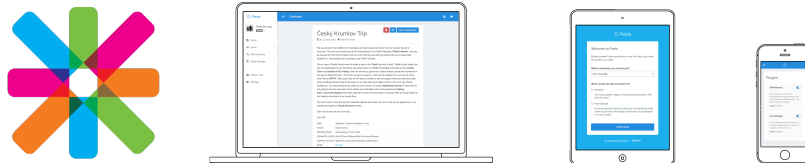


# Coordination System For Foreign Students' Educational Stays

Do Long Thanh\*



## Abstract

The goal of this project is to develop a new information system for the non-profit organization called Erasmus Student Network (ESN). ESN is a Europe-wide international student organization coordinating student exchange programs. It implements solutions that encourage the higher level integration of new international students with Brno University of Technology. The main purpose of the developed system is to improve the communication between incoming students and ESN members who take care of the students. At the current stage, the information system successfully cooperates with Brno University of Technology, Mendel University in Brno, and Masaryk University. In the next phase, we expect the involvement of other Czech and foreign universities.

**Keywords:** User Experience — Erasmus Student Network — Information System

**Supplementary Material:** [Official Site Erasmus Student Network](#) — [Live Demo](#)

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## 1. Introduction

Nowadays, it is easier than ever before to study, work, and travel around the whole world. Studying abroad gives students a unique opportunity to live in a foreign country. Although it is a valuable experience, for many it means to leave their home for the first time. It may become hard to get used to the new surroundings, culture, people, local cuisine and probably the language.

To accommodate the needs of exchange students, Erasmus Student Network<sup>1</sup> (ESN) was created. Currently, this international network now consists of 900 higher education institutions from 40 countries (Figure 1), and it operates at 18 Czech universities. ESN helps with the integration of international students and provides relevant information about the foreign university

during their time abroad. The organization involves around 40,000 young people offering their services to 200,000 students every year [1].

Organization of a such number of students is a challenging responsibility. Therefore, some ESN sections created their private information systems in order to manage their standard tasks. These information systems aim to eliminate the lengthy administrations by making the data readily available.

The primary mission of this project is to support the work of ESN by facilitating the work between local and international university students. It implements solutions that simplify the integration of new exchange students of Brno University of Technology. In the next phase, we expect to include numerous universities not only from Brno but elsewhere in the country and even abroad

<sup>1</sup>Official website of Erasmus Student Network: <https://esn.org/>

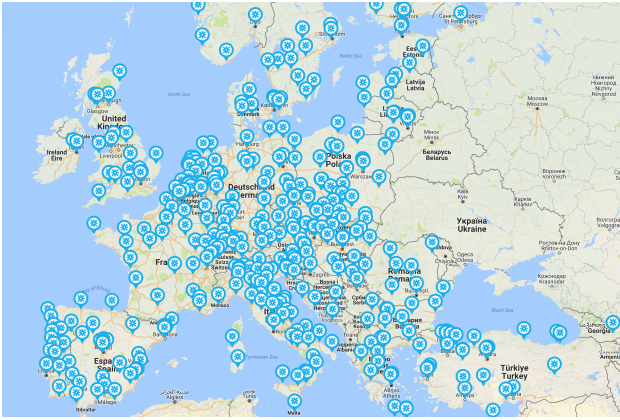


Figure 1. Map of ESN sections [1]

## 2. Analysis of Requirements

Over the last decade, User Experience (UX) has become a buzzword in the field of user interface design. UX is the objective reflection of the interaction between clients and the Web Information Services. Web Information System requires providing high-quality design including user-requirement-based services. A rich user experience emphasizes the users' feeling [2].

To ensure a positive user experience, we need to understand who the user is, what he needs and what is the purpose of the product or service, he intends to use [3]. A thorough understanding of the project the target users helps us to convince visitors to perform *conversion actions*. Conversion action is an action from which benefits the client. Visitors commit conversion actions [4].

For easier comprehension of UX process, I followed the four steps (Figure 2):

1. **Discover:** Understand user needs when visiting a website, and user's behavior patterns.
2. **Define:** Select relevant methods for the current project.
3. **Design:** Analyze gathered information and develop a new system.
4. **Implement:** Verify that the results work well and find improvement.

The information system will be used by many users on the international level. The development of the system without feedback from users during the testing stages would put the project at high risk of failure [4]. I focused on detailed analysis of users and existing information system using the knowledge of UX.

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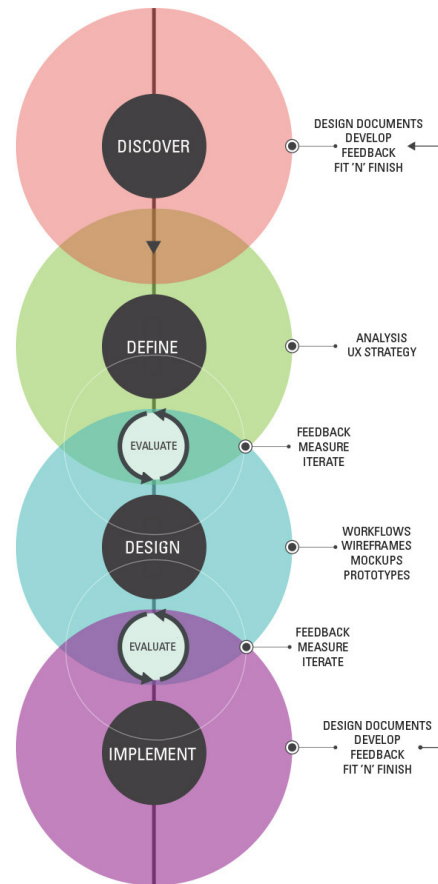


Figure 2. Technological Process UX

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## 3. Existing solutions

Brno University of Technology has its own ESN section called the International Students Club VUT Brno (ISC BUT). This section was established in 2003, and nowadays, it provides help for approximately 600 incoming students every year.

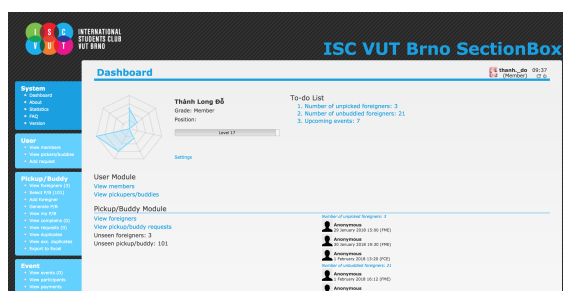
The information system for the international student coordination currently employed by ISC BUT is called SectionBox.<sup>2</sup> The primary purpose of SectionBox is to manage incoming students and organize events for the students. The most prominent benefit of SectionBox is the so-called *Buddy System*. This application helps to connect international students with local students who can be of assistance to their interna-

<sup>2</sup>The website of the SectionBox information system Available from: <https://www.sectionbox.org>

tional peers in situations where they need it the most. It is after the arrival or during the accommodation process, paperwork or other essentials around city and university.

The system's event manager is one of its most significant benefits. It facilitates the management of all the events organized by ISC BUT in one place. On the other hand, if an international student wishes to register for an event, it is necessary to know a private key confirming the participation. This private key is sent by email after successful registration. It is important to note that the registration process does not take place in the system but on the official ISC BUT website. The main problem lies in the fact that only members of the organization have access to the system. The lack of user autonomy then creates other issues, such as problems with changing their profile. It is necessary to report the change to a member of ISC BUT who has the privilege to modify the account.

The unoptimized user interface which can be seen in Figure 3 can be identified as another potential problem. The information system does not support responsive design, which is currently a significant drawback. The web application is not ready for the display resolutions of mobile devices.



**Figure 3.** Analysis of the current non-responsive system - the screen after logging

### 3.1 Solutions from other ESN sections

SectionBox is not the only system used by ESN. In the beginning, the organization used Google forms. Since some ESN sections still utilize Google forms or paperwork nowadays, the majority of them converted to information systems:

**BuddySystem** was created by ESN France. It offers a matching system and sending messages. It supports neither registration to events, nor a modification system.

**Papaya** is a light system version allowing only necessary registration and pairing local and international management. This system is developed as *mobile-first* – designed for the smallest screen and working way up to larger screens.

**Broaddy** was created in the Czech Republic by ESN CULS Prague. This particular system enables the user to perform all of the typical tasks of ESN, but it is not free.

After analyzing the already existing systems, it was crucial to understanding the needs of international students and the members of ISC BUT. As a member of ISC BUT I scheduled several meetings with international students and the ISC BUT organization. Before each meeting, it was necessary to write down what we want to know and choose relevant methods of user research. Based on the gathered information I summarized the results and focused on improving deficiencies using the knowledge of UI design [5].

During the meetings, I quickly discovered that the majority users were not satisfied with the current system. International students would appreciate the possibility of profile editing and multilingualism. I also needed to consider requirements of Brno University of Technology itself, not only the members of ISC BUT. With these findings in mind, I was ready to develop a new information system for ESN to replace the existing system.

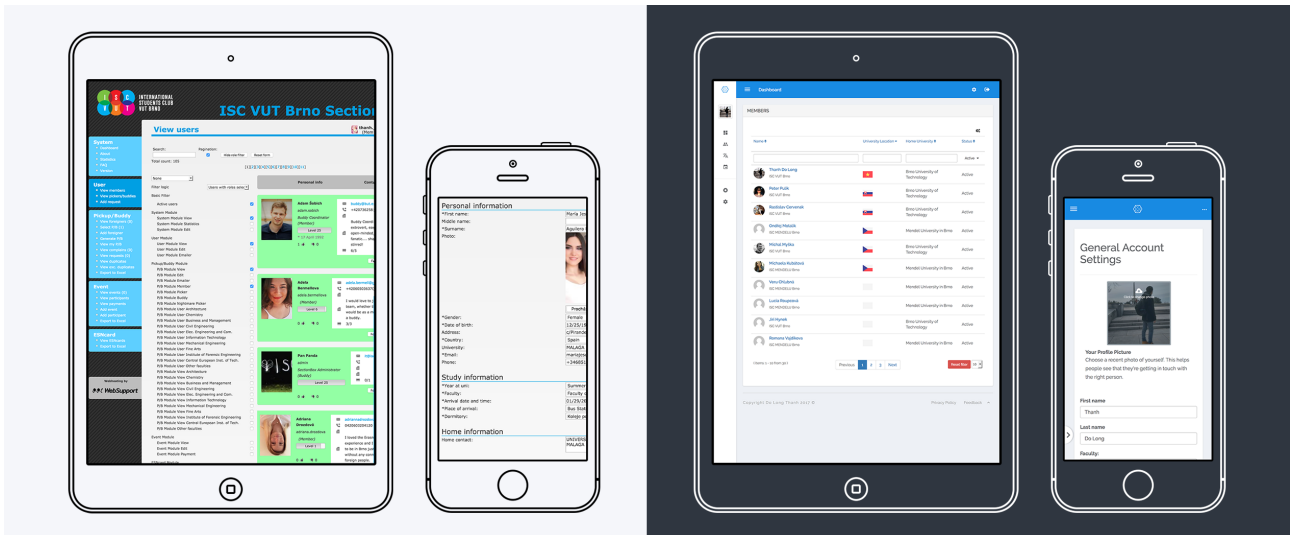
Fiesta presented at Czech National Platform of ESN CZ (conference for Czech ESN sections with attendance of International guests where the future of ESN CZ discussed). The meeting took place on 21st April, and more than 180 ESN members attended it. Eight new universities were involved in the testing, and personal experimentation was participated in by 20 students.

In overall, we completed 11 questionnaires, carried out 20 interviews and tested Fiesta with ISC BUT every second week.

## 4. New system called Fiesta

It is essential to keep in mind what the primary purpose of the new system is. Considering the fragmented nature of systems currently utilized by ESN, this system is an attempt to create a platform capable of embracing all of the specific needs of the various ESN sections. The new system was not implemented individually by the particular sections, but universally. Fiesta follows these criteria.

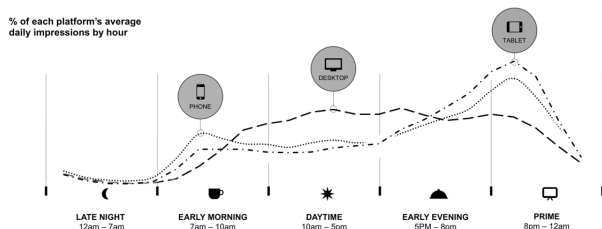
1. **Role-Based Access Control** is necessary for new systems because international students have different permission than members ESN (more information in section 5.2).
2. **Modular system** is modeling technique which subdivides a system into smaller components called modules. The main benefit of modularity



**Figure 4.** On this picture, we can see the current non-responsive system on the left and the new system called Fiesta with responsive design on the right. Responsive web design is the concept of developing a website in a way that allows the design to adapt according to the user's screen resolution.

is customization by request each section of ESN and adding the new solution in the form of a new module. The actual version of the system implements two modules: buddy system and event manager. These two modules were successfully tested. Further modules will be implemented according to requirements of other sections.

3. **Multilingual** execution constitutes an undisputable part of the system. Given that ESN is an organization with international representation, the linguistic needs of the users must be accommodated.
4. **Responsive design** is no longer a trend – it is a necessity. Mobile traffic as a share of total global online traffic in 2017 is nearly 50 % [6]. Hence, the websites that are not responsive lose progressively larger portions of their audience.



**Figure 5.** How much time do consumers spend using mobile media? [6]

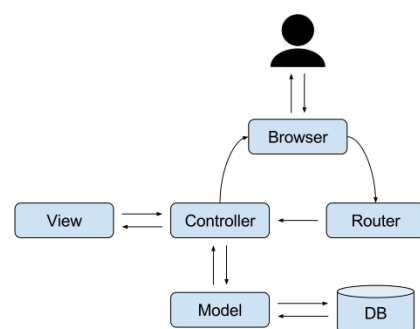
## 5. Implementation

Fiesta is based on PHP Nette framework and MySQL database. Nette framework follows Model-View-Controller. The system is web-based which means that

it also uses HTML5, CCS3, and Javascript. The system also uses powerful front-end framework – Twitter Bootstrap.

### 5.1 Model-View-Controller in Fiesta

MVC or Model-View-Controller is architecture pattern which separates a system into three parts: Model, View, and Controllers [7]. The model is responsible for acquiring and manipulating data, and it interacts with a MySQL database. It also communicates with the controller. The controller is enabled to request data through the model, and can also update the view. Views control the user interface. It is what users see when they interact with the system.



**Figure 6.** Diagram of MVC pattern

### 5.2 Permission ACL

The access control list (ACL) is a set of rules which connects a group of users with the operations which the users are allowed to perform. The purpose of an ACL is to determine whether a given role has the permission to perform a particular operation with a specific resource. ACL is an implementation of

Nette\Security\IAuthorizator interface with only one method `isAllowed()`.

- **International** This role is assigned to an international student after registration. It has the least privileges. With this role, user's only abilities are to view modules, edit personal data and see a list of all active Members of that section.
- **Member** : This role indicates a member of ESN after registration. With this role, the user has the same abilities as internationals. Moreover, Member can see a list of Members from another section, browse and accept buddy requests.
- **Manager** : Admin can only grant this role. With this role, the user has same abilities as internationals. Also, this role can activate or deactivate a profile, or see a list of Internationals.
- **Admin** : This role possesses the same abilities as Manager. However, only this role has the privilege to manage page roles, change application settings and set modules.

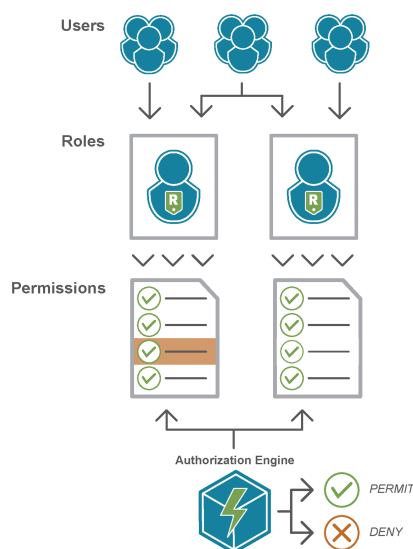


Figure 7. Schema of Access control list

## 6. Conclusions

This paper describes fundamental information about the non-profit international student organization, whose essential responsibility is to help with the integration of international students and to provide relevant information. As it proved above, this organization needs an information system to manage the huge amount of incoming students comfortably.

At the beginning of the project, it was necessary to analyze the actual system and systems from another ESN sections. I proceeded to identify their strengths

and weaknesses to be able to implement a new solution.

The primary challenge was not to provide another coordination system with would be used in one section with specific requirements but to create a multi-language and modular system. This system can be tailored to each organization of ESN. Other types of modules (module for tracking finance or plugin for connecting via Facebook) could be added in the next steps.

At the current stage, the information system successfully cooperates with Brno University of Technology, Mendel University, and Masaryk University. In next phase, it is expected to have a higher involvement of universities not only from Brno but also from the Czech Republic and abroad. In order to enable other sections to help with the development, the system will have an open source character.

## Acknowledgements

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