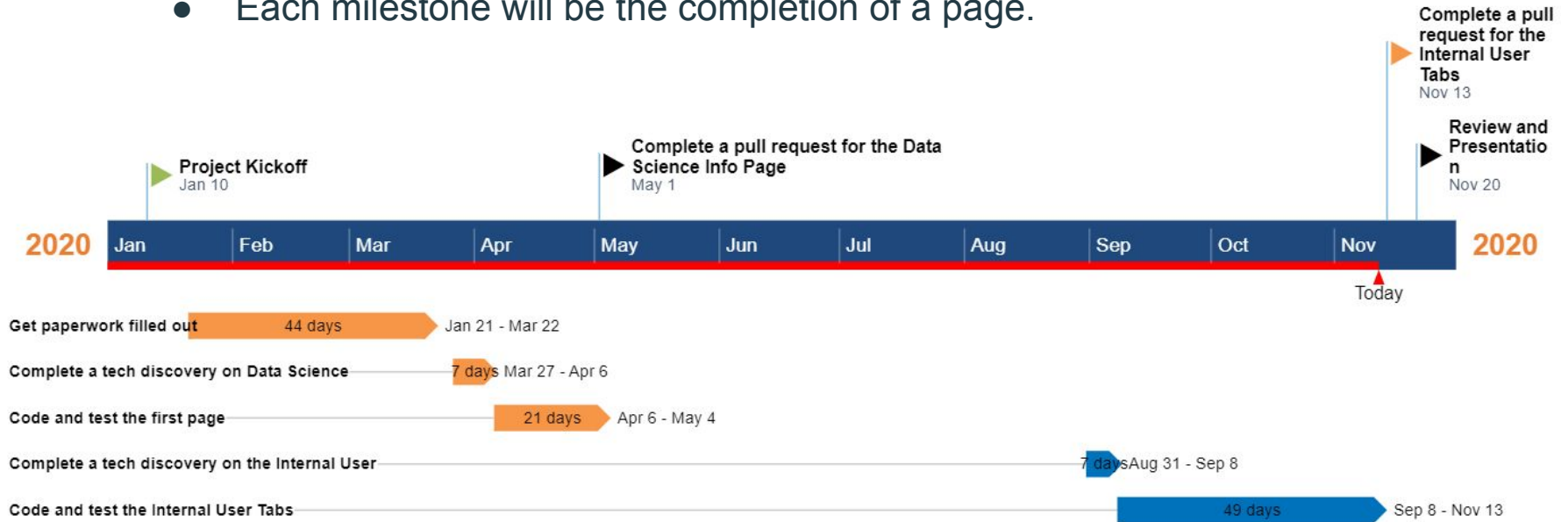
# Risk Identification & Mitigation

- Risk Identification
  - Lack of knowledge of the required coding languages and frameworks
  - Pieces of the code could potentially be implemented in inaccurate or non-optimal ways
- Risk mitigation
  - Learn required languages
  - Use BT support



# Project Milestones & Timeline

- Each milestone will be the completion of a page.





# Process of Creating a New Page



# Step 1: Tech Discovery

- Completed before the start of each page
- Black box approach
- The team test the original page and logs the results
  - Capture all requirements (functional and non functional)
  - Identify and document components
  - API calls
  - Validation requirements
- Tech discoveries serve as an important reference for our team and for anyone who will work with our pages in the future



# Functional Reqs.

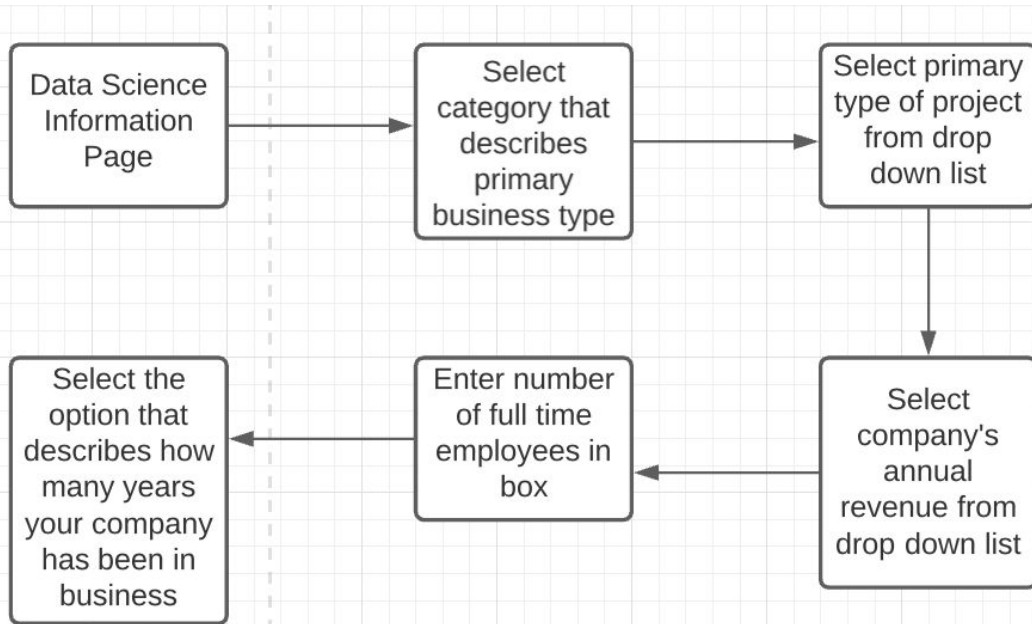
- The pages that we are converting will follow all the functional requirements given to us from the Tech Discovery
- For example:
  - When the “Manage Users” Link is clicked, the Manage User Modal will open on screen
  - When user types to change username, the username will be changed accordingly to the new username

# Non-Functional Reqs.

- Performance (Response Time)
- Reliability
- Maintainability
- Usability
- Appearance (API)



# Functional Decomposition (Data Science Information Page)



Company Profile Setup

Which category best describes your primary business? \*

Residential Homebuilder	Residential Remodeler	Specialty/ Trade	Commercial General Contractor
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Which of the following best describes your primary type of project? \*

Please Select

What is your company's estimated annual revenue? \*

Please Select

How many full time employees are on your company's payroll? \*

5

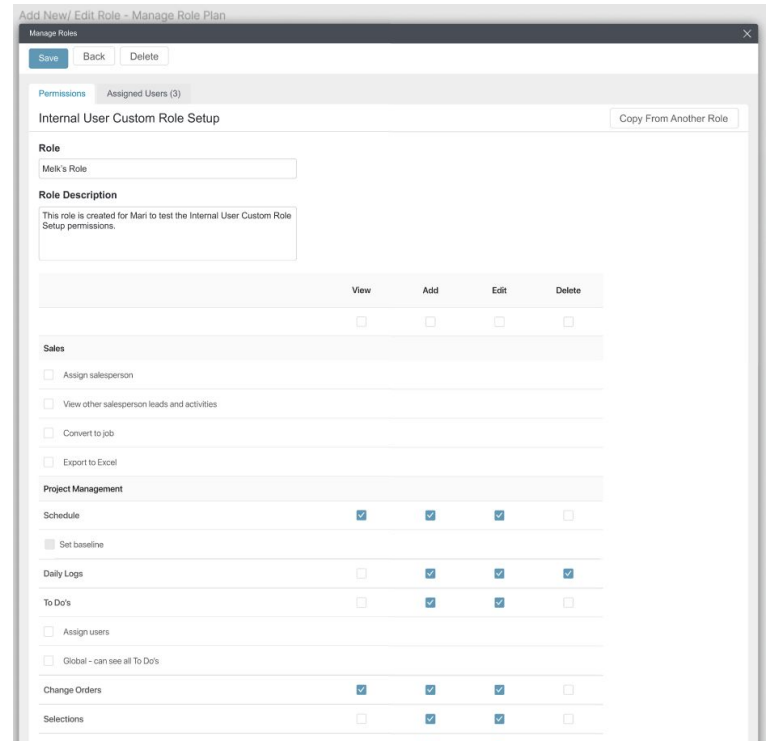
How many years has your company been in business? \*

Less than 1 year  
 1-4 years  
 5-9 years  
 10+ years

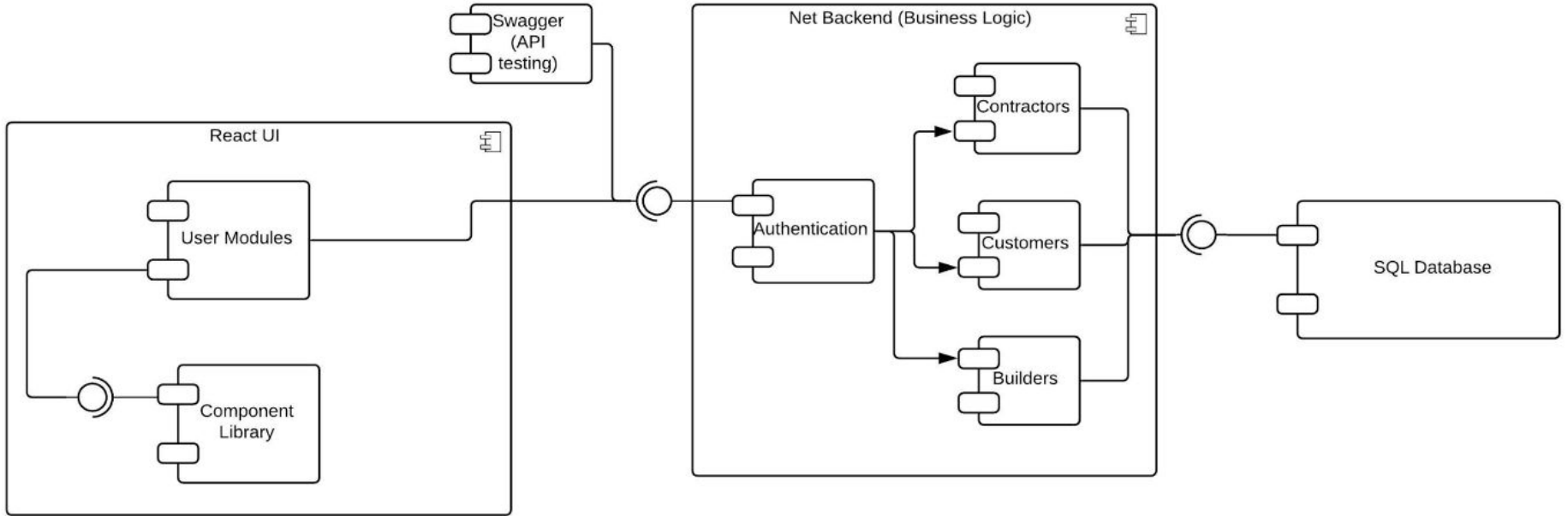
Finish

# Step 2: Design

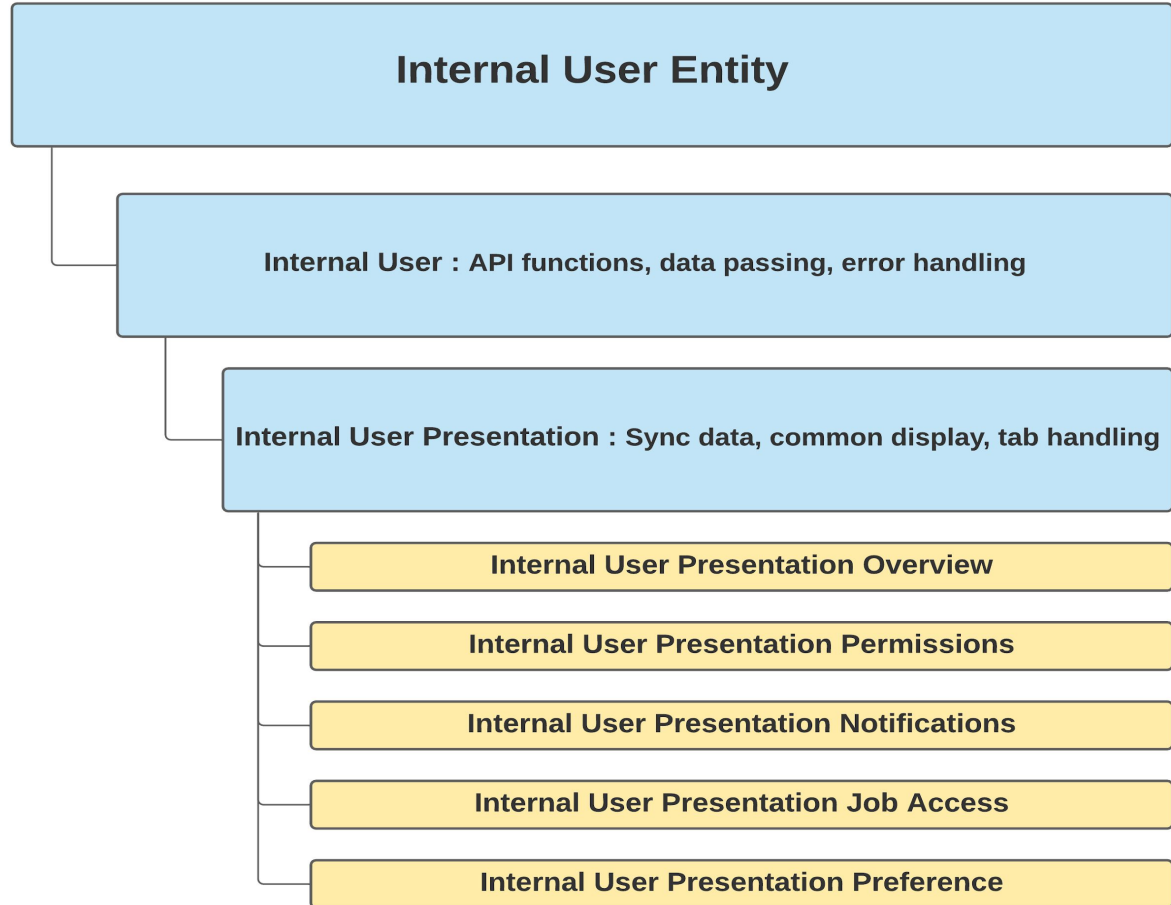
- Use the tech discovery and the new visual mock-ups to build the pages
  - Modified workflow
  - Visual decision made by Buildertrend
- Existing components
  - Data input and output mismatches with API
  - Where and how to handle data manipulation
- Making the design maintainable
  - Reusing existing components
  - Layered hierarchy



# System Diagram



# Software Design



# Other Design Decisions

- Central Types
  - Easy to export for use in other pages
  - Better VS code suggestions, faster development
- API Handlers
  - Production API handler
  - Fake API handler
- Mock data
  - Allow flexible interactions
  - Use of knobs to modify JSON fields



# Step 3: Code

- Understand which existing Buildertrend common components our team can use
- Utilize the requirements and documentation gathered during tech discovery to understand the needs of custom components
  - Ensure maintainability and flexibility of any new components we built
- Build an API handler that makes the correct API calls, performs as expected, and is well documented



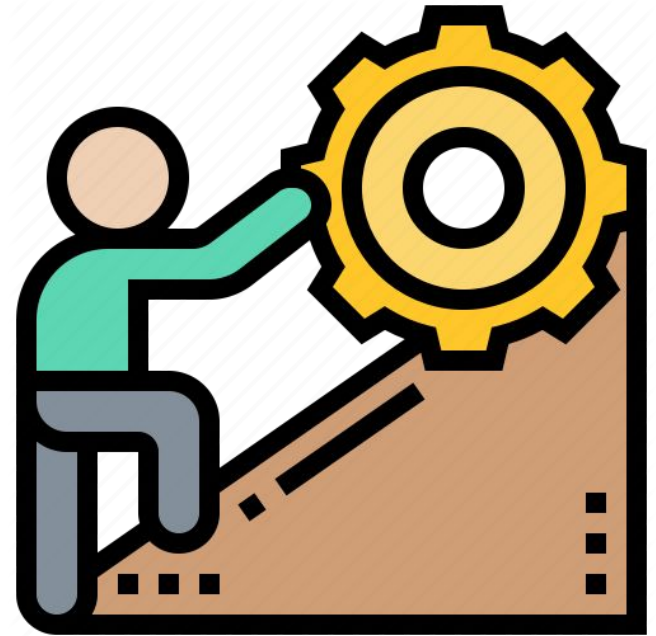
```
1 import React from 'react';
2 import ReactDOM from 'react-dom';
3 import './index.css';
4 import App from './App';
5 import * as serviceWorker from './serviceWorker';
6 React.
7 ReactDOM [?] Children const React.Children: R...
8 <Rea [?] Component
9 <A [?] Fragment
10 </Re [?] Profiler
11 docu [?] PureComponent
12 ); [?] StrictMode
13 [?] Suspense
14 // If [?] cloneElement change
15 // unr [?] createContext tfalls.
16 // Lea [?] createElement
17 servic [?] createFactory
18 [?] createRef
```





# Technical Challenges (Building Pages)

- Challenges building the pages
  - Some pages are large and have many complex features
  - Understanding the existing parts of the code base that directly tie into our pages
    - Integration was a slow and challenging process
  - Understanding and following Buildertrend's coding standards
  - Tying together all of the components we built to have one functioning React page



# Technical Challenges (React)

- Using React
  - React's documentation is not beginner friendly
    - Our team could sometimes get stuck on weekends or evenings when BT employees weren't available to help
  - Steep learning curve
    - Difference in technical understanding with BT
  - Mistakes and bugs in current BT implementation



# Step 4: Testing

- Postman
  - Test API calls and ensure they return the correct information
- Google Chrome Developer Tools
  - Flush out Tech Discoveries to illustrate all moving parts of webpage (including API calls)
- Storybook
  - Develop and test different component types in isolation
- React testing libraries
  - Used for testing React components
- After a significant portion of the page is completed we test: performance, usability, and reliability of the page
- Repeat steps 3 (code) - 4 (test) as needed for refactoring



# Step 5: Version Control

- Submit a pull request to the BT team
- If request is accepted then our code is merged into the master branch by BT
- Repeat steps 1 - 5 for each page





# Project Success

# Data Science Information Page

## Company Profile Setup

Which category best describes your primary business? \*

Residential  
Homebuilder

Residential  
Remodeler

Specialty/  
Trade

Commercial  
General Contractor

Which of the following best describes your primary type of project? \*

Please Select ▼

What is your company's estimated annual revenue? \*

Please Select ▼

How many full time employees are on your company's payroll? \*

5

How many years has your company been in business? \*

- Less than 1 year  
 1-4 years  
 5-9 years  
 10+ years

Finish

# Permissions Page

## Manage Roles Plan

Manage Roles

[Back](#)

### Standard Roles

#### Full Admin

Access to perform all actions on every item in Buildertrend.



#### Project Manager

Access to add and edit all job-related items except for Owner Invoicing and Internal Users and Subs. User will not have access to Sales items.



#### Office Manager

Access to add and edit most items in Buildertrend. User will not have access to Estimates or Warranty.



#### Bookkeeper

Access to all financials and accounting integrations as well as most job-related items. User will not have access to Sales, RFIs, Daily Logs, or Warranty.



#### Selections Coordinator

Access to cost and price information on Selections, POs, and COs. User will not have access to Owner Invoicing, Sales, Warranty, or Estimates.



#### Warranty Coordinator

Access to Warranty, To-Dos, and most communication items. User will not have access to Customer, Job, or Sub information.



#### Architect

Access to view COs and Selections without cost or price information as well as full access to most job-related items. User will not have access to Sales, Owner Invoicing, Warranty, or Estimates.





# Permissions Page

Add New/ Edit Role - Manage Role Plan

Manage Roles

Save Back Delete

Permissions Assigned Users (3)

Internal User Custom Role Setup Copy From Another Role

**Role**

Meik's Role

**Role Description**

This role is created for Mari to test the Internal User Custom Role Setup permissions.

	View	Add	Edit	Delete
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Sales</b>				
<input type="checkbox"/> Assign salesperson				
<input type="checkbox"/> View other salesperson leads and activities				
<input type="checkbox"/> Convert to job				
<input type="checkbox"/> Export to Excel				
<b>Project Management</b>				
Schedule	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Set baseline				
Daily Logs	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
To Do's	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Assign users				
<input type="checkbox"/> Global - can see all To Do's				
Change Orders	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Selections	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

# Preferences Page

Preferences Plan

Internal User Details

Save Save & New

Overview Permissions Notifications Job Access (14) Preferences

## Preferences

### User Settings

Archive User

Username \*  
Meik1234

Password  
\*\*\*\*\* Reset

### Schedule

Alert when there are multiple Schedule Item Conflicts

Schedule Item Conflicts

3

### External Calendar Intergrations

[Learn how to create a feed for your iCal, Google Calendar, or Outlook](#)

Schedule Items  
-- All Schedule Items Selected --  
Create Feed

Lead Activities  
Cows Fly Inc Activities  
Create Feed

To-Do's  
-- All To-Do's Selected --  
Create Feed

### Time Clock

Require location on mobile and track when lan clocks in or out beyond the geofence.

### User Information

**Sarah Biben**  
Full Admin

Email  
sarah.biben@buildertrend.com

# Preferences Page

## Time Clock




Require location on mobile and track when lan clocks in or out beyond the geofence.


Default labor cost code

Default Labor Cost

## Message Preferences

Message Signature

Font    ▾    Size    ▾    **A** ▾    **A** ▾    **B**    *I*    U    **S**                    



Message Signature Image



 Replace File

 [Design Agreement - Final.png](#)

## Contact

Contact Information

Textarea caption message.

# Job Access Page

JOB ACCESS 180

Internal User Details

Save Save & New

Overview Permissions Notifications Job Access (14) Preferences

### Job Access

	Job Name	Job Status	Date Opened
<input checked="" type="checkbox"/>	Aaron Smith	Open	Oct 01, 2019
<input type="checkbox"/>	Bricks	Open	Jun 11, 2019
<input type="checkbox"/>	Brown - 5521 Elmwood - H.24001	Open	Jan 07, 2014
<input type="checkbox"/>	BT Media Schedule	Open	Feb 28, 2020
<input type="checkbox"/>	Clarkson Commercial Remodeling Services	Open	Aug 23, 2019
<input type="checkbox"/>	Corby - 541 S. 198th St - H.24002	Open	May 30, 2017
<input type="checkbox"/>	Dugger - 321 A. St - H.24003	Open	Jan 07, 2014
<input type="checkbox"/>	Karen - 1345	Open	May 31, 2019
<input type="checkbox"/>	Lamason - 26 Tall Lane - H.24004	Open	Jul 08, 2015
<input type="checkbox"/>	McKenna - 11818 1 St. - H.24005	Open	Nov 26, 2018
<input type="checkbox"/>	Rodger Atkins	Open	Jun 12, 2019
<input type="checkbox"/>	Rodger Atkins	Open	Jun 12, 2019
<input type="checkbox"/>	Smith - 125 B St. H.24006	Open	Aug 08, 2018
<input type="checkbox"/>	Sub Demo	Open	Jun 11, 2019
<input type="checkbox"/>	Thomas - 414 S. 198th - H.24007	Open	Oct 17, 2016

### User Information

**Sarah Biben**  
Full Admin

**Email**  
sarah.biben@buildertrend.com

# Engineering Standards

- IEEE 1028-1997 - IEEE Standard for Software Reviews
- IEEE 12207-1996 - Information Technology - Software Life Cycle Processes
- IEEE 12207-2017 - Systems and software engineering -- Software life cycle processes

# Design Practices

- Iterative prototyping
- Modular design



**IEEE**

*Advancing Technology  
for Humanity*

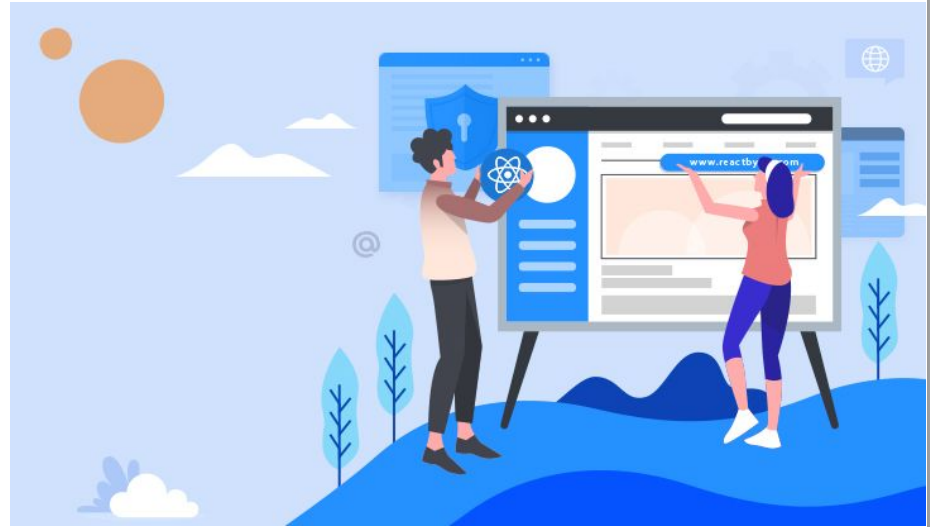
# Lessons Learned

- Lessons Learned
  - Code: React, Formik, Storybook, Ant Design, and TypeScript
  - Ability to work in remote environment
- Industry experience
  - Business mindset
  - Working with other teams' code
  - Importance of communication, reaching out for help



# Conclusions

- Conclusions
  - Help provide BT customers with faster and more modern user experience by converting ASP.net pages into React
- Future work
  - BT will use our code for their updated website
  - BT will continue the process of their React Migration



Thank You!



Questions?