

## **Project report-out & lessons learned document**

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### **Project sponsor**

Dr. Tim Maciag (ENSE 871 Professor)

### **Business need/opportunity**

The Canadian Engineering Education Association / Association Canadienne de l'éducation en génie (CEEAA-ACÉG), including the Engineering and Humanities Special Interest Group (SIG), holds conferences once a year and meetups (roundtables) monthly or bimonthly, and they don't currently have tools for in-depth, consistent, and sustainable communication channel over their conferences and meetups. They require a platform that facilitates communication channels, member networking inside and outside of the organization, bilingual support, and an information exchange portal for engineering educators.

The purpose of this project is to improve communication and cooperation between academics, instructors, and professionals working in the field of engineering education, especially the Engineering and Humanities Special Interest Group within the Canadian Engineering Education Association / Association Canadienne de l'éducation en génie (CEEAA-ACÉG). In order to achieve the SIG's objectives, the team is designing an online platform prospecting some features like networking tools, bilingual support, event advertising, information exchange, member-only areas, user-friendly interfaces, and building relationships within and outside of the SIG with the ultimate goal of advancing engineering education in contexts related to the Engineering and Humanities.

### **Reflections on project planning, execution, & closing**

#### **North Star & carryover customers**

NorthStar (target) customer: Humanities and Engineering SIG members.

Carryover customers: Other SIG members, Students, and engineering educators.

#### **Summarized assumptions made and constraints uncovered.**

The assumptions made for this project are:

- The present stakeholders will remain involved throughout the project.
- The project will be built using WordPress.
- Free or cheap plugins will be used for the demo website.
- Dummy data will be used in the absence of substantial data.
- The platform administration should be minimized.

The uncovered constraints:

- The use of free plugins proved to be more restrictive as we found some plugins with good features that would be useful to the customer but they are not free.
- WordPress constraints made it more difficult to directly translate our prototype to the website.
- WordPress allows you to personalize plugins, widgets, and functionalities. However, it requires more effort than we anticipated. There are large learning curves.

### **Summarize key findings from affinity diagramming and empathy mapping**

The affinity diagramming and empathy mapping gave us avenues to document the needs of the customers and create a group understanding of the project. From the affinity diagram and empathy map, we discovered that the customer was saddened about the current state of things where members of the Humanities and Engineering SIG barely visited their section on the CEEA website and did not have a one-platform connection of the SIG members. This in turn slowed down collaboration and the sharing of relevant information. They were looking for a website that promotes collaboration between the members and easy sharing of information. They also wanted this website to be accessible by the general public with restrictive access so that non-members could also see what is going on in the community.

### **Initial & evolution of our USM/MVP (why is what we produced an MVP?)**

At the beginning of the project, we decided to develop a networking website with bilingual support. This website would have the feature of letting members sign up and log in to their accounts. Members will be able to make edits to their profiles, create and join events, join research interest groups, and build connections with other members while non-members will have access to only view the content of the site. As time went on we removed some features that were deemed distracting by the manager and customers or were hard to edit to meet the requirements of the customer due to monetary and WordPress plugin constraints. These features included the events section of the website and the send requests and make connections feature.

The website we developed is a simple networking platform on WordPress with the following:

- Individual self-created and edited membership profiles with information such as full name, contact information, research interests, bio, and a link for publications.
- Research Interest Groups where members can create and post on to share information and request for collaboration.
- A map that provides an interactive experience for people to find the locations of members in the SIG along with their research interests and build a network
- An About Us page that informs non-members about what the Humanities in Engineering SIG is about and how to join.
- The ability to switch and access the website in French or English

This website is an MVP as it addresses all the basic concerns and requirements of our customers.

### **Summarize prototyping activities and usability evaluation findings**

The final WordPress solution reflects the insights gathered through the prototyping and usability evaluation process. Key features include:

- A clean, modern layout with a clear visual hierarchy to guide users
- A simplified navigation menu that groups related features and functions
- Prominent calls-to-action and visual cues to highlight key actions
- Intuitive form designs and input fields that leverage affordances for ease of use
- Consistent branding and design elements across the entire site

We developed a prototype that simulates the website's navigation and the way of showing information; however, we did not know about the WordPress design system. So, we went prototyping with low fidelity, which shows the concept of the website. Throughout check-ins, we got feedback from the customers and we updated our website according to the customer feedback.



Figure 1. Prototype Design for the members page (Changed to the landing page of the website at the final product)

The map works as an affordance for the users. The marker(s) work as signifiers the user can click and check what member is located at the point. Also, under the page, name search and groups search work affordances and signifiers in guiding users to search by name and by group. The users can click each member card which moves the user to the member's profile

page. The member cards carry the member's information that is backed by the Gestalt concept: The information is grouped in a similar way in each card, so the user perceives the card as grouped information of a member.

**Summarize your final WordPress solution. Include screenshots of your final solution, linking back to prototyping activities, feedback/comments gathered, and lecture topics**

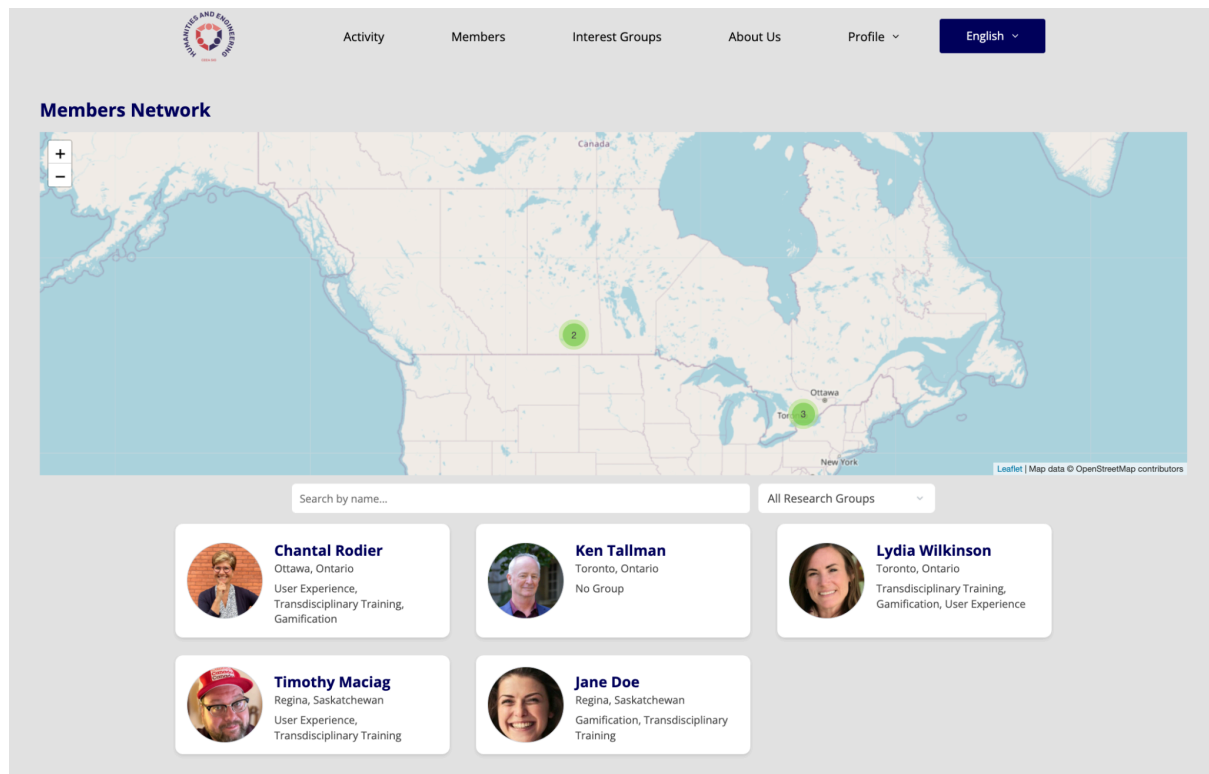


Figure 2. Final Version of the landing page.

Our customers stated that the website should demand as little administrative labor as possible because they do not have enough time to administer it. As a result, Member Network and Research Interest Group are powered only by the plugin and user inputs. As a result, the landing page generates the current active member list, as well as map markers. The member network component aggregates user data from all member profiles automatically.

### **Reflections on project results (maximum 2 pages)**

- Summarize how you felt about this project (likes/dislikes)
  - WordPress removes a lot of needless effort when creating a website, but it also has limitations when it comes to using plugins. It involves purchasing an additional pro edition of the plugin.
- Summarize what went well during the project.
  - We were worried about implementing the research interest group. Knowing about the BuddyPress plugin resolved almost all of my concerns.
- Summarize what did not go well during the project.
  - The implementation of the member network component took much more time than we expected. We thought there would be some useful free plugins, but it turns out not to be the case. So, we developed all the functionalities in custom.
- How successful was your team in translating prototypes into WordPress reality?
  - We were able to translate a substantial amount of the prototype into WordPress.
- Did the people-centered design ideas discussed in lectures help/hinder your design explorations?
  - The people-centered design ideas greatly helped our design, as they were the backbone that influenced most of our processes and decisions.
- Would you do the same for future projects?
  - When it comes to specific requirements, we will go with custom widgets, functions, or plugins unless the customer does not want to spend an extra budget on plugins or themes.
- What would you do differently on future projects?
  - We will gather clearer feedback from the customer during the design prototyping stage to prevent making too many changes during the implementation stage and spending a lot of time adding and removing features.
- Summarize opportunities and design ideas for future work.
  - It was a great experience using WordPress and having the opportunity to work on a people-centered design project. The concepts from the lectures were tested and challenged practically. We would apply this experience to future projects in designing usable, efficient, and delightful software products.

## **Appendix: WordPress themes and plugins and custom code**

**1. Elementor:** This plugin includes Elementor header and footer builders that help in building a website without any coding work. We used this plugin for the basic styles of the website. Based on 6,756 ratings, it gets 4.5 out of 5 ratings. The last update for this plugin was April 10, 2024, and the active installation counts over 5 million. This plugin is the most famous website builder plugin among WordPress plugins.

**2. BuddyPress:** This plugin is used for the social networking section of the website. This plugin has been rated 4 out of 5 stars by 365 people. It was last updated 2 weeks ago with 100,000+ active installations. It can be simply installed, activated, and updated from the plugin section of the WordPress backend.

**3. BuddyBuilder:** This plugin is used for the customization of the BuddyPress plugin pages. This plugin has been rated 4 ½ out of 5 stars by 53 people. It was last updated 9 months ago with 2,000+ active installations. It can be simply installed, activated, and updated from the plugin section of the WordPress backend.

**4. Forminator:** This plugin is used for the membership account registration and login forms. This plugin has a 5.0 rating based on 1,656 ratings. It was last updated 3 days ago with 500,000+ active installations. It can be simply installed, activated, and updated from the plugin section of the WordPress backend.

**5. Weglot:** Weglot is a versatile multilingual translator plugin. Its latest update, version 4.2.6, was released on April 8, 2024. With over 60,000 installations and more than 1,500 user ratings, it's a popular choice for website translation. Weglot supports over 110 languages, allowing you to expand your reach to a global audience. You can select the languages you wish to offer, and Weglot will take care of the translation process. It combines automatic translation with manual editing to ensure accuracy. The plugin automatically detects your website's content and provides machine translations, which you can then review and refine for improved quality.

**6. Members Network:** When the users arrive at the landing page, this component displays all of the members in the form of a list and map markers. The component implements the member list and member pointer (or marker) on the map that is part of the prototype design. The customers' feedback indicated that the platform should be administered at a minimum. To meet the criteria, we studied and researched available plugins without success. So, we decided to tweak an existing plugin, WP Open Street Map (OSM): It does not require an API key, unlike Google Map requires one to use the plugin. When the markers overlap, OSM converts the markers to a circle icon with counts of the markers that indicate how many members are present at the same location. In the back end, the custom php function (custom function is added in `~/stack/wordpress/wp-content/themes/buddyx/functions.php`) retrieves data such as the user's name, location, geolocation (latitude and longitude), group(s), member avatar image, and the URL for the member profile. Then, a custom JavaScript function (`~/stack/wordpress/wp-content/themes/buddyx/assets/js/user-location-matcher.js`) lists the

members and associates markers with the member list from the data. Also, JavaScript enables searching by typing a member's name and selecting a group to show members belong to the group only. The component will perform jobs without trouble; however, if the member count exceeds 100, pagination or paging with a scroll function should be considered to handle the vast amount of data. OSM has a 3.5 rating out of 5. It was updated on April 5, 2024, with 2,000+ active installations. It is a fundamental plugin of WordPress.

### Widget Template:

~/stack/wordpress/wp-content/themes/buddyx/elementor-widgest/elementor-members-location-widget.php

```
<?php
if ( ! defined( 'ABSPATH' ) ) {
    exit; // Exit if accessed directly.
}

class Elementor_Members_Location_Widget extends \Elementor\Widget_Base {

    public function get_name() {
        return 'members_location_map';
    }

    public function get_title() {
        return __( 'Members Location Map', 'text-domain' );
    }

    public function get_icon() {
        return 'eicon-google-maps';
    }

    protected function _register_controls() {
        // You can add controls like title, and any configuration here if needed
    }

    protected function render() {
        echo '<div id="member-network-title">Members Network</div>';
        echo '<div id="map" style="height: 450px; width: 100%;"></div>';
        echo '<div id="select-container"><input type="text" id="userNameSearch"
placeholder="Search by name..."/ > <select id="group-filter"><option value="all">All
Research Groups</option></select></div> ';
        echo '<div id="member-cards"></div>';
    }
}
```

```
// Register widget
add_action( 'elementor/widgets/widgets_registered', function( $widgets_manager ) {
    //require_once( __DIR__ . '/elementor-members-location-widget.php' );
    $widgets_manager->register( new \Elementor_Members_Location_Widget() );
} );
```

**Custom function** in ~stack/wordpress/wp-content/themes/buddyx/functions.php

```
....
// Custom Function for member list
// Brian
// brianjkim.dev@gmail.com
// March 31, 2024

// add_action('wp_enqueue_scripts', 'enqueue_and_localize_script');
add_action('bp_init', 'enqueue_and_localize_script');

function enqueue_and_localize_script() {
    wp_enqueue_style('leaflet-markercluster-css',
'https://unpkg.com/leaflet.markercluster/dist/MarkerCluster.css');
    wp_enqueue_style('leaflet-markercluster-default-css',
'https://unpkg.com/leaflet.markercluster/dist/MarkerCluster.Default.css');
    wp_enqueue_script('leaflet-markercluster-js',
'https://unpkg.com/leaflet.markercluster/dist/leaflet.markercluster.js', array('leaflet-js'),
null, true);

    wp_enqueue_style('leaflet-css', 'https://unpkg.com/leaflet@1.7.1/dist/leaflet.css');
    wp_enqueue_script('leaflet-js', 'https://unpkg.com/leaflet@1.7.1/dist/leaflet.js', array(),
null, true);

    wp_enqueue_script('user-location-matcher', get_template_directory_uri() .
'/assets/js/user-location-matcher.js', array('jquery'), '1.0', true);

    // Path to the CanadaCities.json file
    $json_path = get_template_directory() . '/assets/js/CanadaCities.json';
    // Ensure the JSON file exists
    if (file_exists($json_path)) {
        // Load and decode the JSON data into an associative array
        $json_data = file_get_contents($json_path);
        $cities = json_decode($json_data, true);
    } else {
```



```

    $cities = array();
}

$users_data = array();
$users = get_users(); // Retrieve all users

foreach ($users as $user) {
    // Retrieve Member Avatar
    $avatar_url = get_template_directory_uri() . '/assets/images/default-avatar.png';

    if (function_exists('bp_core_fetch_avatar')) {
        // BuddyPress is active, and you can safely use its functions here.
        $avatar_url = bp_core_fetch_avatar(array(
            'item_id' => $user->ID, // User ID
            'object' => 'user', // 'user', 'group', 'blog', or custom object (like
'custom_post_type')
            'type' => 'full', // 'thumb' or 'full'
            'html' => false // Return URL, not HTML
        ));
    }

    /*if(empty(bp_get_user_avatar_url($user->ID))) {
        $avatar_url = get_template_directory_uri() .
'/assets/images/default-avatar.png';
    } else {
        $avatar_url = bp_get_user_avatar_url($user->ID);
    }*/

    $user_location = xprofile_get_field_data('Location', $user->ID); // Assuming
BuddyPress xprofile field
    $groups = groups_get_user_groups($user->ID)['groups'];

    // Initialize geolocation data
    $geo = array('lat' => null, 'lng' => null);

    // Attempt to match the user's location to a city in the JSON data
    foreach ($cities as $city) {
        if ($city['city'] === $user_location) {
            $geo['lat'] = $city['lat'];
            $geo['lng'] = $city['lng'];
            break; // Stop searching once a match is found
        }
    }
}

```

```

    }
}

    /// Preparing user data, including group details
    $user_groups_info = array();
    foreach ($groups as $group_id) {
        $group_details = groups_get_group(array('group_id' => $group_id));
        $user_groups_info[] = array(
            'group_id' => $group_id,
            'group_name' => $group_details->name,
        );
    }

    // Append user data with geolocation
    $users_data[] = array(
        'uid' => $user->ID,
        'profUrl' => WP_HOME . "members/" . $user->user_login,
        'uname' => $user->display_name,
        'avatar' => $avatar_url,
        'location' => $user_location,
        'lat' => $geo['lat'],
        'lng' => $geo['lng'],
        'groups' => $user_groups_info,
    );

}

    // Localize script with prepared user data
    wp_localize_script('user-location-matcher', 'UserData', array(
        'users' => $users_data,
    ));
}

// Custom Elementor Widgets
add_action('elementor/widgets/widgets_registered',
'register_custom_elementor_widget');

function register_custom_elementor_widget() {
    // Ensure Elementor is active
    if (defined('ELEMENTOR_PATH') && class_exists('Elementor\\Widget_Base')) {
        require get_template_directory() .
'/elementor-widgest/elementor-members-location-widget.php';
    }
}

```

```

\Elementor\Plugin::instance()->widgets_manager->register_widget_type(new
Elementor_Members_Location_Widget());
}
}

```

### Custom JavaScript file:

~stack/wordpress/wp-content/themes/buddyx/asset/js/user-location-matcher.js

```

document.addEventListener('DOMContentLoaded', function() {

    if (typeof UserData !== 'undefined' && UserData.users) {
        let map = L.map('map', { scrollWheelZoom: false }).setView([52.7024, -99.9867], 4);
        // Center on Canada

        L.tileLayer('https://{s}.tile.openstreetmap.org/{z}/{x}/{y}.png', {
            attribution: 'Map data © OpenStreetMap contributors',
            maxZoom: 18,
        }).addTo(map);

        let markers = L.markerClusterGroup().addTo(map);
        let cardsContainer = document.getElementById('member-cards');
        let userNameSearch = document.getElementById('userNameSearch');
        let groupFilterSelect = document.getElementById('group-filter');

        const initializeGroupFilter = function() {
            let allGroups = {};
            // Collect all unique groups from UserData
            UserData.users.forEach(function(user) {
                user.groups.forEach(function(group) {
                    allGroups[group.group_id] = group.group_name;
                });
            });

            // Populate the select box with options
            Object.keys(allGroups).forEach(function(groupId) {
                let option = new Option(allGroups[groupId], groupId);
                groupFilterSelect.add(option);
            });
        }
    }
}

```

```

// Function to update both the map markers and member cards
const updateContent = function() {
    // Clear existing markers and cards
    markers.clearLayers();
    cardsContainer.innerHTML = "";

    // Get the selected group(s), assuming the presence of an "All Groups"
    option with a specific value or detecting no selection as "All Groups"
    let selectedGroups =
Array.from(groupFilterSelect.selectedOptions).map(option => option.value);

    // Determine if "All Groups" is selected either by specific value (e.g., 'all')
    let isAllGroupsSelected = !selectedGroups.length ||
selectedGroups.includes("all");

    let searchFilter = userNameSearch.value.toUpperCase();

    UserData.users.forEach(function(user) {
        let userHasGroups = user.groups && user.groups.length > 0;
        let userInSelectedGroup = user.groups.some(group =>
selectedGroups.includes(group.group_id.toString()));

        let matchesSearch =
user.username.toUpperCase().indexOf(searchFilter) > -1;
        // Ensure users with no groups are shown when "All Groups" is selected
        let shouldIncludeUser = (isAllGroupsSelected ||
(userInSelectedGroup && userHasGroups)) && matchesSearch;

        if (user.lat && user.lng && shouldIncludeUser) {
            // Create and append the member card
            let card = document.createElement('div');
            card.className = 'member-card';

            card.onclick = function() {
                window.location.href = user.profUrl;
            };

            let imageDiv = document.createElement('div');
            imageDiv.className = 'member-avatar';
            imageDiv.innerHTML = `<div style="width:100px;
height:100px; border-radius:50%; border: 1px solid #D1D5DB; background-image:
url('${user.avatar}'); background-position: center; background-size:auto 100%;
background-repeat: no-repeat;"></div>`;

```

```

        let userDetails = document.createElement('div');
        userDetails.className = 'member-details';

        let userInfo = document.createElement('div');
        userInfo.className = 'member-info';
        userInfo.innerHTML = `<span
class="member-name">${user.username}</span><br> ${user.location || 'Not location
specified'}`;

        let userGroups = document.createElement('div');
        userGroups.className = 'member-groups';
        userGroups.innerHTML = `${user.groups && user.groups.length ?
user.groups.map(group => group.group_name).join(", ") : "No Group"}`;

        userDetails.append(userInfo, userGroups);
        card.append(imageDiv, userDetails);
        cardsContainer.appendChild(card);

        // Create and add a marker to the map for the user
        let marker = L.marker([parseFloat(user.lat), parseFloat(user.lng)]);

        marker.bindPopup(`<b>${user.username}</b><br>${user.location}`);
        markers.addLayer(marker);
    }
});

};

initializeGroupFilter();
updateContent();

// Update content on group filter change
groupFilterSelect.addEventListener('change', updateContent);

// Update content on search input change
userNameSearch.addEventListener('keyup', updateContent);
}
});

```