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# Switzerland Feasibility Analysis

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**WPI**

# Switzerland Feasibility Analysis

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## The Assessment of Switzerland as a Sustainable Project Center and Gateway to Europe

Interactive Qualifying Project Report completed  
In partial fulfillment of the Bachelor of Science degree  
At *Worcester Polytechnic Institute*, Worcester, MA

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**Dean Karen Oates**

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## **Abstract**

This feasibility analysis was prepared for Dr. Karen Oates, Dean of Arts and Sciences at Worcester Polytechnic Institute, to present the paradigm for Zurich, Switzerland as a project center. Following university requirements for existing project centers and the vision of faculty, we delineated the components for a sustainable, compelling project center. After assessing all relevant information from an on-site investigation, we concluded that the necessary environment exists in Switzerland and recommended a model for the establishment of the center.

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## **Glossary of Definitions and Abbreviations**

**Eldgenössische Technische Hochschule (ETH)** – Swiss Federal Institute of Technology, a world-renown science and technology university in Zurich.

**Global Perspectives Program (GPP)** – Established by the IGSD to promote off-campus project sites to WPI faculty and students.

**Haute École de Gestion (HEG) Fribourg** - Institute for Entrepreneurship in Fribourg, part of the University of Applied Sciences and Arts Western Switzerland.

**Hochschule Luzern (HSLU)** –Lucerne University of Applied Sciences and Arts, a well-known university in central Switzerland.

**ID 2050** – Mandatory preparation course for travel to an off-campus IQP project center

**Interactive Qualifying Project (IQP)** – Interdisciplinary project examining the intersection of society with science and technology.

**Interdisciplinary and Global Studies Division (IGSD)** –Department at WPI that oversees operation of off-campus project centers.

**Major Qualifying Project (MQP)** – In-depth research project within students’ major.

**Neu-Technikum Buchs (NTB)** – Established engineering school in Buchs.

**Pilot Project** – Short-term trial prior to full approval of the project site’s programs.

**Pre-Qualifying Project (PQP)** – Mandatory preparation course for students traveling off-campus for their IQP, teaching country specific culture and language.

**Project Center** – Established off-campus program run through the IGSD.

**Project Site** –Any off-campus location where students are completing WPI projects.

**Schweizerische Bundesbahnen (SBB)** – Swiss railway system.

**Sponsor** – Organization that provides students with IQPs and/or MQPs.

**Worcester Polytechnic Institute (WPI)** – Small engineering university in Worcester, MA.

**WPI Plan** – Undergraduate project based curriculum implemented in 1970.

**Zürcher Hochschule für Angewandte Wissenschaften (the ZHAW)** –Zurich University of Applied Sciences.

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## **Executive Summary**

The strength of the project-based curriculum at Worcester Polytechnic Institute (WPI) lies in the completion of two unique projects, the Interactive Qualifying Project (IQP) and Major Qualifying Project (MQP). Students often complete these projects off-campus; however, due to increasing enrollment, competition for placement is at an all-time high. This IQP assesses the feasibility of a potential project center in Zurich, Switzerland.

Often performed in business, a feasibility study is an active investigative process, detailing the positive and negative consequences of engagement in an opportunity. Considering possible alternatives, the study provides a recommendation determining if an opportunity is viable and sustainable.

We began our feasibility study by interviewing various members of the WPI community associated with the projects program, including Dr. Richard Vaz, the Dean of the Interdisciplinary and Global Studies Division (IGSD), to develop our project definition and understanding of the project center requirements.

Before leaving for Switzerland, our project definition contained three components vital to project center sustainability: sponsors, costs, and logistics.

According to the IQP and MQP learning outcomes, for an effective project experience, students and sponsors must be proactively engaged with each other. For a sustainable center, the sponsors must consistently solicit a strong student response to their projects.

Initially, we compiled a potential sponsor list by organizing Switzerland into five different sectors: academia, pharmaceuticals, industry, finance, and sports. Seeded by

contacts from Professor Schaufeld, based on his prior business ventures in Switzerland, we then initiated communication across the sectors.

After meeting with potential sponsors, we can confidently affirm that there is a high interest in sponsoring IQPs. Interest in MQP sponsorship exists from several organizations, but needs to be further defined.

If a project center in is not cost competitive with other project centers, then the center’s value to WPI will be diminished. In order to assess affordability, cost-specific data was tracked to come up with an estimated budget for students. The costs of a Zurich project center are compared below to all established spring semester project centers. Zurich was comparable to the more conservatively priced project centers.

**Table 1: C- and D-Term International Project Sites**

<b>IQP Project Site</b>	<b>Out-of-pocket Expenses</b>	<b>Housing and Program Fees</b>	<b>Total</b>
<b>Costa Rica</b>	\$1,825	\$1,950	\$3,775
<b>Bangkok, Thailand</b>	\$3,320	\$1,350	\$4,670
<b>Zurich, Switzerland</b>	\$3,600	\$1,500	\$5,100
<b>Hong Kong</b>	\$4,500	\$2,250	\$6,750
<b>Windhoek, Namibia</b>	\$4,600	\$2,300	\$6,900
<b>Wellington, NZ</b>	\$4,450	\$2,750	\$7,200
<b>Melbourne, Australia</b>	\$4,150	\$3,300	\$7,450
<b>Copenhagen, Denmark</b>	\$3,300	\$4,250	\$7,550
<b>London, UK</b>	\$3,800	\$3,750	\$7,550

Beyond costs, defining logistics as requirements for students and faculty to live safely and affordably abroad, we investigated the viability of accommodation, transportation, communication, and other relevant factors. Through on-site research on sponsors, costs, and logistics, our conclusion is that the opportunity exists for a project center in

Switzerland. In order to efficiently and effectively integrate a project center into WPI, our team has outlined a three-phase plan based on our research.

Our initial three-phase implementation plan includes a realistic timeline for project center development. A full graphical representation and information on the phase plan can be found in the recommendations section. Because of the high cost and scarce availability of numerous housing options in one location, we also recommend students groups split into a distributed model to be in close proximity to their projects.

The phase plan presents a timeline for advisor contact with sponsors and relationship development. This timeline includes preservation of previously engaged sponsors as well as a return to untapped opportunities across the five sectors. The advisor is encouraged to generate high sponsor interest from these mature and fresh opportunities. Concurrently, the establishment of the IQP center and other milestone progressions are outlined.

Due to the ample number of interested IQP sponsors, we recommend an immediate move from WPI to establish an IQP center. Following the creation of this center, a pilot MQP program would start.



## **Introduction**

### **WPI: A Project Based School**

Worcester Polytechnic Institute (WPI), a small engineering university, offers students unique project opportunities. Incorporated in 1970, the WPI Plan distinguished WPI from other engineering institutions, which traditionally follow a rigid curriculum, by integrating project work complementary to classroom learning. These projects provide students with platforms to solve real world problems outside of an academic environment.

Often, projects correlate with opportunities to study abroad at one of WPI's off-campus project centers. The two types of projects students typically complete off-campus are the Interactive Qualifying Project (IQP) and the Major Qualifying Project (MQP). The IQP is an interdisciplinary applied research project that focuses on the intersection of science and technology with society. The MQP is a major research project within a student's field of study (WPI, 2013).

### **The Interactive Qualifying Project**

WPI views the IQP as a medium for students to develop and apply communication and critical thinking skills. According to the WPI 2013-2014 course catalogue, the IQP teaches students to communicate clearly across a wide range of people, develop and follow through with an appropriate methodology, and integrate information from multiple sources and perspectives (WPI, 2013). In considering foreign cultures and perspectives, students enhance their learning of the IQP outcomes.

When abroad, many WPI students complete projects for outside sponsoring organizations, including universities, NGOs, companies and government agencies. Dependent upon current sponsor needs, the type of projects students complete varies greatly across different organizations. Most of the projects fall under one of fourteen established categories, such as “Technology and Environment” or “Historic and Artistic Preservation Technology” (See Appendix A) (WPI, 2013). Through IQPs, WPI students continue to address wide variety of important issues for their sponsors.

Similar to IQP sponsors, project locations vary greatly. WPI currently has 21 established IQP project centers throughout the world. These project centers range from Boston, to Hong Kong, Melbourne and Windhoek, Namibia (See Appendix) (WPI, 2013).

### **The Major Qualifying Project**

As a synthesis of all prior learning and project work, the MQP is an in depth research project in the major field of study. The outcomes of the MQP include applying major-specific skills and techniques to problems in the professional industry, demonstrating clear and effective communication, and using critical thinking and analysis.

While students may satisfy these outcomes in working with WPI faculty, many prefer to participate in projects sponsored by external organizations. Upon completion of the MQP, students are sometimes offered full-time positions with their sponsor organization. Students may also use their sponsor organization as a reference later on in their professional career.

By completing MQPs off-campus, students have the opportunity to work in a location that is central to their industry and specific to their interest. There are currently 14 MQP off-campus project centers (See Appendix C). While some centers are specific to certain majors, others accept students from a wide range of disciplines.

Even though completing one of WPI's projects abroad is not a typical travel abroad experience, WPI students still experience many of the cultural benefits while also working in a professional environment.

### **Addition of New Project Sites**

Because of WPI's growing undergraduate population and students' increased interest in travel, project sites often reach capacity and students who have applied for a position in an off-campus site are denied the opportunity to travel. To help offset this issue, WPI has gradually been adding new project centers to increase the total number of students who can travel off-campus each year.

Usually, project centers are proposed because a WPI faculty member has contacts and interest in a location. They then attempt to find project sponsors and, if they are successful, secure housing and select students for a pilot project. If the faculty member runs the site on their own for a year or two and prove it to be successful, they can then gain the support of the Interdisciplinary and Global Studies Division (IGSD) to establish it as a full project center.

Professor Jerome Schaufeld of WPI's School of Business was interested in Zurich, Switzerland as a potential site for a new project center. Professor Schaufeld had worked

extensively with Switzerland in the past, as he had helped to build a global company based out of Zurich. After finishing his work with the company in Basel, he maintained his Swiss connections through teaching in Fribourg, consulting with swissnex, and working with the Commission for Technology and Innovation (CTI). In his extensive contact with Switzerland, he became aware of the advantages of working there, such as its central European location, neutrality, and the use of the English language. These traits struck him as advantageous for an IQP project site.

In addition to Professor Schaufeld's personal and professional interest in Switzerland, Dr. Karen Oates, Dean of Arts and Sciences, has worked to establish a consistent and coherent global strategy for WPI. The global strategy targets five main hubs as platforms for WPI's global presence and expansion. Switzerland was one of these hubs, along with Brazil, Singapore, China and Russia. Realizing their shared interest in Switzerland, they performed the initial steps to establish a project center. Before a project center can be established, the feasibility of the proposed center must be assessed. Often, a feasibility study of a project center is performed by a student team as their IQP.

## **Background**

Through creating a solid research-based foundation of WPI's global presence at off-campus project centers, the Zurich Pilot Project team assessed problems facing the centers. These included the demand among WPI students for not only off-campus project centers, but also the necessary conditions for project center indoctrination, development, and growth. Logistical standards were also considered in identifying Switzerland's value as a potential project center.

## **Definition of a Feasibility Study**

A feasibility study is an active investigative process to determine whether or not a "business opportunity is possible, practical, and viable" (Hoagland, 2000). Upon completion, the feasibility study does not automatically conclude that the opportunity must move forward. Rather, the study details the positive and negative aspects of engagement in the opportunity and provides a recommendation to move forward or not. A feasibility study, however, is not a business plan. The feasibility study provides an investigative foundation, answering the question, "is this a viable business venture?" (Hofstrand, 2009a). In contrast, a business plan uses the feasibility study foundation and "outlines the actions needed to take the proposal from 'idea' to 'reality'" (Hofstrand, 2009a).

## **Importance of a Feasibility Study**

Since "the process of defining a new business is critical" (Hoagland, 2000), reaching the desired outcome is often dependent on preparation before action. By performing a

feasibility analysis or study, important decisions can be evaluated with full information based on prior research, since mistakes in the startup stage often lead to failure.

Feasibility studies can be conducted for both the creation of new business opportunities or the expansion of existing opportunities to determine if the scale and scope of a particular opportunity provides a viable foundation for future success. During an evaluation of an opportunity, there are three components that an organization should examine that will be helpful guidelines when reaching a decision:

- **Market Issues** – The primary area in the feasibility study is “to address is potential market opportunities” (Bielik). If there is a large enough demand for a certain product in the marketplace, for example a new project center, and it is able to compete with the existing product(s), then the “proposed venture should be pursued” (Bielik).
- **Technical and organizational requirements** – This component deals with the internal set-up of the opportunity. Technical and organizational requirements concern facility and equipment, and organizational structure and management respectively. The market opportunity is expanded by the logistics of technical and organizational requirements.
- **Financial overview** – Based on the estimates given from the previous two components, the financial viability of the opportunity must be assessed in a brief overview. The different sources and outlets of financing should also be listed with the associated budgeted costs. In order to determine the opportunity’s full financial situation, the present and future costs should be analyzed, asking

questions like: “What are the total start-up costs required in order to begin operation? And what are the future operating costs involved?” (Bielik).

Obtaining responses to these components should be viewed as a minimum requirement for continuing forward with any further investment in the particular opportunity. “If the results of the feasibility study indicate that the proposed venture is economically viable, then the [organization] can begin to develop a business plan” (Bielik) in accordance with its earlier findings. In the remaining section, the purpose and the desired outcomes of a feasibility study are outlined.

### **Applying a Feasibility Study when Assessing a Potential Project Center**

The concept of a feasibility study can be applied to any decision making process to provide more information to the decision makers. When assessing a potential project center, a feasibility study outlines the positives and negatives of the particular site so that an informed decision can be made.

The feasibility study for a project center provides recommendations for whether or not to move forward with a particular site. The study can also suggest certain small digressions from current positions. The component guidelines (listed above) can be abstracted from business to apply to the evaluation of any opportunity, in this case the assessment of a project center.

## **The Purpose of a Feasibility Study**

Often feasibility studies are conducted so a detailed view of every aspect of the opportunity can be presented without bias. It is so crucial that enough details are presented for an accurate allocation of time and resources, ensuring the optimal environment for success. Theoretically, these resources could be allocated elsewhere and the opportunity cost of moving forward must be weighed.

Overall, the feasibility study contains the evaluation of a possible opportunity from a neutral point-of-view. The viewpoint can either be discarded or used as a decision-making tool when determining the outcome of the opportunity. Since a large amount of resources would be invested in the opportunity, the “feasibility study is important because it forces the [organization] to put its ideas on paper and to assess whether or not those ideas are realistic” (Bielik). In the final form, the feasibility study should:

- “... [Be] understandable and easy to read
- Address all of the relevant issues and questions
- List and discuss all of the underlying assumptions of the project analysis
- Meet the expectations of the project committee
- [Be] logically consistent within sections and among sections
- [Be] thoroughly researched using good research techniques
- Contain all of the relevant information
- Meet the conditions of the consulting contract” (Hofstrand, 2009b)



## **The Outcomes of a Feasibility Study**

The outcomes of a feasibility study are important in determining whether or not to move forward with a potential opportunity. Since “the decision of whether to proceed is often not clear cut” (Hofstrand, 2009a), the ideal feasibility study must be accurate and provide relevant information so the “risks and rewards of moving forward with the business project” (Hofstrand, 2009a) are clearly defined.

While it is “not the purpose of the feasibility study [...] to decide whether or not to proceed with a business idea” (Hofstrand, 2009a), the “feasibility study outlines and analyzes several alternatives or methods of achieving business success” (Hofstrand, 2009a). In analyzing these alternatives or methods, a feasibility study may recommend and give focus to strategic implementation of the opportunity. The outcome of the feasibility study should provide a foundation that “help[s] answer the essential question of ‘should we proceed with the proposed project idea?’” (Hofstrand, 2009a).

## **The Importance of WPI Project Centers**

In order for WPI students to “...step up to take on the world’s greatest challenges, [they] must be armed with practical experience and know-how” (WPI). Off-campus project centers add value to and are the foundation of the WPI project experience. Project centers connect students to the community they are in, providing a platform for them to increase their awareness of societal problems and associated solutions. “At more than 30 Project Centers around the world, [students work to] find solutions to issues that impact the people who make up those communities” (WPI). Throughout the process, project centers

allow students to work collaboratively and in-depth with peers and project advisors over a fourteen-week period of preparation and on-site project work.

An important distinction about project centers from other, traditional study abroad programs is that project centers allow students to not only see the world, but also solve problems that matter. This is done by working in areas relating technology and science to societal needs in the IQP, or working in areas of their own technical expertise in the MQP. While students complete a project at an off-campus project center, they work in a unique educational environment where programs “focus on the strategies and needs of state and local governmental and non-governmental agencies” (WPI).

### **The Interactive Qualifying Project and Learning Outcomes**

Typically undertaken in the third year of study, the IQP “challenges students to address a problem that lies at the intersection of science or technology with society” (WPI, 2013). Unique to other academic programs, the IQP allows “students to work in interdisciplinary teams, often with an external sponsoring organization, to develop solutions to real world problems” (WPI, 2013). During successful completion of an IQP, students satisfy the nine learning outcomes set forth by the IQP:

1. “Demonstrate an understanding of the project’s technical, social, and humanistic context.
2. Define clear, achievable goals and objectives for the project.

3. Critically identify, utilize, and properly cite information sources, and integrate information from multiple sources to identify appropriate approaches to addressing the project goals.
4. Select and implement a sound methodology for solving an interdisciplinary problem.
5. Analyze and synthesize results from social, ethical, humanistic, technical or other perspectives, as appropriate.
6. Maintain effective working relationships with the project team and with the project advisor(s), recognizing and resolving problems that may arise.
7. Demonstrate the ability to write clearly, critically, and persuasively.
8. Demonstrate strong oral communication skills, using appropriate, effective visual aids.
9. Demonstrate an awareness of the ethical dimensions of their project work” (WPI, 2013).

In learning about the role of science and technology, and its impact on society, most IQPs are organized by division. These divisions span different niches within the interaction between science and technology, and society, varying across project centers.

The IQP allows students “to gain knowledge outside their major field” by approaching it as a “learning opportunity” (WPI, 2013). Students may choose to complete an on-campus IQP or an off-campus IQP, through the Global Perspectives Program (GPP), overseen by the IGSD. Project work completed at an off-campus site “provides teams of students with extraordinary opportunities to learn by solving real-world problems” (WPI, 2013).

## **The Major Qualifying Project and Learning Outcomes**

The project work completed in the major field of study, often in the fourth year, called the MQP, “demonstrate[s] an application of the skills, methods, and knowledge of the discipline to the solution of the problem that would be representative of the type to be encountered in one’s career” (WPI, 2013). Similar to completion of an off-campus IQP, an off-campus MQP is “very valuable for access to state-of-the-art resources and contacts for future professional work” (WPI, 2013).

The MQP should be focused as a culmination of all previous study and project work (including Humanities Capstone and IQP) to solve problems or perform tasks, while satisfying seven learning outcomes:

1. “apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study.
2. demonstrate skills and knowledge of current information and technological tools and techniques specific to the professional field of study.
3. use effectively oral, written, and visual communication.
4. identify, analyze, and solve problems creatively through sustained critical investigation.
5. integrate information from multiple sources.
6. demonstrate an awareness and application of appropriate personal, societal, and professional ethical standards.
7. practice the skills, diligence, and commitment to excellence needed to engage in lifelong learning” (WPI, 2013).

By completing an MQP, students must combine their theoretical knowledge with a practical application in their major. The MQP and its learning outcomes help guide the final synthesis of theory and practice, while providing students with an opportunity to solve an organic, real world problem related to their field of study.

### **Increasing Enrollment and Demand for Project Centers**

The undergraduate population of WPI has been increasing over the last two decades, growing from 2,676 full-time undergraduates (Blinn, 1994), in 1994, to 3,841 undergraduates in 2012 (Enrollment Management, 2012). Due to the increasing enrollment, since the inception of the WPI plan in 1970, there is a direct increase in the popularity of off-campus project centers. As a result, the demand to complete a project abroad has increased greatly, and competition for positions in the Global Perspectives Program is at an all-time high. Unfortunately, there is currently not a large enough capacity at the global project centers for every student to complete their project abroad. According to the IQP application sheet for 2009-2010 (See Appendix D), the number of applications to attend an off-campus IQP project center is 489 students while capacity is only at 387 students.

The IGSD has viewed opportunities to grow WPI's global presence, through number of project centers, as a high priority to meet the growing demand. Project centers must pass several rigorous standards to be considered for full implementation into IGSD's portfolio. However, the unique nature of the project center allows IGSD "to replicate project center[s] concept in any corner of the world" (Vaz, 2012). While the continued expansion of project centers abroad is clearly necessary, the addition of more centers must be

carefully monitored so that they develop in conjunction with WPI and IGSD standards and guidelines.

### **Requirements for a Project Center**

There are various requirements for a project center before it can be fully established and integrated into the IGSD Global Perspectives Program. The requirements often follow two main themes, safety and affordability, which the project center must fulfill before it can be considered feasible. The following six requirements span the overall needs of an established project center:

- “Support and availability of sponsors who can provide compelling projects
- Availability of affordable options for logistical necessities (Cell Phones, Internet Access, Groceries, Dining out, Transportation)
- Affordable and safe housing for students and faculty
- A safe environment
- Availability of suitable healthcare
- Interest of students and faculty in the location and projects” (Woodnorth et al., 2009)

### **Availability of Suitable Project Sponsors**

Since students often work “with external sponsoring organizations, to develop solutions to real-world problems” (WPI, 2013), the availability of suitable project sponsors is critical for a successful experience. When defining what a suitable project sponsor means, our team found that the definition encompasses several main components.

The most important component of having a viable project center is finding interested sponsors. The project sponsor works with students on various projects. A potential project sponsor must be educated about the learning outcomes and objectives of the IQP or MQP in order to have relevant projects. Level of interest from the sponsoring organization is also crucial for the development of the project sponsor. Students are likely to be more motivated if they feel that the sponsor cares. The sponsor must be actively engaged with students and vice versa so that both parties can cooperatively work towards completion of the project by helping each other along the way.

Not only must the project sponsor be interested and proactive, the project sponsor must also be able to provide compelling projects for students to work on. Projects must be interesting and deep enough for students to spend their seven-week preparation period and seven-week project work period working with complete focus. Besides the quality of the projects offered by the sponsor, projects must be made available in large enough quantity, warranting that a project site has enough projects for students to work on. The quantity of projects at a particular site must not only span one year, but also must be sustainable over a long period of time. The sustainability of suitable sponsors contributes to the viability of a project center.

Often project centers are associated with a certain theme of project work. IQPs in Copenhagen, Denmark projects focus on the environment and technology for people with disabilities whereas in Cape Town, South Africa projects deal with social issues, like sanitation, clean drinking water, and childhood development. MQPs in Budapest, Hungary focus on computer science at the Computer and Automation Research Institute

(See Appendix E). These country-specific projects often lead to a longer, more meaningful connection with the sponsor that will likely translate into project sustainability on a yearly basis.

The last requirement for a suitable project sponsor is that they provide students good working conditions, whether out in the field or in the office. WPI students work hard on projects and good working conditions can help them achieve objectives easier. Project teams also need a liaison in the sponsoring organization to work with.

### **Logistical Necessities**

There are logistical requirements to the setting up of a successful project center. These will be detailed later in the methodology section, along with a specific examples anchored in Switzerland.

- Housing – safe and comfortable student rooms that are located near the project site and other student needs
- Internet – access to stay connected with WPI, project research, and home
- Telecommunication – phone capabilities for general communication or emergency situations
- Dining Out/Groceries – students have many options for dining, including a meal-plan system, restaurants, or cooking
- Airfare – getting to and from the country can be one of the greater costs
- Local Transportation – getting around the project site and country is dependent on the local infrastructure



- Excursions/Tourist Activities – free time can be a rewarding experience culturally

### **On-site Housing for Students and Faculty**

Students and faculty that travel to project centers should have a reasonable expectation of safe and affordable accommodations, secured and habitable upon their scheduled arrival.

Student housing varies from center to center based on availability and other factors.

According to the GPP website, students at the Windhoek, Namibia center live in shared rooms at a local bed and breakfast. In Copenhagen, Denmark, students live in apartments near the center of the city.

All student project center housing must pass stringent university standards set forth by IGSD in a Housing Checklist document (See Appendix F). If the center housing option is evaluated as safe, affordable, and in alignment with IGSD guidelines, then the housing may be considered for student use.

Faculty housing must also be vetted before it can be considered. While it is not a requirement that faculty housing be located in the same complex as student housing, it is preferred that faculty housing remains close to the project site and students. This housing must be affordable, since the costs are budgeted by WPI.

### **Zurich, Switzerland as a Potential Project Center**

This section discusses relevant aspects of Zurich, Switzerland as a project center, including a brief history and WPI's connection. More detailed historical and logistical information about Switzerland can be referenced in Appendix G.

## **Switzerland: Origin, Neutrality, and Present Day**

Starting in the 13<sup>th</sup> century, the largely alpine area, known as present-day Switzerland, was controlled by the Hapsburg dynasty. However, “through the intermediary of the Hapsburg lords” (swissuniversity.ch, 2012), the Holy Roman Empire could control the territories as part of its domain. The Emperor decided to seize Hapsburg land and create a trade route, known as the Gotthard pass, across the Alps to connect trade from Northern Europe and Italy.

Three valley communities that were centralized along the route created an alliance in 1291 to ensure “perpetual mutual assistance” (swissuniversity.ch, 2012) against Hapsburg attempts to reclaim it. This pact between the three communities in the Alps is widely considered the foundation of the Swiss Confederacy.

In 1515, the relatively new “Swiss Confederacy was defeated by a French coalition in the Battle of Marignan” (swissuniversity.ch, 2012). After the defeat, the Swiss Confederacy introduced a neutrality doctrine that would curtail any further militaristic, political, or direct economic action with other countries.

Today, Switzerland’s neutrality is still intact. Until recently, Switzerland was not a member of the United Nations. Despite it not officially joining international organizations, like the European Union, Switzerland still maintains healthy diplomatic relationships with almost all countries. Throughout Switzerland, the connections between adjacent countries are apparent, especially with the use of four official languages: Swiss-German, French, Italian, and Romansh.

## **WPI's Relationship with the ZHAW**

The connection between WPI and the Zurich University of Applied Science (the ZHAW) began at swissnex Boston, an initiative of the Swiss Government. According to the swissnex website, their mission is to “take an active role in strengthening Switzerland’s leadership as a world-class location for science, education, and innovation.” In this capacity, they serve to connect North America and Switzerland.

Professor Schaufeld’s prior working experience with swissnex Boston was instrumental in developing the official relationship with the ZHAW. After an introductory meeting and negotiation process, a collaboration agreement between WPI and the ZHAW was signed. The agreement formed a foundation for WPI’s interest in Switzerland.

The ZHAW takes a very practical approach to learning due to its mandate as an applied science university. Students at the ZHAW complete a semester-long bachelor’s thesis that is comparable to the MQP, as this work is in the major field.

The feasibility team conducted their project in coordination with Dr. Diyana Petrova, program director at the Wädenswil campus. Besides holding weekly meetings with Dr. Petrova, the team was able to utilize the ZHAW facilities and resources to contact organizations, work on the project report, and conduct interviews. Collaboration with the ZHAW served as a platform for expansion throughout Switzerland, allowing us to conduct our study.

## Shifting Perspectives

When the feasibility analysis team was introduced to the project, it was with little form and a fair amount of ambiguity. Although that can be described as the very nature of the project, the team deemed it important to attempt to bring more form and structure to the objectives of the IQP. Preliminary discussions identified our objective as ascertaining and providing WPI with enough information to make an informed decision on whether to establish Switzerland as a permanent project center for WPI.

To create structure and find a focus, we conducted background research, interviewed several important people, and sent out student surveys. The flowchart below outlines our process for identifying the focus of our paper (See Appendix H).

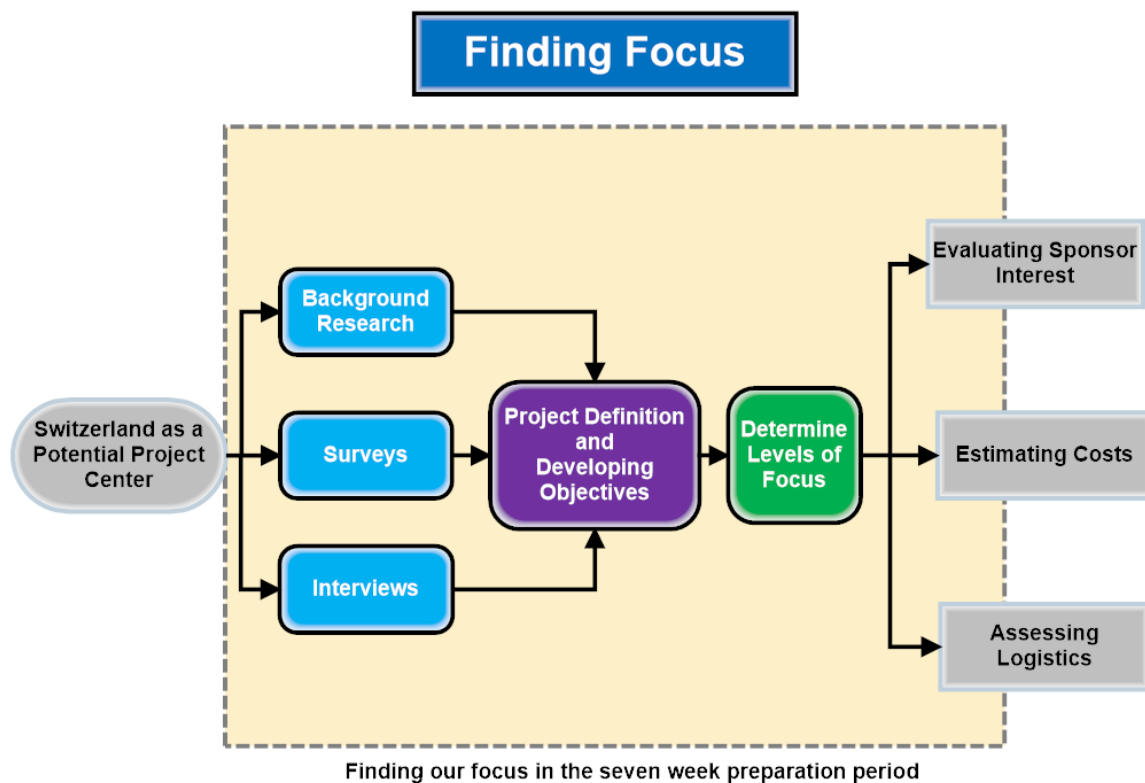


Figure 1: Finding Our Focus Flowchart

As the flowchart above indicates, we decided that the three main aspects of our preparation work would include interviews, surveys and background research. These would allow us to fully develop a project definition and objectives. From there we could determine our levels of focus. The result of this process was the development of three focus levels: evaluating project sponsor interest, estimating costs, and assessing logistics.

## **Understanding the Requirements**

In order to get a better understanding of our IQP requirements, we equated ourselves to outside consultants and tried to identify who our clients and end-users were. It was clear that WPI was the client, and students were the end users. Therefore, if Switzerland provides enough opportunity, promise, viability and appeal for both WPI and the students, then we would be able to recommend Zurich as a project center. So, in order to understand the expectations of students and faculty we sent out surveys and conducted interviews.

## **Interviews**

The group identified the required interviews by focusing on the two relevant geographical locations where the projects would operate, i.e. WPI and Switzerland. At WPI, the IQP program is run by the IGSD and various off-campus IQPs have dedicated advisors. Our advisors had been in contact with universities, companies and organizations in Switzerland as well. Therefore, they seemed like a natural choice for interview subjects as well. The following interviews were identified as high priority in Worcester and Boston:

- Dean Rick Vaz (Head of IGSD)
- Dean Karen Oates (Head of the WPI Arts and Sciences Department)
- Sebastien Hug (swissnex Boston)
- Professor Schaufeld (Advisor to the Zurich IQP)
- Dr. Tara Mann (Advisor to the Zurich IQP)
- Professor Peter Pederson (Advisor to Copenhagen, Denmark IQP)
- Zachary Duca, Dominic Lopriore, and Nathan Roux (Bar Harbor, Maine Feasibility Study IQP Group)

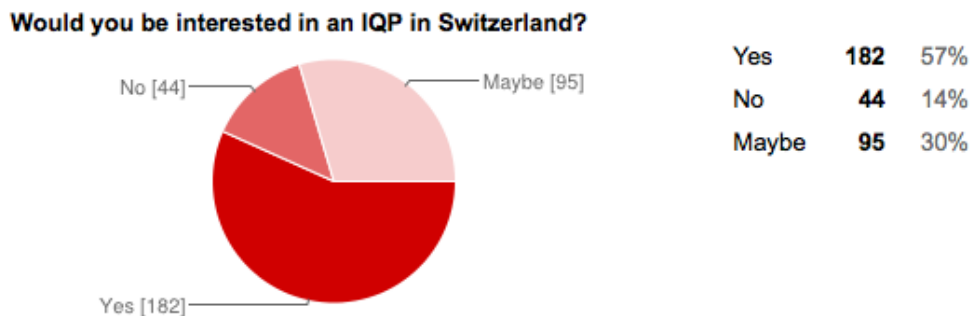
Conducting these interviews allowed us to fully understand the components of a feasibility study and to determine which were the most important. The emphasis on the importance of finding compelling projects in Switzerland helped influence our decision on which aspects to focus on.

## **Surveys**

In order to better evaluate student interest for a potential project center located in Switzerland, the feasibility analysis team created a study questionnaire to directly gather data and responses. The questionnaire presented to students consisted of a combination of eleven multiple-choice and open-response questions which students were required to answer. The full analysis of the survey results can be found in Appendix I. A selection of student responses can be found in Appendix J. This format of a questionnaire was utilized so students were able to generate free, non-rigid responses that are uncharacteristic of purely multiple-choice surveys.

The questionnaire was sent to all WPI undergraduate students, including those that have already completed or were in the process of completing their IQP or MQP. The motive for sending it out to this demographic of students was two-fold. First, students that have yet to complete their IQP or MQP, most likely freshmen and sophomores, were good objective candidates for the questionnaire. This is so that the responses are not biased by their project experience. Second, students that have completed at least one or more projects, likely juniors and seniors, were good subjective candidates. This is because the questionnaire would not only take into account their previous project center experience, it would also be able to superficially evaluate if Switzerland seemed like a compelling project center.

This survey allowed us to gain insight on the level of student interest for a project center in Switzerland and the types of projects they would want available there. The most relevant and encouraging data provided by the survey was the level of student interest. The graph below reflects students' answers to the question "Would you be interested in an IQP in Switzerland?"



**Figure 2: Student Interest in Switzerland IQP**

Clearly, this survey indicated that there is a high student interest in a Switzerland project center and finding prospective students in future years would not be a problem.

## **Objectives of the IQP**

The objective of the “Switzerland Feasibility Analysis” is to collect enough data to make a useful and effective recommendation to WPI about whether or not to establish Switzerland as a permanent project center for WPI and, if so, what kind of projects will be available over the years. The team will look at the short-term and long-term feasibility of the project center and will make recommendations accordingly.

Aspects that the IQP will look into include:

1. Project Availability
2. Cost to WPI
3. Cost to Students
4. Logistics
5. Future opportunities and logical expansion possibilities

## **Levels of Focus**

After conversations with our advisors, it was deemed necessary to prioritize these objectives based on importance. Therefore, different levels of focus were identified.

## ***Sponsors***

The top level, our main priority, was to identify potential sponsor interest for the IQP group in D-term of the year 2014. We knew that 21 students had been selected for the



next IQP. Therefore, finding a sufficient number of potential projects would be the main goal. This would be done by meeting with a lot of potential sponsors and gauging interest and the likelihood of them sponsoring projects in both the short and long term.

### *Cost*

The next most important goal would be to identify cost to WPI and students and outline ways to minimize this cost. The cost of a project center can be divided into two portions: institutional costs and student costs. Both of these could be major factors in whether or not WPI would establish Switzerland as a permanent project center.

### *Institutional Costs*

When WPI establishes a project center, it takes on certain expenses. In order to run a project center, WPI may send at least one advisor to the project site sometime in advance to help finalize the projects. This would incur flight, housing, travel, and dining expenses. It is possible that meetings held during this time could include business lunches, dinners or other social cost bearing events.

Furthermore, when students are sent to Switzerland for their projects, one advisor per 10 to 12 students accompanies them. An advisors travel and living expenses, as well as a daily allowance, is provided. They may also bring their family with them given the timeline of the project.

The advisors are also required to teach ID 2050 which is centered around background research for the off-campus IQP. They are paid for teaching that class as well.

Finally, miscellaneous expenses also arise, such as a final presentation venue, marketing material, refreshments, and tokens of appreciation for the guests. All of these expenses need to be taken into account and minimizing these costs can be achieved in a variety of ways which will be explored further.

### *Student Costs*

Students pay for their IQP expenses themselves. These expenses would include airfare, local travel, room and board, and any other miscellaneous expenses they might incur. Students are not allowed to get paid for any work they do for academic credit. Therefore, minimizing these costs would require finding areas with low cost of living and choosing a timeframe for the project such that airfare costs can be minimized.

### *Logistics*

The third most important goal would be to identify logistics for students and faculty which includes the best ways to handle living and travel. Cost of food per day and an estimated cost of some leisure activities would also be some important costs to identify.

This level of focus goes further, however, as it's important to consider methods of communication. Some questions that need to be answered when researching this level of focus include:

- How will students and advisors stay in touch?
- Where is Internet available?
- Is there is a need for a cellphone, a local bank account, or a credit card?

- Are purchases usually made via credit card or should students always carry cash?

The research compiled in this report could be used as a strong starting point for D 2014 preparation period and goes a long way towards affirming or denying the viability of Switzerland as a potential project center.

The last level of focus would be to identify secondary avenues for WPI expansion in Europe. That would include side-projects that WPI could pursue, new project center models that can be experimented with, and partnerships and relationships that can be beneficial for WPI in the long run.

### **Switzerland and WPI's Global Strategy**

The idea behind establishing Switzerland as a permanent project center for WPI is to look at a Global Strategy for WPI. While the Global Strategy does go beyond the scope of the project, identifying potential factors that could help WPI maintain a sustainable Project Center in Switzerland would probably affect WPI's Global Strategy to a certain extent.

Switzerland can be seen as a Gateway to Europe as it is centrally located. It has France to the West, Germany to the North, Italy to the South, and Lichtenstein and Austria to the East. A country that has finance, pharmaceuticals, industry, academia, sports, and a well-developed infrastructure, Switzerland has plenty of opportunities both in and around it. The question that remains to be answered, however, is if it is a viable venture that WPI can benefit from.

# Methodology

## Sponsors

In previous feasibility studies completed for other sites, a large amount of emphasis was placed on the logistical aspects, such as housing, costs and transportation. Although these are important points to consider, we believed that the most important determining factor of a project site's success is the availability of consistently interesting, meaningful, and challenging projects. A location's potential for compelling projects should be the trigger to start looking into the other logistical areas. Because of the importance of finding valuable sponsors and projects, we spent a larger portion of our work on finding sponsors and projects than on the other logistics.

The flowchart below outlines the process used to assess the interest of sponsors in Switzerland (See Appendix H).

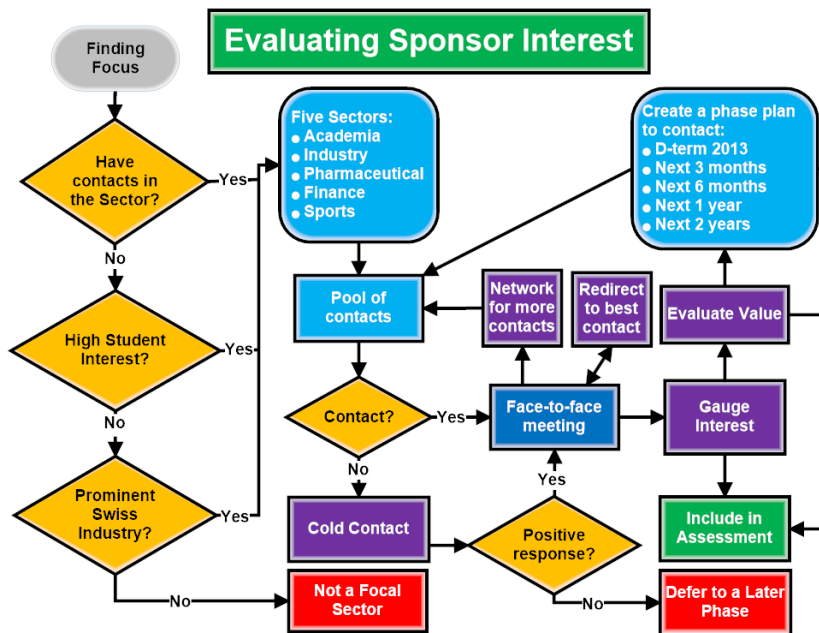


Figure 3: Evaluating Sponsor Interest Flowchart

To limit the parameters of our project sponsor search, five focal sectors of Swiss economy were selected. These were selected based on existing contacts, student interest and prominence of industry. Once these sectors were established, contacts were identified and the communication about WPI's project began. The outcome of these exchanges allowed us to assess the interest that exists in Switzerland.

### **Identifying sectors**

Since WPI projects differ greatly in topic and are completed for such a wide range of sponsors, many different types of sponsorships were considered. Switzerland has a wide variety of successful and interesting industries, but, for the scope of this project, a few sectors of their commerce needed to be identified as the focal points. It was decided by both the group members and advisors that focusing on five sectors of Switzerland's industry would provide a reasonable scope of the country and still be feasible to complete in a seven week period.

To determine which sectors would be focused on, a variety of methods were employed.

Firstly, we determined sectors to which WPI already had many contacts and alumni.

These sectors were considered to be most valuable because organizations and companies where we already had contacts were easier to navigate and more likely to take an interest in WPI projects. Next, we surveyed the student body of WPI to determine which sectors students would be most interested in completing IQPs in. Finally, we considered which industries are prominent in Switzerland that would correspond to a field of study at WPI. These sectors would be the most valuable while looking into the possibility of a future MQP center in Switzerland.

Once the five sectors were fully established, we could begin looking for companies or organizations that fall into each sector and individuals within that organization to contact.

### **Finding contacts**

We began our contact search through the personal contacts of our advisors. Professor Jerome Schaufeld had many contacts in a variety of industries in Switzerland due to his previous businesses there. In addition, Dr. Diyana Petrova, head of academic programs at the ZHAW, was able to provide several contacts for organizations more local to the university in Wädenswil. Between their contacts, we were able to identify leads in a wide variety of organizations.

Since we had also established a relationship with swissnex Boston, we were also able to obtain some contacts through our connections there. Swissnex suggested several initial contacts for us to get in touch with after hearing about our project, and, as the project continued, they were able to find specific contacts in various organizations for us as the need arose.

In addition to the contacts gained through advisors and swissnex, we were able to obtain a list of WPI alumni living in Switzerland. The list included their most recently reported job and company. Through this list, we contacted several of them who worked in companies or organizations that we were interested in speaking to about projects.

To keep expanding our list of contacts and acquaintances, we adopted a practice of asking everyone we met with for more contacts of organizations or individuals who may

be interested in working with WPI. Through this practice, we were able to gain many more secondary and tertiary contacts.

### **First communications**

The first communication we initiated with most of the contacts was an email message. As we obtained more contacts, we emailed them to introduce ourselves and our project. We asked if we could set up a meeting either in person or via Skype. This general formula remained the same regardless of the type of contact, although the emails themselves did not fully follow any template as we found it important to personalize the email based on the contact and the organization (See Appendix K). For most contacts, we also attached a prepared document explaining our project objectives and the projects program to the email (See Appendix L).

The objectives of the first meeting varied greatly depending on the individual and the context in which we hoped that they could help us.

Some of the contacts were directly associated with an organization that we hoped would sponsor projects in the future. For these contacts, the objective of the meeting was to provide them with a full understanding of IQPs and MQPs and explain how these projects could benefit their organization. While we were not expecting any concrete projects to be determined and settled upon during the first meeting, we were hoping to assess the interest of the organization in sponsoring future projects.

For other contacts, our initial meeting was more to gain some advice and perspective in how to go about asking for sponsors. Many of Professor Schaufeld's personal contacts

were individuals who have spent many years working in a certain field or industry in Switzerland. While these individuals may not be looking to sponsor projects directly, they may be able to offer leads or provide advice about other organizations who may meet with us to discuss this opportunity. Even just gaining their perspective on our project and hearing their advice about how to introduce WPI's project was insightful.

### **Continuing contact**

How the communication with potential sponsors was continued varied greatly depending on the type of contact. All contacts received a thank you email the day after meeting with them (See Appendix M). For contacts that were just giving us advice or other contacts, usually only the one meeting was necessary, but their contact information was kept in case we wanted to follow up with them in the future. For those who were possibly interested in sponsoring future projects, much more follow up was necessary.

We prepared several documents for potential sponsors. One of these documents explained WPI, the IQP, the MQP, and our objective of completing the feasibility analysis. This served as a good basis for introducing WPI and its projects. Another document was created that contained examples of some IQP abstracts found from the WPI project database. This document helped sponsors better understand the scope of the IQP. Similar documents were prepared with examples of abstracts of MQPs (See Appendix N and O).

One of the MQP documents contained abstracts of projects completed in the life sciences, relevant for those particular organizations. The other included abstracts of MQPs done in



mechanical, electrical and civil engineering, for use in organizations more interested in those fields. Copies of these documents can be found in the appendices.

With a follow up or thank you email, we often attached the appropriate documents as supporting information to what we discussed in the meeting. Second meetings could then be scheduled, preferably with other members of the contact's staff who may be interested in sponsoring projects. As many meetings as necessary could be arranged until it was clear that the staff fully understood WPI's projects and their potential of sponsoring could be assessed.

### **Assessment**

The potential sponsors were assessed for their likelihood to sponsor appropriate level projects in the future. It was also noted whether they seemed more interested in sponsoring MQPs, IQPs, or both project types.

To determine a potential sponsor's interest in WPI's projects, we first explained WPI's projects to the best of our ability. We gave examples of IQPs or MQPs that could be done for their organization and answered their questions to the best of our ability. Once they understood the projects and what WPI had to offer, the success of the meeting was determined by the enthusiasm of the potential sponsor, the availability of projects, and the projects' relevance to the organization.

Once we had gathered that information, we could discuss the time frame of the projects with the organization. Some contacts had project ideas ready by the end of the meeting that they would like to propose for the students coming next year. Others were intrigued

by the idea of WPI projects, but were not sure that the logistics would work out immediately. Some did not think that sponsoring projects would be right for their organization at this point in time, but might consider it in a few years.

## Logistics

While examining the feasibility of establishing a project center, it is important to consider the logistical necessities of the students and professors during their travel and stay at the site. This section outlines the methods used to go about determining the costs and accessibility of transportation, communication, dining options, and leisure activities. The flowchart below summarizes our identification of needs and assessment of availability (See Appendix H).

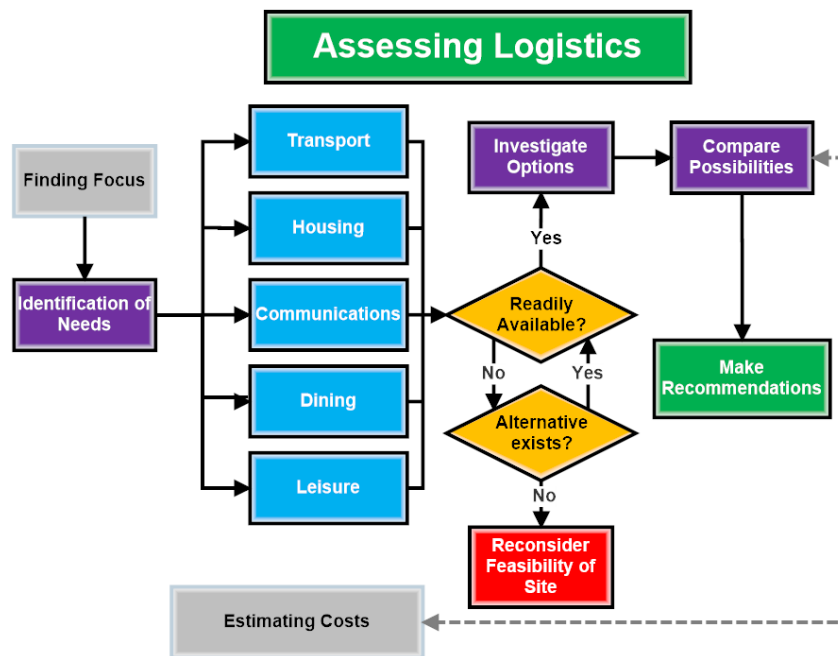


Figure 4: Assessing Logistics Flowchart

As shown above, the five main necessities were identified: transportation, communication, dining, housing and leisure activities. These were then each assessed for

availability and various options were researched and compared. The results of this research was then considered and incorporated into the recommendations of project center development.

## **Transportation**

Transportation is essential to students and faculty traveling to a project site. While the largest transportation necessity is clearly getting to the project site itself, local transportation and regional travel are also essential. To estimate the cost of transportation, various modes of transportation were compared. In addition, various types of tickets and passes were researched and compared.

### *Airfare*

It is quite difficult to estimate airfare for future students and advisors traveling to Switzerland. Students and advisors may be flying from various airports within the US depending on whether they return home before flying to Switzerland. In addition, airlines do not have flights and prices posted far enough in advance for researching those costs now. Even if prices were posted in advance, prices constantly fluctuate until flight departure.

Instead, a rough estimate of airfare based on the six students completing the Zurich Pilot Project in D-term 2013 was provided. By averaging what those six students paid for airfare, we can find a general estimate. From here, gasoline prices, tax increases and inflation will have to be considered when estimating costs in future years.

To aid future travelers with purchasing airfare, we researched days of the week that are least expensive to fly. We also looked into the optimal time frame for purchasing tickets in advance. Hopefully, students in the future can take advantage of this information to purchase the most economical airfare possible.

Additionally, we considered the fluctuation in airfare for different seasons. In future years, this project center may run in any term of the school year, or even the summer term, and understanding which terms would have the least expensive airfare could help contribute to this decision.

### *Local*

Local travel is particularly important because it needs to be ensured that students can easily get from their residencies to their sponsors' headquarters, the sites of other meetings they may need, and other local attractions. To determine the accessibility and costs of local travel, we researched Zurich's extensive public transportation system. We looked into the costs of the various short- and long-term passes available, as well as buying single trip tickets.

This information will be helpful not only for estimating student and advisor costs, but also for future students and advisors to make decisions about which types of passes or tickets to purchase based on their personal and professional needs.

## ***Greater Switzerland and European Travel***

During their time abroad, most students will want to travel to surrounding cities and, in Europe, possibly even surrounding countries. To estimate a cost for this, travel passes and tickets that cover larger regions were researched. Since everyone is different, some students will want to travel more than others while abroad.

This section compares the costs of longer distance passes and the estimated fare for trips to popular locations. In addition, research on inexpensive European airfare is included.

## **Communications**

While abroad, it will be essential for students and faculty to have easy access to methods of communication. Students will need a way to remain in contact with each other, advisors, sponsors, contacts for their project, as well as friends and family at home. In addition, internet access will be vital for email correspondence and online research.

## ***Cellphones***

For cellphones, we researched various methods of obtaining a temporary phone in Switzerland. We looked at the options available in the temporary phones plans and determined which ones might best suit student and faculty needs. We also looked into alternatives to obtaining a cellphone, such as calling cards, international calling programs, and online calling systems.

### ***Internet Access***

Most likely, students and faculty will mostly be accessing the internet from their housing or from their sponsor's office. Availability of internet in housing will be examined in the housing section. In case the students want or need another location from which to access the internet, the availability of internet cafes in the Zurich region was determined. Also, the availability of public internet was researched.

### ***Dining***

Students and staff will need to eat while in Switzerland. It is assumed that for financial reasons, students would mostly buy groceries and cook for themselves, rather than dine out. On occasion students could dine for the cultural experience. This section looks into the availability of grocery stores and restaurants and evaluates their costs.

### ***Groceries***

To estimate the cost of groceries, the grocery bills of all six students in the Zurich Pilot Project were carefully collected and averaged. Since these students purchased groceries together and then split the grocery bill at the end, a master list of the price paid during each grocery store trip was kept. The total could then be summed and divided among the six students to find how much each student paid for groceries throughout their stay in Switzerland. In addition, the availability of groceries in Switzerland was assessed.

## ***Dining Out***

To determine an approximate cost for dining out, the average meal prices were found for inexpensive and expensive restaurants in the Zurich area. These averages were then used to calculate the price of eating out once a week, with one week being at an expensive restaurant.

## ***Housing/Dining Co-Plans***

Some housing options may also provide some sort of meal plan for students living there. This would probably mostly be seen in universities or bed and breakfasts. Any housing options which could have a meal plan attached will weigh the meal plan costs to the cost of groceries in that specific housing option section.

## **Housing Options**

Housing can be difficult to estimate prices for because students could be based out of a variety of cities and could be in or outside of each of those cities. Housing in general is researched and tips were provided from this research to guide future advisors to find less expensive housing for students in the future.

In addition, housing local to Wädenswil was researched and described. Because of this project's affiliation with the ZHAW in Wädenswil, it is likely that at least some students will be based there in future years. Thus housing in Wädenswil is detailed in particular.

## **Leisure Activities**

The availability and affordability of options for students' down time is very important. Most students will want to attend events and tourist attractions in Zurich and in other regions. By looking at tourism resources, many examples of weekend activities in Zurich and other areas of Switzerland were identified.

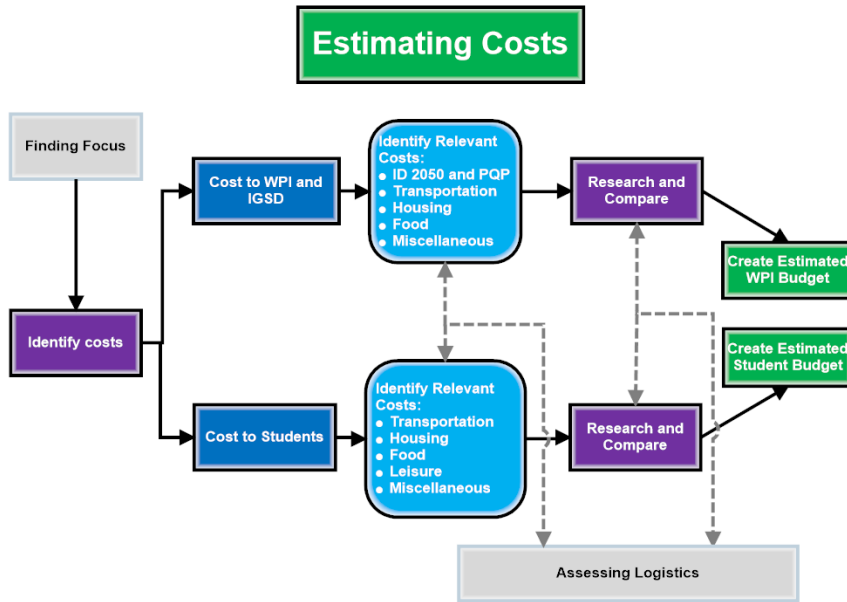
Many inexpensive weekend or evening activities were researched and included in this report. Also, skiing, a popular but expensive, leisure activity was included because of the anticipated interest of WPI students in this particular activity.

## **Cost Analysis**

Researching the costs associated with running a project center is a very important aspect to a feasibility study because high costs to either WPI or perspective students could be a restricting factor on the site. If it costs WPI too much to create a project center in Switzerland, it is unlikely the center would be established. Similarly, if student costs are too high, the project center would likely go unfilled and sponsors would be disappointed.

To estimate the costs of a potential project center in Switzerland, there were two main aspects to consider. They were the costs of WPI project center operations and the student expenses at the project center. In the logistics section, the estimated costs associated with various logistical aspects were researched and calculated. These estimates were then used to create an estimated budget for both faculty and students stay in Switzerland. This process is outlined in the flowchart below (See Appendix H).





**Figure 5: Estimating Costs Flowchart**

Once these estimated budgets were created, they were compared to the estimated budgets of other project centers to determine whether the cost of a project center in Switzerland is reasonable.

Several categories were identified as the main costs of traveling to Switzerland. These are standard categories that are necessities to both students and advisors traveling. The following chart breaks down these categories for both the student and advisor and identifies each cost as either being a cost for the student (S), advisor (A), or WPI (W).

**Table 2: Student and Advisor Costs Breakdown**

Category	For Students	For Advisors
Transportation	S	W
Housing	S	W
Food/Dining	S	W
Leisure Activities	S	A
Miscellaneous	S	W A

This chart illustrates that students are responsible for all of their costs while abroad. WPI will pay for the advisors living expenses; however, the advisor may have some out of pocket charges for leisure activities and possibly some miscellaneous charges.

Using this chart and the methods outlined in the logistics section for estimating the cost of each category, budgets can then be prepared with the costs for students and for WPI.

## Data and Analysis

### Sponsors

When looking at potential project sponsors, classified them into different sectors. This classification system allowed us to approach different organizations in Switzerland in strategic manner.

### Project Sectors

Based on our research and the results of the questionnaire sent to all undergraduates, we identified various aspects of Switzerland that were iconic of Switzerland or had a sizeable impact on Switzerland's Gross Domestic Product.

The five most relevant sectors were:

- **Academia:** Switzerland has a wide variety of universities of applied sciences and world renowned federal universities such as ETH Zürich and University of Basel. Working with these academic institutions could provide students with unique opportunities to work with students of different cultures.
- **Industry:** Switzerland is famous for its chocolate, cheese, Swiss Army knives and watches. All of these would come under the banner of industry. Students working with these industries would experience genuine Swiss culture.
- **Finance:** Renowned for its banks, Switzerland is a great location to work with financial institutions. UBS and Credit Suisse are two of the biggest banks in Switzerland and could be potential project sponsors.

- **Pharmaceuticals:** Northern Switzerland, specifically Basel, has many pharmaceutical companies. Hoffman-La Roche and Novartis are two of the largest pharmaceutical companies located there. Collaborating with these companies would help WPI gain a strong foothold in Switzerland.
- **Sports:** The Fédération Internationale de Football Association (FIFA) and the International Olympic Committee (IOC) are both headquartered in Switzerland. These two iconic sports organizations are well known and well respected. Collaboration between WPI and FIFA or IOC would be unique to Switzerland.

After choosing the project sectors, we met with some potential sponsors and explained our project, our requirements, and gauged interest. We received varying degrees of interest depending on their experience and past interactions with WPI.

### **Academia**

Academia and education is WPI's own sector and, as can be expected, we were able to garner the most initial interest from institutions in this field. WPI was already collaborating with the ZHAW in Wädenswil and thus had experience with the Swiss hochschulen. The projects completed with the ZHAW served as excellent examples to use when explaining WPI's projects to other academic institutions.

### ***Potential Sponsors***

We met with representatives from various educational institutions including:

**The ZHAW – Zürcher Hochschule für Angewandte Wissenschaften**

**ETH Zürich** – Eidgenössische Technische Hochschule Zürich

**HSLU** – Hochschule Luzern

**HEG Fribourg** – Haute École de Gestion Fribourg

**NTB** - Interstaatliche Hochschule für Technik Buchs

**Uni Basel** - Universität Basel

### *Types of Projects*

While the exact nature of the projects is still unclear, there is a lot of interest from HEG Fribourg, the Lucerne University of Applied Science and Arts and, of course, the ZHAW. There is also interest from NTB in Buchs; however, its location isolates it from the other areas which may pose a challenge for the next year.

### *Wädenswil and Zurich*

The D-term 2013 pilot project in Switzerland was conducted in cooperation with the Zurich University of Applied Sciences, i.e. the ZHAW. The hochschule has many different schools, including the school of Life Sciences and Facilities Management situated in Wädenswil. After meeting with various faculty, we were able to ascertain likely projects for D-term, 2014 and the years after.

### *The Chemistry Institute*

At the same time as our feasibility analysis, an IQP with the ZHAW chemistry institute examined and worked to convey the history of the department. Our conversations with the advisor of the chemistry project team, Dr. Achim Ecker, revealed that the next step would be to solicit sponsors for such an exhibit following which its implementation would take place. An assessment of its popularity and its effectiveness in the dissemination of information are just some of the many follow up projects possible.

Dr. Ecker sees IQPs as a good external view of internal processes. He suggested some possible projects related to:

- Chemical safety
- Evacuation plans
- Allocation of lab resources and optimization of lab layouts
- Effective marketing strategies and resource allocation of the ZHAW and the chemistry program specifically

While all of these ideas could be developed into compelling IQPs, Dr. Ecker believes that the chemistry department's capacity would be at most one project a year. He was also intent upon expanding contact with WPI by providing possible MQPs. They would be specific to chemistry or chemical engineering majors and he could foresee hosting three to four MQPs a year. No specifics were discussed; however, some logistical difficulties like aligning the MQP with the ZHAW curriculum and timeframe were identified.

Furthermore, seven weeks was perceived to be a potential limitation due to the fact that

training in lab equipment use would be a lengthy process and students would spend too much time being trained and too little time researching and completing their project.

### *The Working Group on Sustainability*

The ZHAW in Wädenswil also has a Working Group on Sustainability whose current assignment is “Product Focus: Sustainable Development.” Their timeline is fairly flexible and the size and impact of potential projects described was similar to the scope of an IQP. The projects that were described by our advisor, who is a member of the group, could be completed within seven weeks and could have a meaningful impact to the ZHAW. Some of the initiatives described were:

- Implementation of an E-bike initiative to allow faculty and students easier travel between the ZHAW campus locations.
- Reduction of PET consumption initiative to make the ZHAW campus more eco-friendly.
- Encouraging yard sales and up-cycling in the ZHAW community.
- A movie night where films on sustainability are presented to students.
- Encouraging food sustainability by introducing vegetarian food days in the cafeteria.

Since the members of this working group are promoting these issues in addition to their regular responsibilities, time limits their progress. By introducing an IQP team to implement an initiative or assess the effectiveness of an existing one, the working group could accomplish more of their objectives.

### *Environmental Engineering Department*

We also met with Dr. Danièle Lagnaz and Dr. Tom Bratschi of the Environmental Engineering Department. They indicated that they might be interested in sponsoring a project or two in the next few years. While these were preliminary discussions, they showed potential to turn into real projects over time.

### *HEG Fribourg*

The meeting with HEG Fribourg was very promising because of ongoing international cooperation with WPI. Professor Schaufeld, teaches there once a year so our point of contact, Professor Baldegger, was very familiar with WPI. Furthermore, he could see the potential benefits of such projects and was interested in hosting two to three projects in D-term, 2014. Project options that were discussed:

- A project with the Business School in HEG Fribourg focused on operational analysis of the “Innovation Labs” that are being set up by them.
- A project in conjunction with the Engineering Institute in HEG Fribourg.
- A project in conjunction with one of HEG Fribourg’s industry partners.

It was clear that the idea of hosting IQPs with HEG Fribourg had been discussed before as he had an exceptionally clear understanding of the way these projects work. Fribourg’s location is extremely central as it’s almost halfway between Zurich and Geneva and only a short distance to Berne, the capital of Switzerland. It’s ideal for students because it is less expensive than the big cities of Switzerland. Furthermore, housing is readily



available and affordable, their campus is large and therefore full of opportunities in terms of future projects, and their outlook on education is very similar to that of WPI.

Given the detail in which these project options were discussed and the certainty with which Professor Baldegger could say that the University would be interested is a strong positive indicator for projects in Switzerland and specifically Fribourg.

#### *HSLU – Hochschule Luzern*

The first meeting with our contact, Professor Uwe Schulz, in HSLU was promising and a follow up meeting was arranged. In the second meeting, a lot of discussions ensued and at the end there was strong interest to host two to three projects in D-term, 2014. There were also discussions regarding what kind of projects would be possible and if there was a way to maximize WPI and HSLU student collaboration.

#### *HSLU Expected Model for the Future*

The discussions with Professor Schulz covered mutual benefits such as international collaboration in terms of IQPs and MQPs, the possibility of exchange programs, and research opportunities for both parties. The timeline for project proposal was discussed in the meeting as well as the kinds of projects that would be available. Some possible ideas that were discussed included the evaluation of the life cycle of a product and improving and implementing sustainable processes for the University. The results of the discussions led to the expectation of project proposals in late May 2013.

### *NTB – Hochschule in Buchs*

Our contact for the Hochschule in Buchs showed enthusiasm for collaborative projects that would lead into various forms of international cooperation between the Universities.

While there were no detailed discussions about the logistics and timeline of hosting the projects, there remains potential for collaboration with the university in the future.

### *ETH Zürich and Universität Basel*

Meeting with representatives from ETH Zürich had mixed results. When we approached a WPI alumna who works as a post-doctorate there, we received a generally positive response. There were discussions regarding the timeline of the projects and how much work is usually done. She could foresee a certain amount of interest in MQPs and she was unsure about interest regarding the IQPs.

Our interaction with the University of Basel was also very promising. There were conversations regarding the possibility of hosting projects in the next few years. While they were vague and the logistics were still to be worked out, there was a generally positive attitude towards the collaboration between WPI and the University of Basel.

### ***Strategy***

All the institutions that we contacted had some interest in establishing a relationship with WPI. Most of the universities recognized IQPs and MQPs as the first step to richer and deeper partnerships with WPI. With most academic organizations, aligning the IQPs and MQPs with the schedule of their students and faculty was also important. Their faculty

are usually too busy in early and mid-January. Therefore, D-term seemed to be the best time to work with them.

After collecting the interest from sponsors, we found that we could expect anywhere from 6 to 9 IQPs for D-term, 2014 (two to three each from the ZHAW, HEG Fribourg and HSLU). Follow up projects or new stand-alone projects could be developed with these universities for future years as well. There is also interest from NTB which is always a great option for projects in the future.

## **Industry**

Unlike academia, the industry sector has been harder to gain a foothold in, mostly because it is more difficult to find the right contact in the organization. Furthermore, it is difficult to prove to potential sponsors that a project's benefits outweigh its costs.

## ***Potential Locations***

We approached representatives at various industries including:

- GreenTEG
- ClimeWorks
- GROW Wädenswil
- Nestlé
- Stryker

### *Types of Projects*

There was a certain challenge when approaching individual companies. There had to be clear value to the company, in the case of MQP it had to last long enough for training in the lab as well as actual project work, and, in the case of IQP, the direct benefit to the company was difficult to prove.

### *GreenTEG and ClimeWorks*

GreenTEG and ClimeWorks are two spinoffs from within the ETH community that focus on sustainable energy. They are located in the Technopark in Zurich which is a great location with over 250 companies. These kinds of small to medium sized companies would definitely require a large amount of process optimization which would make for interesting IQPs.

While these companies or any of the 250 companies in the Technopark hold promise, it definitely seems as though it will take at least a year, maybe more, to garner their interest and satisfactorily prove to them the value of WPI projects.

### *GROW Wädenswil*

GROW is an incubator program of sorts run by the ZHAW to help their graduates start and run companies. A project with GROW itself is unlikely; however, it does have the contact information of various companies which could potentially offer a project. The most important obstacle to overcome is proving value to the company. This can be done

by explaining the project over time, have examples of projects conducted in Switzerland and also targeting a company that needs a problem to be solved.

### *Nestlé and Stryker*

Our contacts in Nestlé and Stryker did not quite pan out and a meeting was not possible. The reason behind this was not the lack of interest; rather, scheduling difficulties and shifting priorities made meetings difficult. It would still be worthwhile to pursue these contacts over the next year or two as this could quite possibly lead into projects in the future.

### *Challenges to Overcome*

There are many challenges that WPI will have to overcome while approaching these companies. First and foremost, there is the challenge of proving the value of the project to a company. The potential industry partners that we spoke with were very cautious of any investment in the project. Although working with WPI requires no liquid capital, many companies tend to value time and resources equally if not more. Therefore, for them, the benefits of the project should outweigh all of its costs.

Second, WPI will have to overcome the issue that seven weeks is perceived to be too short a time period for any work to be completed in a satisfactory manner. Working with an industry partner often requires students to be familiar with their policies, procedures and equipment use. This is especially important in MQPs as students will most likely be handling complex equipment.

Finally, WPI must find the correct person in the correct company. Both these aspects are important because if the appropriate company is not chosen, then there is no demand for a project. Similarly, if the right contact in the company is not approached, then the project, no matter how important, may not be secured. Working with large companies is tempting because they could have an abundance of interesting projects; however, finding the best point of contact within that company is difficult. Smaller companies may not have the time or resources to devote to side projects and may not even have the need to sponsor such a project.

### *Strategy*

Without the right contact, it seems difficult to garner enough interest from a company in Switzerland. In order to overcome the challenges laid out earlier, it would probably be best to approach these companies once there are more examples of projects done in Switzerland.

It is also very important for the advisors of the project center (if it were to become one) to stay in touch with the industry contacts that we have acquired so far. By staying in touch with potential sponsors, they will be more likely to host projects as WPI's presence in Switzerland grows.

In Switzerland, academic institutions work very closely with industrial sponsors. By working continually with the institutions listed in the Academia section of this report, WPI is more likely to meet the appropriate contacts in different companies than just approaching them without a reference.

## **Finance**

The finance field showed limited promise in the short term. This is because the economy is hitting banks hard and many of them are downsizing their workforce. They are less likely to invest time in a project that they have no guarantee of value. That said, we did have a contact that could potentially evolve into a project with Credit Suisse.

### ***Potential Locations and Project Types***

The only contact that we had in the financial sector was a WPI alumnus in Credit Suisse. Although the type of the project was not discussed, discussions were ongoing and the possibility of conducting a project with Credit Suisse existed (unclear as of now whether it would be an IQP or MQP). There is a likelihood of having projects with Credit Suisse that are in the same department as the WPI alumnus, but the details are still to be worked out.

### ***Strategy***

The best strategy we have is to continue to stay in touch with Credit Suisse and solicit further contacts in companies in the financial sector. Over time, WPI would have a much more conspicuous presence in Switzerland allowing for the solicitation of projects from many different companies.

## **Pharmaceuticals**

Pharmaceutical companies are known to have a presence in northern Switzerland, specifically Basel. Hoffman-La Roche and Novartis are both headquartered there. The University of Basel and ETH each have a pharmaceutical research center there as well.

### ***Potential Locations and Project Types***

Our ventures to Basel involved two very interesting and promising meetings. A meeting with the University of Basel was very informative as was the meeting with Hoffman-La Roche.

#### *University of Basel*

Our talks with Mr. Erich Thaler, the Head of Global Affairs at the University of Basel, as well as Dr. Antonio Loprieno, the Rector of the University of Basel, told us a great deal about their university. Their response to the possibility of hosting projects for WPI students was generally positive. Rector Loprieno also informed us about ETH Zürich's Department of Biosystems Science and Engineering (D-BSSE). Both these locations hold a unique opportunity for WPI and should be pursued in the future. It does not seem likely that a project will be organized in D-term, 2014 in Basel; however, in future years, it could be a good, viable option.

#### *Roche*

We also were in contact with Hoffman-La Roche, one of the largest pharmaceutical companies headquartered in Basel. Our contact was a WPI alumnus, Mr. David LaPré



who is the Head of Global Pharma Technical Operations. When he was in New Jersey with Genentech, a subsidiary of Roche, in Nutley, New Jersey, MQPs were organized there. Now that he has moved to Switzerland, a new opportunity was presented and we were invited for a tour of Roche and for discussions of potential project sponsorship.

Apart from a tour of their headquarters and presentations on their technical operations, discussions of Roche possibly sponsoring MQPs in biomedical, chemistry or even interdisciplinary fields were very promising. A partnership with Roche could prove to be very beneficial to both parties. Depending on how further meetings and negotiations go, the cost to WPI for the Switzerland project center could be subsidized by MQPs.

### ***Strategy***

This is definitely a great opportunity to get WPI's name well known in Switzerland. Furthermore, considering the size of Roche, having it listed as one of the companies we work with will be attractive for students, faculty and other project sponsors as well. WPI should definitely take this opportunity very seriously and follow up on it. This could be the first step to garnering sponsored projects, making Switzerland a self-sustaining project center, and increasing WPI's recognition in the region.

### **Sports**

Coming into our IQP, sports was one of the sectors we chose as we knew that FIFA and a skiing association are headquartered in Switzerland. However, there was limited interest from the two organizations and no real point of contact. Over a few years, it seems like this sector may have some potential but it seems like an unlikely avenue for WPI in the

next two or three years. We do have a few contacts available; however, it was not possible to contact them.

## **Logistics**

### **Transportation**

Since transportation is such an important aspect of traveling, the availability and cost of transportation is very important to consider before going abroad. Fortunately, transportation to Switzerland is easily found and frequent, even if expensive. The following sections outline the types of transportation available to and within Switzerland for future travelers' reference and for use in pricing out a trip to Switzerland.

#### *Airfare*

Flights between the US and Switzerland are very plentiful and leave many times a day. Obtaining a flight to Switzerland should be no problem at all as long as students book their tickets well in advance. It used to be believed that the best airfare could be obtained by booking about 6 weeks before the travel. However, recent studies have shown that it has become increasingly frugal to book flights as early as possible. Booking flights 21 to 24 weeks in advance seems to be the best deal for international flights (Higgins, 2012; McGuigan, 2013).

Estimating the cost of airfare for future years becomes very difficult as gasoline prices, inflation, and taxes are changing regularly (Yamanouchi, 2012). Also, prices may vary quite significantly depending on the airport travelers are departing from. Typically, larger airports are less expensive for international flights because they have them more

frequently. For those wishing to travel from a smaller airport, it will probably be necessary to fly to a larger airport first and then depart from there. This, of course, adds additional costs to the flight. This is not always the case however, and it is important to research airline prices from all size airports ("Which Offer the Cheapest Flights: Large Hub Airports or Small Airports?," 2012).

In addition to flight prices fluctuating from inflation, flying at different times of the year can greatly alter airfare. Typically flying to anywhere in Europe during the summer is the most expensive because the weather is the nicest and the most people are going on vacation. Places like Switzerland that have a large influx of winter sports enthusiasts may also hit another peak season in the winter, especially over Christmas and New Years'.

The fall and spring would then be the most likely time to find deals in airfare, however with enough hunting and some luck, deals can be found any time of year (Warder, 2013).

The day of the flight can also impact the cost. In general, flying on Fridays or weekends would be more expensive than flying on weekdays. Historically, Tuesdays and Wednesdays have been the least expensive flying days. Students definitely want to avoid flying the day before or a few days before a holiday, such as the day before Christmas Eve. However, sometimes flying on the holiday itself can save quite a bit of money. The best way to find out about these deals is to use a flight search engine that allows flexible dates to find the cheapest days to fly. Expedia or Kayak are good examples of these websites (Warder, 2013).

Because finding actual airfare prices even just for next year is not feasible yet, we give our estimate as the average that the students participating in the Zurich Pilot Program

paid for their airfare. Table 3 below highlights the route each of the six students took to arrive in Zurich, the airline with which they flew, and the round trip cost.

**Table 3: Roundtrip Airfare to Zurich, Switzerland**

<b>Student</b>	<b>Departing Trip Route</b>	<b>Returning Trip Route</b>	<b>Airline</b>	<b>Roundtrip Ticket Cost</b>
A	New York - Zurich	Zurich – Mumbai-Bangalore	Swiss Air	\$1000.59
B	Philadelphia - Zurich	Zurich - Philadelphia	US Airways	\$824.10
C	Albany – Philadelphia - Zurich	Zurich – Philadelphia - Albany	US Airways	\$920
D	Hartford – Philadelphia - Zurich	Zurich – Philadelphia - Hartford	US Airways	\$963
E	Boston - Zurich	N/A	Swiss Air	N/A
F	Hartford – Philadelphia - Zurich	Zurich – Philadelphia - Seattle	US Airways	\$957.64
			<b>Average:</b>	<b>\$933.07</b>

The cost of airfare varies greatly depending on the route that the student took. Student A had the highest airfare because his return flight was a two part flight to India. Student B’s airfare was the lowest because she took just one non-stop flight each way. Student D booked only a one-way flight, so his data will not be considered in the average. Overall, the flight average comes to \$933.07 per person.

Using the average airfare cost from D-term 2013, students can gain a general idea about how much airfare will cost them in future years, however we do expect this to fluctuate greatly and students should keep in mind that they should start looking for airfare deals early to find the best one.

## *Local Transportation*

Switzerland has an extremely expansive public transportation network. This system is known as SBB CFF FFS, the compilation of its three letter abbreviations in German, French and Italian, respectively. It is also referred to by the three letter abbreviation in the language appropriate for the current region. For example, in Zurich and other German speaking regions of Switzerland, the public transportation system is known as just SBB (Schweizerische Bundesbahnen). For simplicity, the transportation system will be referred to as SBB in this report.

The SBB covers over 26,000km of routes between its buses, railways and ships ("The Company, "). It is also the densest public transportation system in the world. With trains connecting all cities and most moderate sized towns, it is definitely possible to get anywhere in the country. Upon arriving in the city or town of destination, expansive bus routes get passengers even closer to their final destination. Boats and ships also cross the major bodies of water in Switzerland to allow faster transport than traveling all of the way around them. The vast size of the transportation system in Switzerland makes it fairly simple to get anywhere in the country.

To take advantage of this excellent transportation system however, users must have a ticket or pass of some sort. Several types of ticketing options are available to travelers in Switzerland ("Rail Pass Switzerland: Buy a Swiss Pass," 2013). The different types of tickets and passes were researched and compared to allow students and advisors to select the type of pass that best fits their needs. The types of passes that are available include:

- **Swiss Half-Fare Card:** This card is purchased for 175 CHF and allows the customer to pay only 50% for each trip ticket that they buy.
- **Track 7:** This is an add-on available to the Half-Fare Card for youth that would additionally allow free travel on all routes between the hours of 7pm and 5am.
- **Swiss Pass:** This pass provides unlimited travel on all urban public transportation as outlined on the Swiss Pass map (See Appendix P). This can be purchased for various time frames. In addition, this includes free admittance to over 400 museums and a half price discount on most mountain top trains.
- **Swiss Flexi Pass:** This pass gives users unlimited access to transportation for a certain number of days within a month. This can be purchased for anywhere from 3-6 days within the month and the days do not need to be consecutive.
- **Swiss Transfer Ticket:** This ticket provides users with round trip transportation to and from a border railway station or airport.
- **Swiss Card:** This card provides users with round trip transportation to and from a border railway station or airport and half price tickets throughout the duration of their stay in Switzerland.
- **Individual Tickets:** Single or round trip tickets to a destination can be purchased each time travel is desired.

A comparison chart of the various ticket types can be found in Table 4 below.

**Table 4: Comparison of Various Swiss Transportation Passes**

Pass Type	Duration	Youth Cost	Adult Cost	Description	Includes
Half-fare card	1 year	\$186.41	\$186.41	Provides half price tickets on all modes of public transportation for one year.	-Children under 16 travel free
Half-fare card with Track 7 add-on	1 year	\$328.82	N/A	Provides half price tickets on all modes of transportation and free transport between 7pm and 5am.	-Children under 16 travel free
Swiss Pass (consecutive days)	1 month	\$484.66	\$646.57	Provides unlimited transportation on all urban public transport as outlined on the Swiss Pass map for consecutive days.	-Free admission to museums -Panorama routes included -50% discount on Mountain routes -Children under 16 travel free
	22 days	\$440.99	\$587.98		
	15 days	\$380.27	\$507.03		
	8 days	\$314.23	\$418.62		
	4 days	\$217.30	\$289.73		
Swiss Flexi Pass (nonconsecutive days in one month)	6 days	\$440.99	\$440.99	Provides unlimited transportation on all urban transport for nonconsecutive days within a one month pass. Also includes 50% discount on passes for non-selected days within the month.	-Free admission to museums -Panorama routes included -50% discount on mountain railways -Children under 16 travel free
	5 days	\$387.73	\$387.73		
	4 days	\$335.53	\$335.53		
	3 days	\$276.95	\$276.95		
Swiss Transfer Ticket	1 month	\$143.80	\$143.80	Round trip transportation to accommodations from the airport or border.	-Children under 16 travel free
Swiss Card	1 month	\$207.71	\$207.71	Round trip transportation to accommodations and 50% off transportation during stay.	-Children under 16 travel free.

### ***Further Travel***

For students interested in traveling outside of the country, be it for project work or for personal travel, they will need to consider the additional transportation costs. This transportation can be paid for on an individual trip basis, or some sort of Eurail pass

could be obtained. All price estimates in this section go for the least expensive travel times and assume that the traveler is 21 years of age, thus can use youth rates.

For comparison, estimates of a roundtrip train ticket to some of the biggest cities surrounding Switzerland are compared in Table 5 below. In this table, the city closest to the Swiss border in the direction of travel was selected as the departing point, assuming that the students would have a pass to travel within Switzerland. These prices are estimates from TGV Europe (Train à Grande Vitesse) for leaving on a Friday and returning on a Sunday ("Travel by Train in Europe, Best Ticket Prices on TGV-Europe," 2013). The prices shown in the table were selected for the least expensive travel, regardless of the time of day.

**Table 5: Cost of Roundtrip to Travel to Neighboring Cities**

City	Departing Swiss City	Roundtrip Price
Munich, Germany	Konstanz*	\$102.37
Paris, France	Basel	\$172.78
Milan, Italy	Lausanne	\$176.68
Lyon, France	Geneva	\$52.22
Salzburg, Austria	St. Gallen	\$214.61
Turin, Italy	Lausanne	\$191.76

\*Konstanz is a German city right on the border than can be accessed with the Swiss Pass.

Clearly, trips outside of Switzerland can add up fast. If a student is considering traveling extensively outside of the country, or to locations further than those displayed in the table, they may want to consider purchasing a Eurail Pass. There are many options for purchasing a Eurail pass which include ("Eurail Pass – View Pass Options & Find Out How It Works | Eurail.com," 2013):



- **Global Pass:** The global pass includes access to 24 European countries. Users can select access to the transportation for any 10 or 15 days in a two month span.
- **Select Pass:** The select pass includes access to 3, 4 or 5 countries of the customer’s choice for 5, 6, 8 or 10 days within a two month span.
- **Regional Pass:** The regional pass has countries grouped by region. Users select which region they would like to buy a pass for, and can select access to transportation for anywhere from 4-10 days in a two month span.
- **One Country pass:** Customers select the country of their choice and can choose to have access to transportation for 3-8 days within a two month span.

If selecting the Global Pass, students would be able to select to have either 10 or 15 travel days in a two month span. These travel days would provide them with transportation in 24 European countries (See Appendix Q). Table 6 below shows the price for each of the options for the Global Pass.

**Table 6: Options and Prices for the Eurail Global Pass**

<b>Travel Days</b>	<b>Price</b>
10 Days/2 months	\$565.11
15 days/2 months	\$741.79
2 months of travel days in a row	\$1,071.76
3 months of travel days in a row	\$1,322.48

For the Select Pass, customers choose 3, 4 or 5 countries to travel in and select 5, 6, 8 or 10 days of travel. The prices for this pass can be seen in Table 7 below.

**Table 7: Options and Prices for the Eurail Select Pass**

<b># of Travel Days (in a two month span)</b>	<b>Price for 3 countries</b>	<b>Price for 4 countries</b>	<b>Price for 5 countries</b>
5	\$303.99	\$340.36	\$374.14
6	\$335.17	\$371.54	\$405.32
8	\$396.23	\$431.30	\$467.68
10	\$459.88	\$493.66	\$527.43
15	N/A	N/A	\$667.74

For the regional passes, many country combinations are possible. For the purpose of this study, only the country combinations including Switzerland were considered. Three Regional Passes include Switzerland: Austria-Switzerland, France-Switzerland, and Germany-Switzerland. Table 8 shows the pricing options for these three Regional Passes.

**Table 8: Options and Prices for the Eurail Regional Pass**

<b># of Travel Days (in a two month span)</b>	<b>Austria- Switzerland</b>	<b>France- Switzerland</b>	<b>Germany- Switzerland</b>
4	\$281.90	\$374.14	
5	\$313.08	\$322.18	
6	\$342.96	\$359.85	\$314.38
7	\$374.14	\$392.33	\$410.52
8	\$405.32	\$424.81	
9	\$435.20	\$465.08	
10	\$466.38	\$489.76	\$472.87

Country Passes can also be purchased if students are considering traveling in one particular country for a while. The prices vary based on country and number of traveling days. The travel days must be within a one month span. Table 9 below shows the prices for various countries and numbers of days traveling.

**Table 9: Options and Prices for the Eurail Country Passes**

Country	Price in USD							
	3 days	4 days	5 days	6 days	7 days	8 days	9 days	10 days
Austria	\$107.83	\$120.82	\$132.51	\$144.2	\$157.19	\$168.88	-	-
Croatia	\$85.74	\$100.03	-	\$132.51	-	\$146.80	-	-
Italy	\$187.07	\$207.86	\$231.24	\$252.03	\$275.41	\$297.49	\$319.58	\$341.66
Spain	\$229.94	\$261.12	\$231.24	\$327.37	\$362.45	\$396.23	\$432.60	\$466.38

In addition to traveling by trains, students can also consider traveling by plane around Europe. There are many airline providers that have inexpensive flights between European countries. The ones that serve Zurich in particular are ("Airlines operating at Zurich Airport," 2013):

- Germanwings
- WOW Air
- Vueling
- easyJet

Inexpensive flights can easily be searched through individual inexpensive airlines like those listed above, or they can be searched through a flight search engine such as Expedia.com or Travelocity.com (Steves, 2013).

## **Communication**

While abroad, students and advisors will need a way to stay in contact with the world, both at home and within Switzerland. In this section, the availability of cellphones and internet for travelers to Switzerland were researched, as they are the two most common forms of communication today.

## *Cellphones*

Many travelers would prefer to acquire a cellular phone while abroad. This is particularly important for students so that they can get in contact with each other, check in with advisors, and make calls in case of emergency. Most American cell phones will not work in Switzerland, and even those that do would probably have high roaming charges for being out of range. Because of this, it is assumed that most students and advisors would be looking for a phone adaption or temporary phone that would work in Switzerland ("traveling.ch - cellphones," 2013).

### *Cellphone Options*

Most American cell phone providers operate on the 1900 MHz network, while most overseas providers use the 900 or 1800 MHz network. Some providers have tri-band phones; this means that they will work on any network. Students should first look to see whether or not their current cell phone provider uses tri-band phones.

If the traveler does have a tri-band phone, they have the option of leaving their phone on roam throughout their stay. This gives them the benefit of keeping the same phone number that they had in the US, but results in astronomical roaming fees.

It is possible to rent a phone upon arriving in Switzerland, probably from the airport, however this can be very expensive. Not only is there a rental fee for the phone, the provider also charges relatively high per-minute rates. There may also be minimum use requirements that can drive up the price for a phone that gets little use ("traveling.ch - cellphones," 2013).

A much more economical way to go about this is to purchase a prepaid SIM card. These cards can be purchased at the airport, or at many providers' outlets throughout the country. If the traveler is already in possession of a 900 or 1800 MHz network phone or a tri-band phone, they can just insert the SIM card into that phone. If not, this type of phone can be rented or purchased.

SIM cards provide users with a new phone number to use for the duration of their stay. These are just temporary numbers based out of the UK. By using the SIM cards, the users pay the same rates as Swiss locals on that network. This is much more economical than renting a whole phone system from the airport or allowing a phone from the US to remain on roam ("traveling.ch - cellphones," 2013).

### *Cellphone Alternatives*

As an alternative to obtaining a cellular phone in Switzerland, other options are available. Calling cards can be purchased that will allow inexpensive calling from public phones. Some calling cards can be used for a rate of just a few cents a minute for international calling. These cards are available through websites such as comfi.com and centcalls.com. These can be purchased in Switzerland or before leaving through the US (Fidelity, 2013; International, 2013).

In addition to buying a card, students can also setting up an account with an international calling service such as PennyTalk. These programs allow travelers to call from any phone, landline, payphone, or even borrowed cell phone for very low rates. The users simply dial a free 1-800 number first, enter their account number and PIN number. They

can then call any number and talk for however long they would like at low rates. The company simply charges the credit card associated with that account for the call (PennyTalk, 2013).

While both of these are great options that allow travelers to get in contact with others, there is no phone number associated with either of these options, so they are unable to receive incoming calls. Another alternative that allows students and advisors to receive calls is to use the internet based Skype.

Skype allows users free access to video chatting. With a Skype account, travelers can call others and elect to either turn the video chatting aspect on, or just leave it at a voice call. Calling to another person's Skype account is free, but students would have to buy Skype credits to call to phones. This is helpful in that they would have a way to receive calls as well as initiate them. The main limitation with this system is that the user must have internet access to send or receive calls, so while traveling or in a location without internet, this option would not work (Skype, 2013).

It is entirely possible that students could use some combination of these cellphone alternatives instead of obtaining a temporary phone or SIM card. The students who travelled to Switzerland in D-term 2013 opted not to obtain phones, but to use Skype to call home and make important calls. They also obtained a PennyTalk account that could be used in case of emergency while traveling.

Overall, there are many options that students and advisors could pursue to set up a system to make calls while abroad. Most of these options would not be too expensive, and

travelers would need to select the system that works best for themselves and matches their calling needs.

### *Internet Access*

Accessing the internet will of course be important for students and advisors while abroad. Not only is this necessary for research related to project work, students and advisors will likely also rely on the internet to stay in touch with friends and family from home, through email, Skype and other methods.

While looking at housing, a major aspect to be considered is if the property has an internet connection. This is extremely important if students or advisors expect to do any work from home. Fortunately, most short-term living arrangements typically provide residents with internet. If not, a temporary internet plan can be purchased for a living space through a Swiss provider, such as Sunrise.

Other than in housing, students should have access to the internet in their workspace. If the company or university has a locked network system, the students should be given access to this system through the organization. Since almost all companies rely on the internet to some extent, this should not be a problem.

If students need access to the internet at locations other than home and work, there are other options. Internet cafes are quite prevalent in Switzerland. Internet cafés can be found in all major cities in Switzerland and many smaller towns as well. At these cafes, students or advisors can pay a fee to use a provided computer to access the internet. Other

cafes or bars may provide free internet access to customers as long as they are buying food or drink from the establishment (JustLanded, 2013).

In addition to the cafes, many busy locations such as train stations, universities, and touristy areas have a public network. From this public network users can access the SBB timetables to find train and bus routes free of charge. To use more than this one website, users may log in via a VPN login system. These VPNs (Virtual Private Networks) allow users to set up an account attached to a credit card or bank account. When users wish to access this public network, they can log in to their account and use the internet. They will be charged a fee for the internet.

Even people who do not have a VPN account could buy some time on the public network by entering credit card information at the time of desired use. However, this is usually more expensive than setting up an account through a provider.

Since internet should be provided at home and at work free of charge, there should not be any great internet expenses to the student. Only if they really need internet while not at home or work may they need to spend money on internet.

## **Dining**

Food can be a big concern when traveling abroad. Not only is eating out be different from what students are used to, but even grocery stores and availability of certain items may vary greatly from country to country. This section looks at the availability of groceries and dining out in Switzerland, as well as the costs of various dining options.



## *Groceries*

As Switzerland is a well-developed country, groceries are readily available. The two biggest grocery chains in Switzerland are Migros and Coop. At least one, if not both, of these stores can be found in most towns throughout the country. Other than the limitation that most stores are not open on Sundays and holidays, students should not experience difficulty getting groceries.

The largest difference between buying groceries in the US and in Europe would be the language of the packaging, some of the brand names and the portion sizes. As long as students are willing to try new things and remember to look up the German words for any obscure products that they are looking for, grocery shopping should not be a hassle.

To estimate the cost of groceries, the six students participating in the Zurich Pilot Project kept an accurate record of all of their grocery purchases. All receipts were kept and a running grocery total was calculated. By adding the totals on all of the grocery receipts and dividing this number by the six students, an average student's grocery bill could be calculated.

It would not be feasible to do these calculations on the last day of the term because this analysis needs to be completed before that date. To compensate for this, on April 1<sup>st</sup>, the beginning of the fourth week of the program, the grocery bills accumulated thus far will be used to calculate the average cost of groceries per person per day. This daily average can then be used to calculate an average per student for the entire term.

As of April 1<sup>st</sup>, our grocery total was \$1,029.19. Once this number is divided by the six students, we reach a total of \$171.53 per person. Since we have been living here since March 7<sup>th</sup>, we have purchased groceries for 25 days so far. When \$171.53 is divided by the 25 days that it covered, the daily grocery total per student is \$6.86.

Using a daily average of \$6.86, we can multiply this number by the approximate number of days that students would be living in Switzerland. Since a term is 7 weeks long, it is reasonable to use 50 days as the time frame that students would be in Switzerland.

Students should know that if they choose to come early or stay later, their grocery bill will proportionally increase.

The grocery cost per day was then used to estimate a grocery cost per week, month, and term. The calculated values in both CHF and USD are provided in Table 10 below.

**Table 10: Average Student Grocery Costs**

<b>Grocery cost per:</b>	<b>CHF</b>	<b>USD</b>
Day	6.44	6.93
Week	45.08	48.48
Month	193.2	207.79
Term	322	346.31

By multiplying the daily average by the number of days in the estimated duration of stay, we reach a total of \$346.31 per student. This number is assuming that students are purchasing wisely. This includes buying many items in the store brand, eating expensive foods modestly, and buying some non-perishable items in large quantities while on sale. This number is also assuming that the students will be cooking almost every night, as

there were only a few nights in the 3 weeks of sample data that the students ate out. Estimates for dining out will be provided in the following section.

### *Dining Out*

It is likely that students would want to dine out on occasion while visiting Switzerland. This is the perfect opportunity for them to try Swiss specialties like raclette and fondue that they may not be able to prepare for themselves at home. Also, enjoying a meal in a restaurant allows students more cultural emersion by integrating into the Swiss life style.

There is a large variety in the types of dining options that Zurich offers. Zurich offers everything from outdoor eateries to expensive gourmet dining (Zuerich.com, 2013). Because it is assumed that WPI students would be looking for a frugal way to eat out on occasion, it is assumed that students would eat out once per week. Of these seven dinners out, six of them could be at relatively inexpensive places while one is at a higher end restaurant for the experience. There are many dining guides on Switzerland tourism websites that can guide students to these restaurants.

According to numbeo.com's cost of living guide for Switzerland, an average price of a dinner at inexpensive restaurant is \$22.37. The average cost for a three course meal at a higher end restaurant is \$53.26. Thus assuming that students would enjoy 6 meals at an average of \$22.37 and one meal at \$53.26, the overall cost of dining out for the seven weeks would be \$187.47.

### ***Housing/Dining Co-plans***

As the ZHAW does not have student dorms and a traditional dining hall set up, it is unlikely that a housing/dining co-plan will be established. However, if such options arise, the price will have to be considered for how much the co-plan costs and how much separate housing and groceries would cost.

### **Housing Options**

Housing is the most difficult logistic to work out in Switzerland. Short-term housing can be difficult to find and sometimes quite expensive. Also, most universities do not have university-approved housing that could be rented to students. Despite the difficulties of housing, there are many measures that can be taken to help find less expensive, quality housing for students and advisors.

### ***Avoiding Large Cities***

By avoiding housing in expensive downtown areas, costs can be cut quite a bit. For example, apartments in the city of Zurich itself are very expensive and difficult to find for only a short period of time. By looking at the smaller towns surrounding Zurich, cheaper housing may be found for short periods of time and still only have students a short train ride from Zurich.

The problem that arises with housing students in any smaller towns is that housing is much more limited. Small towns are typically not used to a large influx of people and

physically may not have the capacity to house more than six students or so. This can easily be remedied however by splitting up students into multiple living groups.

### *Dividing Students into Living Groups*

Instead of trying to house many WPI students all in the same location, students can be divided up into several groups for housing. This system could work in many different ways depending on where the students' projects are based.

One option would be to divide the students between several different small towns that are close to each other, or at least near the same central city. By housing maybe six or eight students in each location, it can be assured that students would not be too isolated. Also, students would be near enough to each other to see each other and socialize together in nonworking hours.

If the locations were near enough to each other, students in the same project groups could even live in different living groups. This would allow students working together to not spend too much time together because it would allow students to compartmentalize their project from their personal life. This would also encourage interaction between students living in different areas.

Another option for dividing the students between locations is to place students near different cities. Instead of having all of the students grouped around Zurich, some students could be based in Zurich, while others were based in Fribourg, Basel or Bern. This would be particularly helpful if the projects were based in a variety of different cities. All of the students could then be based near the city that they are working out of,

instead of commuting from outside of Zurich. This split location model will be discussed more thoroughly in future sections.

### ***Wädenswil Specific Housing Options***

Some research was done on housing near Wädenswil because the students in the pilot program were based there in 2013. The ZHAW campus in Wädenswil hosted the six students in the pilot program, and it is serving as a starting focal point for future projects. Therefore, it is likely that at least some students will be living in or near Wädenswil in future years.

The housing options located in or near Wädenswil are:

- **Strickhof:** Strickhof is a student housing option right in Wädenswil. It is about a five minute walk away from the ZHAW's campus and may be able to rent apartments or dorms to students depending on the schedule of the school whose students usually live there. Prices were also very reasonable for the pilot project students' apartment in 2013.
- **Richterswil Youth Hostel:** Richterswil is a neighboring town to Wädenswil. The ZHAW has a membership with the youth hostel which can get a rate of \$6.39 per student per night. It would take students about 40 minutes to get to the ZHAW campus by public transportation or 30 minutes walking.
- **Zurich Youth Hostel:** There is also a youth hostel in Zurich that may be able to house students for a discounted price. Group prices would have to be negotiated with the hostel depending on the number of students and the duration of the stay. This does

give the students the opportunity to be in the city; however, the cost of living might be a bit higher there.

- **Allegra Bio Bed and Breakfast:** This bed and breakfast is also located in Richterswil. It appears to be quite expensive, but it could be possible to work out a group or extended stay rate. It is also a possibility for advisor housing.
- **Villa Magnolia Bed and Breakfast:** Similar to the Allegra Bio Bed and Breakfast, this is also located in Richterswil. It is a bit more expensive than the Allegra, but again could possibly give group rates and is a possibility for advisor housing.

All of these housing options would require more negotiation and research once the number of students based there and the exact dates were known, but they do serve as good examples of what is available for housing options in the Zurich region. Other locations, such as Fribourg, may have even more housing options because the city is a college town with a higher percentage of students.

Because there are so many unknown about housing, an estimate of \$1,500 will be included in the budget for students. This is significantly more than the pilot project group paid for their housing. The students paid \$850 per single room and \$550 per person for a double room.

### **Leisure Activities**

There are many activities in the surrounding areas to keep students entertained when they are not working on their project. Many of these activities are free, which would spare the

students some expenses. The types of entertainment central to Zurich are highlighted in the following sections.

### *Museums*

There are many museums in Zurich that serve as great weekend activities for students. In addition, admission for many of these museums are free with the Swiss Youth Pass, and those which do not have free admission are likely to have a half rate for ticket holders or at least a student price. Because of this, visiting museums can be a fun, educational and economical weekend activity.

There are many museums in Zurich itself and of course many more in surrounding areas and cities. The following list is a partial list of museums in Zurich:

- Kunsthaus Zürich: Art Museum
- Rietberg Museum: Art Museum
- Zoological Museum: Animal Museum
- Urania Observatory: Astronomy Museum
- Swiss National Museum: History Museum
- Haus Konstruktiv: Art Museum
- Tram-Museum Zurich: Transportation Museum
- Beyer Museum of Time: Industry Museum
- Zurich Toy Museum: Industry Museum
- Swiss Craft Center: Art Museum
- Museum of Design: Art Museum



- Nordamerika Native Museum: History Museum
- Volkerkundemuseum: Cultural Museum
- Helmhaus: Art Museum
- Medizinhistorisches Museum: Medical History Museum
- Kuturama Museum des Menschen: Natural History Museum
- Kunsthalle Zürich: Art Museum

The museums cover a wide variety of topics, which means there are likely museums that correspond to most students' interests. Overall, museums are an affordable, fun leisure activity for students and plentiful in Zurich and the rest of Switzerland.

### *Sightseeing*

European cities are interesting for American tourists in that there are old buildings and elaborate churches that simply were not a part of American history. People interested in history, architecture, art, religion, or culture in general can enjoy a day of sightseeing around a city. Switzerland's cities are no disappointment for the sightseeing enthusiasts!

There are many churches, parks, and old buildings to see in Zurich. Some of the most famous highlights include:

- Old Town
- Fraumunster (Church of our Lady)
- Grossmunster (Great Church)
- St. Peterskirche (St. Peter's Church)
- Lindenhof Platz (Park)

- Parkanlage Zuerihorn (Park)
- Botanical Gardens
- Belvoir Park

Similarly, most other Swiss cities are excellent for sightseeing as well. Because of the excellent transportation systems in Switzerland, it becomes quite easy to take a day trip to another city for sightseeing. For example, day trips to Lucerne, Bern, Basel, and Fribourg where all accomplished by the Zurich Pilot Project.

Instead of paying for tours of the city, students can invest in a travel guide book to take sightseeing with them. These books often provide some background and context for the various sights and generally include a map of the main attractions of each city. Also, packing a picnic lunch from home can help cut down on the costs of sightseeing, and, on a nice day, enjoying a lunch in a scenic spot can be very pleasant.

In addition, visiting the tourist information desk at the train station of each city can be helpful. Not only does the staff typically speak English, they often have maps of the city, pamphlets of information on various attractions, and may be able to provide some advice on which attractions are most worth the time.

In general, sightseeing can be an excellent way to get a glimpse into the cultural background of a city and is typically very inexpensive.

## *Shopping*

Whether out of necessity or desire, most students and advisors will go shopping while they are abroad. Zurich offers plenty of shopping options which might be perfect for rainy weekends or an evening study break.

Shopping is available in a variety of locations in and around Zurich. Some of the shopping destinations include:

- **Bahnhofstrasse:** The Bahnhofstrasse (or Train Station Street) is possibly one of the largest shopping districts. This street has more than 90 shops, most of which are famous brands and companies ("The Bahnhofstrasse of Zurich - The popular promenade for recreation and shopping in the heart of Zürich," 2013).
- **Old Town:** In the Old Town, shoppers can find smaller, more touristy gift shops featuring authentic Swiss products ("Shopping in Zurich and Around," 2013).
- **Zurich-West & Aussersihl:** In this region, the shopping consists of high end brand names that are traditionally Swiss ("Shopping in Zurich and Around," 2013).

There are also many other shopping destinations in the surrounding areas. A day trip for shopping in another city could easily be managed.

## *Skiing*

Because skiing in the Alps is something that Switzerland is particularly known for, it is likely that some students would like to spend a day skiing. Luckily, Switzerland often

still has enough snow for skiing until well into D-term. While skiing can be a costly trip, it may be worth it to many skiing enthusiasts or those who have always dreamed of skiing in the Alps.

If students are willing and able to go skiing on a weekday instead of a weekend, they may be able to find discounted rates. They may be able to work out an arrangement to work one day of a weekend in exchange for one weekday off for skiing. Also, since there are many options for places to go skiing, it is likely that students would be able to make a day trip to ski and avoid paying for a night in a ski resort.

For the students in Switzerland in D-term 2013, they took a Wednesday off to go skiing at Flumserberg, local to Zurich. Each student paid about \$149.13 for the day skiing. This included the ski rentals, lift tickets and one meal at the ski lodge. Students interested in skiing should definitely do research to find the best deal, but \$149.13 is a good estimate of what they can expect to fine.

Between the multitude of options of leisure activities in Zurich and the surrounding cities, students and faculty should have no problems finding ways to keep themselves entertained in their free time. With the exception of a ski trip, most of these activities incur little to no cost, making them very affordable.

## **Cost Analysis**

In looking at the logistics of having a project center in Switzerland, estimated costs for varying aspects of traveling to Switzerland were calculated. These costs can be used to estimate the cost to WPI of having an advisor located at the site and to students

completing their project at the site. This section details each of these budgets and compares them to the costs of other project sites around the world.

### **Cost to Students**

The costs that students would have to pay to complete a project in Switzerland were divided into five general categories:

- **Transportation:** This category includes round trip airfare to the project location and local transportation to move within Switzerland.
- **Dining:** This includes grocery bills and eating out once per week (six times at a less expensive restaurant and once at a high end restaurant).
- **Housing:** This includes the cost of renting a room or apartment for one term.
- **Weekend Activities:** This category includes any extra activities that students would like to participate in while abroad. This could be traveling outside of Switzerland or attending more local attractions.
- **Miscellaneous:** This cost includes anything not already accounted for in the previous sections such as laundry, dry cleaning, calling cards, and other miscellaneous needs.

As outlined in the logistics section of this report, students have many options in each of these categories. For example, there are many different public transportation passes that students could buy depending on their travel plans. The price for food can vary dramatically depending on how often the students cook for themselves, the types of food they choose to buy, and their diligence to finding deals and buying in bulk. Because of

these differences, the cost given for each of these categories will just be an estimate of the actual costs students will incur.

### ***Transportation***

Airfare and local transportation are the two main costs to the transportation section of the budget. As acknowledged in the Logistics section of this report, airfare can be very difficult to estimate because of the constantly varying prices. The average cost that students in 2013 paid for airfare to Switzerland was \$933.07. For the purpose of this feasibility study, this was adjusted to \$1,000 because it was assumed that airfare prices will continue increasing in future years.

For local transportation, many options were presented to get around Switzerland. The Swiss Youth Pass was the most promising because students get unlimited transportation in Switzerland with this pass. The pass covers anywhere they would need to go for academic work and most places they would want to go in free time. Because this pass is the most all-encompassing and a likely choice for students, the price of a Swiss Youth Pass for the duration of the project will be used as a local transportation cost estimate. It is the most expensive of the local passes, so if students did choose an alternative pass, this would be a higher estimate.

Because the duration of a WPI term is approximately 50 days, students would need to purchase a one month pass and then a secondary 22 day pass. The cost of the one month pass is CHF 484.66 and the 22 day pass is CHF 415. This brings the total to CHF 870. Using the current conversion rate, this comes to a total of \$933.98. This will be rounded

to \$1,000 for use in this budget considering that there may be some transportation needs not covered by this pass (such as one or two local buses in very small towns or train fare from the airport before a pass is purchased).

The numerical results from this section are presented in Table 11 below.

**Table 11: Outline of Travel Budget**

<b>Transportation</b>	<b>Cost (in US dollars)</b>
Airfare	\$1,000
Local Transportation	\$1,000
Total:	\$2,000

The transportation section of the budget will then be presented as \$2,000, half of which is for airfare and half for local transportation.

### ***Dining***

The dining section includes groceries and eating out. It was assumed that students would eat out seven times (once per week) and cook for themselves the rest of the time. To estimate the cost of groceries, the cost that students in D-term 2013 paid were averaged. In the logistics section, it was found that students paid about CHF 6.44 per person per day. Using this as a model, it can be calculated that students would spend about CHF 322 over the 50 days of the term. Using the current conversion rate, this would be the equivalent of \$345.68. This will be adjusted to \$400 for the budget.

**Table 12: Outline of Dining Out Budget**

Average cost of inexpensive dinner	\$22.37
Inexpensive dinner x 6 (total inexpensive dinners)	\$134.21
<b>Cost of 6 inexpensive dinner + 1 expensive dinner (total eating out cost)</b>	<b>\$187.47</b>

In finding the estimated cost of dining out, the average prices of eating at expensive and inexpensive restaurants were researched. It was assumed that students would eat out at an expensive restaurant once and at inexpensive restaurants six times. The average cost of a meal at an inexpensive restaurant was CHF 21.00 and the average price for an expensive restaurant was CHF 50.00 (Numbeo, 2013). Thus we find a total of CHF 176 for dining out. Converting this to US dollars, we come to an eating out total of \$188. This will be adjusted to \$200 for this budget.

The total cost estimates for dining are shown in Table 13 below.

**Table 13: Outline of Dining Budget**

<b>Dining</b>	<b>Cost</b>
Groceries	\$400
Dining out	\$200
<b>Total:</b>	<b>\$600</b>

The total cost estimate for dining used in the student budget is then \$600.

### ***Housing***

Estimating the cost of housing is the most difficult because there are a variety of locations that students could be living in future years. The average cost that students in



2013 paid for housing was \$750. The housing estimate can then be given as \$1500, assuming that the housing found this year was particularly economical.

### *Weekend Activities*

The cost for weekend activities could vary extensively depending on the types of weekend activities students are interested in. Options for weekend activities are discussed extensively in the logistics section of the paper. Most of the identified activities such as sightseeing and museums are free or very inexpensive. For these common activities that would have no more than a few francs charge, \$100 was budgeted.

For a ski trip, a more expensive venture, but one many students would probably be interested in, the estimate was based off of our day trip to go skiing. One day skiing at Flumserberg, including ski rentals, lift tickets and lunch at the lodge, cost us CHF 140. This converts to \$150.3, which will be estimated at \$150.

In addition, many students will probably want to take at least one further overnight trip during their stay. Basing this estimate on our weekend trip to Munich, \$250 should more than cover the cost of out-of-country transportation, one person's share of an inexpensive hotel, and other travel necessities. An estimate of \$250 will then be included for one weekend overnight trip.

The total estimates for weekend activities are included in Table 14 below.

**Table 14: Outline of Weekend Activities Budget**

<b>Weekend Activities</b>	<b>Cost</b>
Museums, sightseeing, and daytrips	\$100
One ski day trip	\$150
One weekend overnight trip	\$250
<b>Total:</b>	<b>\$500</b>

Overall, a total estimate of \$500 will be budgeted for weekend activities and excursions.

### ***Miscellaneous***

Various others expenses will of course pop up during students' trips abroad that do not fit into any of the previous categories. These include things like laundry, dry cleaning, calling cards, personal care items, and other random needs. Estimates are not provided from the 2013 group yet, because laundry machines were not available and thus laundry was done inexpensively in the sinks. Calling cards were not purchased and most personal care items were brought from the US with the students. To compensate for this category though, \$400 will be included in the budget for these miscellaneous needs.

The following table shows the estimated costs for each of the categories of student costs discussed above and provides an overall estimate of student expenses.

**Table 15: Student Budget**

<b>Student Budget</b>	
Travel to Site (round trip airfare)	\$1,000
Local Transportation (Swiss Pass)	\$1,000
Dining	\$700
Weekend Activities	\$500
Housing	\$1,500
Miscellaneous	\$400
<b>Total:</b>	<b>\$5,100</b>

The overall estimated cost for students to travel to Switzerland for their IQP is \$5,100.

This is not including their WPI tuition and on-campus housing.

### **Student Cost Comparison**

To compare the estimated student cost of an IQP in Switzerland to the costs of other sites, the following table was adapted from WPI's 2013-2014 Off-Campus Project Centers and Programs Estimated Cost Summary. This table shows the estimated out-of-pocket and housing costs for each of the IQP Project Sites. They are organized in order of smallest total cost to highest total cost.

**Table 16: Cost Comparison of Switzerland to Other Project Sites**

<b>IQP Project Site</b>	<b>Out-of-pocket Expenses</b>	<b>Housing and Program Fees</b>	<b>Total</b>
Boston, MA	\$0	\$0	\$0
Worcester, MA	\$0	\$0	\$0
Nantucket, MA	\$1,400	\$700	\$2,100
Mandi, India	\$1,720	\$800	\$2,520
Bar Harbor, ME	\$1,150	\$2,220	\$3,370
Costa Rica	\$1,825	\$1,950	\$3,775
Santa Fe, NM	\$1,650	\$2,550	\$4,200
Bangkok, Thailand	\$3,320	\$1,350	\$4,670
Ifrane, Morocco	\$2,650	\$2,150	\$4,800
Tirana, Albania	\$3,050	\$1,850	\$4,900
<b>Zurich, Switzerland</b>	<b>\$3,600</b>	<b>\$1,500</b>	<b>\$5,100</b>
Puerto Rico	\$2,220	\$3,000	\$5,220
Moscow, Russia	\$3,490	\$2,000	\$5,490
Cape Town	\$3,200	\$2,350	\$5,550
Venice, Italy	\$2,400	\$3,225	\$5,625
Hong Kong	\$4,500	\$2,250	\$6,750
Windhoek, Namibia	\$4,600	\$2,300	\$6,900
Washington DC	\$2,150	\$4,850	\$7,000
Wellington, NZ	\$4,450	\$2,750	\$7,200
Melbourne, Australia	\$4,150	\$3,300	\$7,450
Copenhagen, Denmark	\$3,300	\$4,250	\$7,550
London, UK	\$3,800	\$3,750	\$7,550

Based on the generated estimates, Switzerland would be a mid-range project center. It is significantly less expensive than some of the other European project sites, such as Copenhagen and London. The cost of Switzerland should not prohibit students from applying to the site since the four most expensive sites, Wellington, Melbourne, Copenhagen, and London, are all very popular sites that usually fill up in the first round of site selection.

## **Costs to WPI**

The costs to WPI are much more difficult to estimate due to many unknowns about the cost of running preparation courses, the number of times advisors would have to fly over, and the number of advisors at the project center. Instead of attempting an estimate for the costs to WPI and the IGSD that would be at best wild guess work, listed below are the known types of expenses to WPI that the IGSD can use to calculate the cost.

- Transportation
- Housing
- Dining
- ID 2050 and Pre-Qualifying Project
- Other operational costs.

The costs of running a project site in Switzerland should be very similar to that of other European sites. The costs related to running ID 2050 and PQP courses should be exactly the same for all project sites. In addition, transportation and the cost of living should be similar to sites such as London and Copenhagen. For any other expenses WPI covers for the operation of project sites, Switzerland should be similar to other European ones. Thus using the IGSD's cost of operations for sites like Copenhagen or London should provide a good estimate of the costs for Switzerland.

## Conclusions

Our conclusions and recommendations on how to proceed in the development of a Switzerland project center are the result of a diligent process. This process is outlined in the flowchart below (See Appendix H).

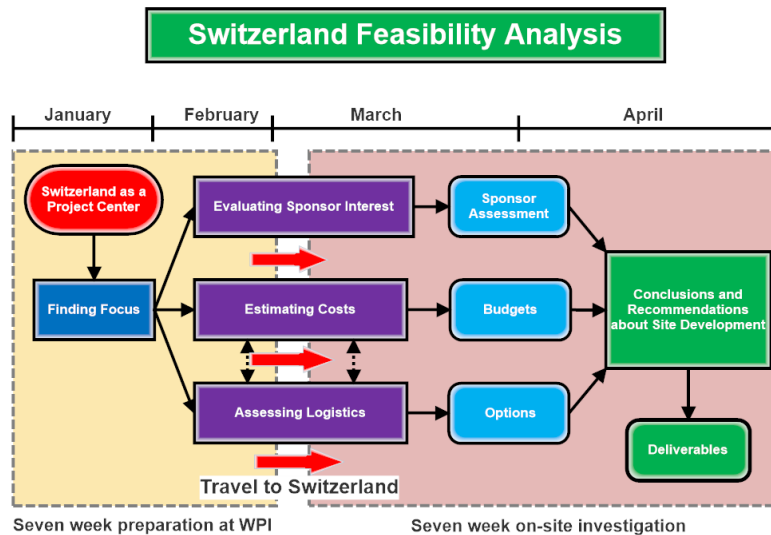


Figure 6: Feasibility Analysis Overview Flowchart

As the flowchart indicates, we first determined the three most important aspects to consider in the development of a new center. We then designed and carried out methodologies for each of these three focuses to gain the necessary information. The assessed interest of the sponsors, the estimated budgets, and the optimal logistics were then carefully combined and analyzed to form our conclusions and recommendations for the future of this site.

## Sponsors

After thorough research, meetings and communiqués, we were able to ascertain both short-term and long-term interest in hosting projects for WPI. There was a significant

interest from sponsors in the field of academia and a fair response from finance and pharmacy. While industry and sports sponsors were fewer in number, there is future opportunity for project sponsors as well.

## **Academia**

The main project sponsors of interest were the ZHAW, HSLU, and HEG Fribourg. NTB seems like a great opportunity to pursue for D2015. The question that arises is how best to place the project center.

Given the logistical difficulty of housing 20 – 25 students in a single location, and the fact that traveling is a safe and easy process in Switzerland, it would be ideal to follow a distributed model where students are split up into different areas. One section could be near Zurich and Lucerne and work on projects with the ZHAW and HSLU. The other section could be situated in Fribourg and work with HEG Fribourg. This would keep the groups sufficiently large enough to prevent isolation of any project team and sufficiently small so as to not create too many logistical challenges. This model also takes advantage of all the immediate opportunities available to WPI from this sector.

## **Industry**

The search for industry sponsors is ongoing. It seems logical that, over time, contacts can be developed and projects can be solicited. Furthermore, by working with academic institutions, WPI is likely to increase its recognition amongst industries.

## **Finance**

We garnered initial interest with one company, Credit Suisse, in the finance sector. If WPI were to complete a project for Credit Suisse, it could serve as an example of students' work for other similar organizations. Credit Suisse provides a great opportunity for students to complete compelling IQPs and MQPs in the future.

## **Pharmaceuticals**

We gained initial interest from Roche in Basel for an MQP. This is a great opportunity for the students as well a step towards subsidizing the cost to WPI of running a Switzerland project center. The location in Basel is also especially beneficial because it's at the border of France and Germany and could serve as a gateway in to those countries.

## **Sports**

Although we received limited to no interest in this sector, it might be worth following up with some available contacts over the next few years. There is potential for working with sports organizations because Switzerland is a center for international sport governing bodies. However, there is a lot of interest in all the other sectors and the project center will probably be running at its full capacity for projects for the next year or two.

## **Logistics**

Overall, the logistical aspects of a project site in Switzerland are certainly feasible. Since Switzerland is a modernized country, all of the necessities for a safe and comfortable life are available there. Multiple forms of transportation, communication, and dining are



readily available, as are housing options and leisure activities. Students should be able to find everything they need while abroad.

### **Cost Analysis**

Switzerland seems like a very feasible project center from a financial perspective. While it would not be an inexpensive project site for students, it would be in the average price range and be less expensive than some of the other European sites. If students are willing to pay even higher rates for other sites, paying for Switzerland should be no problem. As for the costs to WPI, the project center should have very similar operating costs as to that of any other European center.

## **Recommendations**

Using diligent on-site investigation and research, we were able to knowledgeably suggest several strategic moves for WPI as recommendations.

### **Determining Term**

A consideration for a project center is determining term of operation. WPI's academic calendar is divided into four terms rather than two semesters. The terms A- and B-term are grouped into the fall semester, while the terms C- and D-term are placed in the spring semester.

Due to IQP guidelines, a term of preparation must be completed before an off-campus project can be started. For a Switzerland center, A-term is not a viable term for project work because the preparation term would have to be scheduled in the previous year.

Completing a project in B-term is possible; however, return flights in mid-December tend to be more expensive.

Because of the fall and spring semester, it would be logical for the project and preparation term to be grouped into the same semester. A project in C-term with preparation in B-term is awkwardly segmented by winter break. Academic institutions in Switzerland tend to start their spring semester in late February and end in the mid June. Since the timeline does not align with the beginning of C-term, projects that work with these institutions would not be feasible.

Thus, operating the potential Switzerland project center in D-term makes the most sense. Preparation work would begin in C-term with students completing their projects in D-

term in a cohesive span of 14 weeks. Also, students and faculty would not have to worry about returning to WPI for another academic term. During late B- and early C-term, the weather in Switzerland is winter-like conditions. Weather in D-term is more pleasant and would be the ideal time to complete a project.

In the WPI academic calendar, operation of a potential Switzerland project center would best fit to D-term. With this model, the preparation term and the project completion term would be cohesive and allow for efficiency and effectiveness.

### **Pre-Qualifying Project and ID 2050**

Before students complete an off-campus IQP, there are two preparation courses they must take. One course, ID 2050, is a social science research course, introducing students to research designs, methods, and analysis techniques used to complete their IQP. The other course, Pre-Qualifying Project (PQP), is a country specific cultural course.

Since the ID 2050 curriculum is uniform and well established, our recommendations will be for PQPs cultural components. We would highly recommend incorporating language, cultural differences, and travel preparation into the curriculum.

### **Language**

After no prior study of German, we experienced some discomfort when we first traveled in Switzerland. Although there is a large microcosm of English speakers in Zurich, in adjacent communities, where we lived and spent our time, the use of English was less common. Throughout Switzerland, almost everyone speaks Swiss German, a regional dialect of traditional German.

Even those who have proficient German language skills will have difficulty understanding Swiss German. We recommend that basic Swiss German be taught. Important lessons would include basic safety, transportation, directions, dining out, and grocery shopping. If students carry a basic understanding of these phrases, or at least able to use a reference or phrase book, they will feel more comfortable interacting in daily situations.

### **Cultural Differences**

Before arrival in Switzerland, it is important that they learn about common Swiss etiquette. Learning this will help development of reasonable expectations, while also preparing them relevant scenarios.

Though Swiss culture is similar to American culture, students should be aware of a few cultural distinctions. Ideally, for PQP, the professor should either be familiar with Swiss culture or be sufficiently prepared to organize the cultural preparation.

### **Travel Preparation**

We highly recommend that students do travel preparation on transportation and communication. Extensive preparation is not necessary, but doing some preliminary research and making some important decisions before arriving will allow for a smoother transition.

By researching travel passes and determining which will best fit their needs before arriving in Switzerland, students can purchase the pass immediately and focus on other

things. The detail necessary to make an informed decision about travel passes are available in the “Local Transportation” section of this report.

Students should also consider the telecommunication options available and decide whether or not they will obtain a phone abroad. Information on these options is available in the “Cellphones” section of this report. This information can help students determine if they should purchase a phone in Switzerland or while in the US.

### **Project Center Organization**

During consideration of the Switzerland center type, we identified three models, an IQP only, MQP only, or combined IQP and MQP center. Based on our research and contact with potential contact sponsors, we determined all of these models are viable; however, our recommendation is to initially open an IQP center followed by the opening of an MQP pilot site.

After meeting with organizations in Switzerland, we can confidently affirm that there is a high interest in sponsoring IQPs right away. Due to this flux of interest, the market opportunity exists and should be capitalized on.

While the IQP center becomes firmly entrenched and the WPI brand gains recognition in Switzerland, we suggest a more detailed strategy of MQP center implementation be under research and development. Out of several interested, potential MQP sponsors the opportunity and interest presented by Hoffman-La Roche (Roche) should be a high priority to reciprocate. Roche, a global leader in pharmaceutical research and diagnostics, already has experience with WPI students and MQPs through its subsidiary, Genentech,

in Nutley, New Jersey. Since a foundation and mutual understanding already exists between WPI and Roche, the probability of success for MQPs at Roche's Basel headquarters seems high.

While not the direct objective of an MQP center, potential funding from MQP sponsors could help defray the costs to WPI of running the IQP center in future years.

Due to the wide variety of interest already present from potential IQP sponsors, we would recommend an immediate move from WPI to establish an IQP center. Following this center, an addition of a pilot MQP program, possibly with Roche, could add almost instant value for both WPI and its students. The opportunity exists for the combined IQP and MQP center to thrive in an environment where the high caliber of student projects and WPI brand development can generate more interest. The implementation for this model is outlined more in the following Distributed Model and Three-Phase Plan.

### **Distributed Model**

For a project center in Switzerland, we would highly recommend that a distributed model be implemented, especially for the IQP center. This model would have the students divided into multiple living groups based out of different cities. There are many important reasons why this distributed model would help the Switzerland project center function.

Logistically, it makes sense to divide students between two or three locations. Because of the difficulty of finding housing for large student groups, having six or seven students housed in a region is much more viable than finding accommodations for 21. Since the

projects students would be completing are distributed throughout Switzerland, the students should also be distributed regionally based on their projects.

Although we do recommend dividing students in to living groups, it is important that the groups are still large enough for students to feel connected to each other. By keeping living groups to a minimum size of six students, or two project groups, students can be assured that they will not be isolated with their own project group. By having at least one other group to socialize and live with, students can have the important distinction between work and home life.

### **Three-Phase Plan**

Since effective and efficient project center integration is imperative to the overall sustainability of the center, we have created a realistic, detailed timeline of this methodical process in a three-phase plan. The plan presents two main timelines, the advisor sponsor dynamic and project center development, over a three-year span, in phase one, two, and three.

#### **Phase I**

Initially, Phase I (Figure 7) started with the first part of the Zurich Pilot IQP Program in Spring 2013, specifically with this feasibility analysis determining sustainability of a Zurich based project center. Among other findings, the analysis identified five sectors, including a number of interested, potential sponsor organizations.

In order for continued growth of a potential project center in Switzerland, the potential sponsors must be developed further. Late Summer 2013, with the context of finding

sponsors for the Pilot Program Part II, the faculty advisor would re-engage highly interested organizations. The advisor's focus would likely be on the academic sector, where an immediate interest in IQPs was present. Maintaining the dialogue with Roche, with respect to future MQP sponsorship, is also expected.

Throughout the feasibility team's seven-week on-site investigation, sectors and organizations that were light on interest were deferred, but not eliminated. Some organizations were simply not available to meet with in the scope of seven weeks. We would recommend for the advisor to approach these interested, but unexplored organizations (i.e. Nestlé, Stryker, and ABB Group).

After meeting with potential sponsors, the general project ideas and logistics would be finalized early in the fall semester with specifics coming later. A target of six to seven projects is set for Spring 2014.

In preparation for departure to Switzerland, students would begin their preparation term, including ID 2050 and PQP. In parallel to teaching PQP and other academic courses, the advisor would contact potential sponsors ahead of their time in Switzerland. By establishing contact from WPI, the advisor would be able to organize meetings in advance, increasing flexibility for potential sponsors and the probability for meeting.

Concurrent to Phase I, an internal search at WPI would start, for a future co-advisor for the Switzerland project center, should it be established.



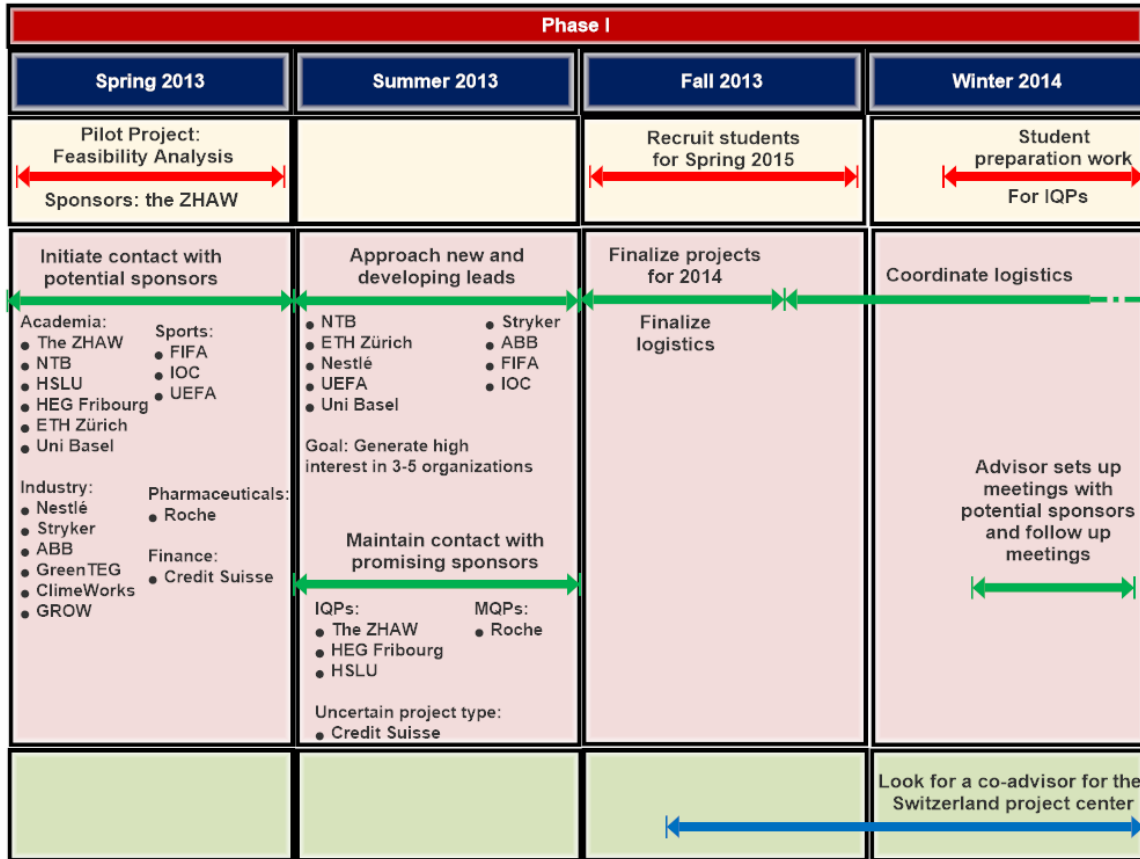


Figure 7: Phase I

## Phase II

In Phase II (Figure 8), the second part of the Pilot Program will commence, with the introduction of the distributed model for 21 new IQP students. As previously explained, the distributed model would allocate students throughout Switzerland, in close proximity to their projects. Based on high sponsor interest, Wädenswil, Fribourg, and Lucerne are the most likely locations for project completion. Students accepted for part two, will be conducting their project work at the ZHAW, HEG Fribourg, or HSLU and will be organized into three living groups, one in each of the locations.

Similar to the advisor sponsor timeline in Phase I, the advisor will meet with sponsors that were contacted from WPI in Winter 2014. The advisor will continue to develop relationships with potential sponsors, but will have a special focus into MQPs.

Preparation for the Pilot MQP Program in Spring 2015 would begin in early Fall 2015. During the advisor's visit to Switzerland, potential MQP sponsors should be further developed to be ready for the program. It is possibly that a MQP program in Basel, with Roche, be started premature of the Spring 2015 target, due to high interest from both Roche and WPI. If MQPs were to begin earlier than expected, necessary coordination with the sponsor organization and students would need to occur.

Also in Fall 2015, dialogue between the IGSD must continue about the establishment and transition of the Switzerland project center. This process would include the integration of the Switzerland center into IGSD and the appointment of a center director, who would oversee the operation on behalf of IGSD.

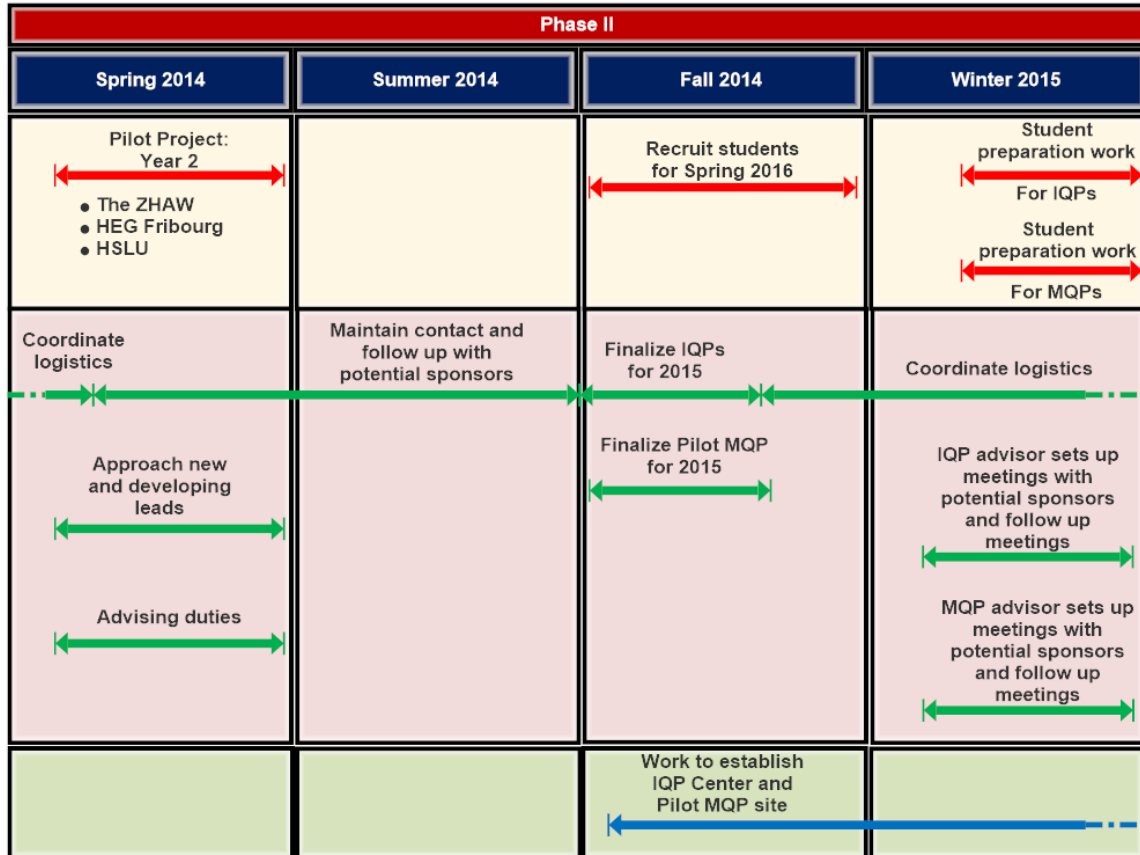


Figure 8: Phase II

### Phase III

Lastly, in Phase III (Figure 9), the IQP center will be in its first year of IGSD operation, after establishment for Spring 2015, meaning a full-time advisor will be present at the project center throughout project completion. Changes could be made to improve the distributed model after the pilot program implemented it in Spring 2014.

Immediate IQP expansion in the academia sector could be achieved through Uni Basel (Basel) or NTB (Buchs). Expansion outside academia, could progress with new leads gleaned by the advisor or by developing one of the previously engaged sponsors (i.e Nestlé, Credit Suisse, or Stryker). Once the distributed model is firmly integrated into the

identity of the IQP center, then projects in different geographical locations will not curb development rather they will enhance it.

In Spring 2015, the Pilot MQP Program will operate parallel to the IQP center. Further dialogue and coordination is necessary to secure a pilot MQP sponsor(s); however, through the feasibility analysis we identified Roche as an interested potential sponsor. We strongly recommend follow-up with Roche as WPI students work with their subsidiary, Genentech, in a similar model. We also recommend that the coordination for the IQP center and Pilot MQP Program be done separately with some collaboration, possibly by two co-advisors so that the appropriate amount of consideration can be applied to each.

Throughout the duration of the Pilot MQP Program and after its first trial, the potential MQP center should start to develop and identity. Usually, MQP centers are associated with certain majors or fields of study, meaning that the projects offered are only for a particular major. Because the Pilot MQPs may be completed with Roche as a sponsor, it seems logical to evaluate the potential MQP center as a life sciences and biotechnology center first. Other alternatives for center identity could surface as bonds are developed with organizations, in the five sectors, throughout Switzerland.

At the conclusion of the Spring 2016 term, the IQP and Pilot MQP center will continue to develop after their first year of parallel operation. The target for project center distribution that this feasibility study recommends as a benchmark is a 60-30-10 percent split of IQPs, MQPs, and inter-organization collaboration respectively.

Since the IQP center was established first, it's logical that more growth has occurred. The broad nature of IQPs also allows the project to be varied across the five sectors previously identified. We project the MQP target at 30 percent because the infancy of MQPs in Switzerland. The Pilot Program would have just come to a conclusion and further development would be recommended. Lastly, the collaborative projects target is 10%, including faculty and student project work.

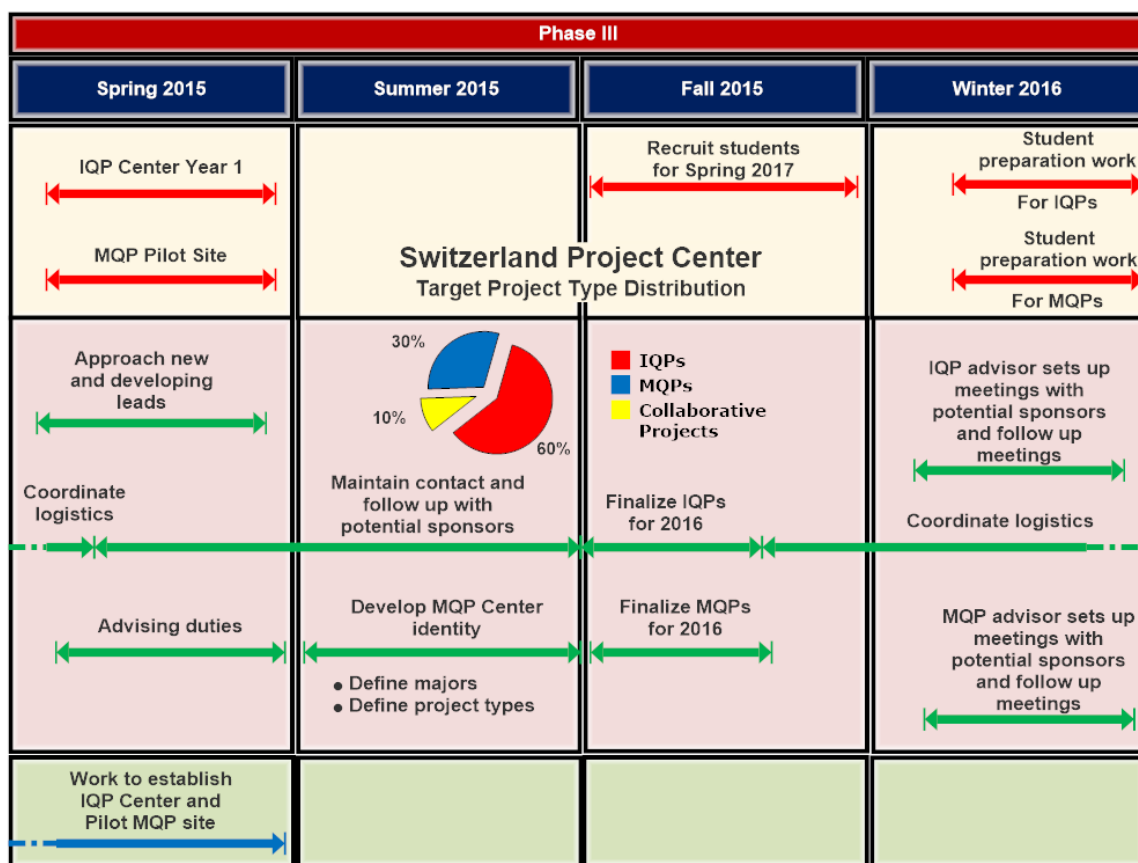


Figure 9: Phase III

Phase III continued (Figure 10), displays two important advancements not captured in the other phases. The first advancement is the view into the combined center's self-sustaining process. By this juncture, Switzerland will have both an IQP and MQP center. Because of

the advisor work early on in Phase I and II, to maintain and develop relationships with sponsors, the amount of projects offered yearly should be self-sustaining. More projects will repopulate the pipeline every year and less advisor nurturing will be necessary.

After establishment of both the IQP and MQP center, WPI will be able to shift its gaze and begin exploring other opportunities in the adjacent countries, including Germany, France, and Italy. The two centers in Switzerland will serve as a platform for continued work throughout the country as well as a launching point into Europe.

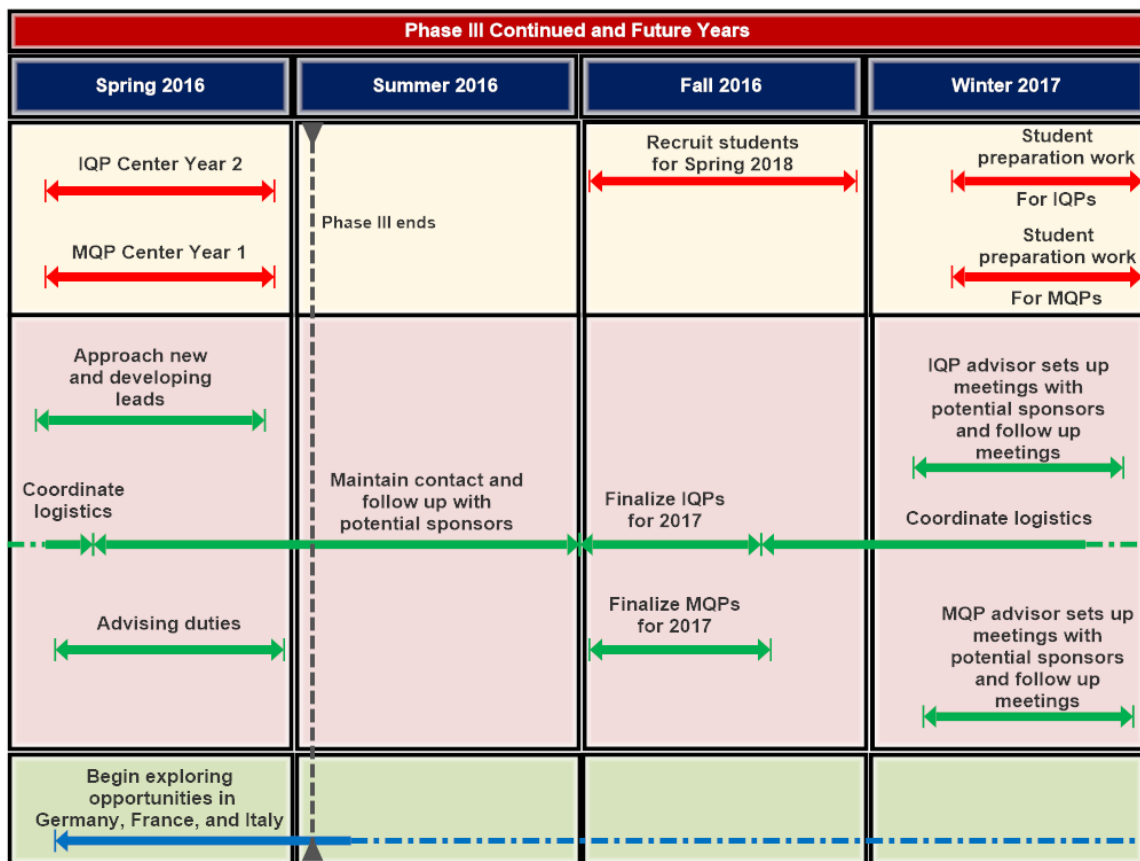


Figure 10: Phase III continued

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## Appendices

### Appendix A: IQP Categories

These are the 13 main divisions that most IQP projects fall into, as illustrated by the WPI Undergraduate Catalog 2013-14.

- Division 41: Technology and Environment
- Division 42: Energy and Resources
- Division 43: Health Care and Technology
- Division 44: Urban and Environmental Planning
- Division 45: Science and Technology- Policy and Management
- Division 46: Social Studies of Science and Technology
- Division 47: Safety Analysis and Liability
- Division 48: Humanistic Studies of Technology
- Division 49: Economic Growth, Stability and Development
- Division 50: Social and Human Services
- Division 51: Education in a Technological Society
- Division 53: Law and Technology
- Division 54: Historic and Artistic Preservation Technology

### Appendix B: Off-Campus IQP Centers

The following is a list of the existing off-campus IQP centers, according to the WPI Undergraduate Catalog 2013-14.

- Bar Harbor, ME
- London, England
- Boston, MA
- Ifrane, Morocco
- Moscow, Russia
- Cape Town, South Africa
- Nantucket, MA
- San Juan, Puerto Rico
- Tirana, Albania
- Venice, Italy
- Washington, DC
- Worcester, MA
- Bangkok, Thailand
- Hong Kong, China
- Wellington, New Zealand
- Copenhagen, Denmark
- San Jose, Costa Rica
- Melbourne, Australia

- Santa Fe, NM
- Windhoek, Namibia
- India

## **Appendix C: Off-Campus MQP Centers**

The following is a list of the established off-campus MQP centers according to the WPI Undergraduate Catalog 2013-14.

- China (various cities)
- Moscow, Russia
- Osaka, Japan
- MIT Lincoln Laboratory, MA
- MITRE, Bedford, MA
- Microsoft, Cambridge, MA
- Panama City, Panama
- Shanghai, China
- Wall Street, NY & London
- Gallo, Modesto, California
- Nancy, France
- Silicon Valley, CA
- WPI-Stanec
- Budapest, Hungary

## Appendix D: IQP Application Data for 2009-2010

site	term	09-10 apps	# spots	ACC
Washington	b	6	28	32
Worcester	b	3	6	10
Zurich	b			
Venice	b	45	28	28
Cape Town	b	38	24	27
Nantucket	b			
San Jose	b	50	28	28
Bangkok	c	34	24	27
London	c			
Worcester	c	5	16	9
Hong Kong	c	30	24	24
Melbourne	c	15	12	16
Boston	d	11	28	28
Copenhagen	d	46	15	15
London	d	34	28	28
Melbourne	d	36	26	24
San Juan	d	33	26	26
Windhoek	d	23	24	24
Worcester	d	2	16	10
London	e	14	24	21
San Jose				
Venice				

## **Appendix E: Sample IQP and MQP Abstracts**

### **Copenhagen, Denmark -- IQP**

#### ***A Catalog of Physical Activities for Visually Impaired Youth***

By: Michael Ardito, ME; Justine Jenna Roberts, BE

Advisors: Zeugner, John F., HU

Date: 2007-05-03

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-050307-055217/>

Abstract:

Among blind and partially sighted people, there is a tendency to lead a more sedentary life. In order to encourage a more active, healthier lifestyle, this project, sponsored for the Videncenter for Synshandicap in Copenhagen, Denmark, created a catalog of physical activities for visually impaired youth. The catalog also contains suggestions for adapting new games and provides other resources that parents, educators, or coaches can consult. The catalog was published by the Videncenter for Synshandicap.

#### ***Revitalizing Recycling in Denmark***

By: Celena H Dopart, AE; Stephanie Elaine Post, BC; Erik C Silva, ECE

Advisors: Looft, Fred J., EE

Date: 2011-05-05

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-050511-093705/>

Abstract:

Denmark is internationally considered a leader in environmentalism and promotes a comprehensive, organized waste management plan. However, household recycling rates are significantly lower than overall recycling rates for the country. In order to raise household rates, we collaborated with Miljøpunkt Norrebro in Copenhagen, Denmark to study the application of psychological factors to an interactive recycling program. Based on our research and results we determined that convenience and information are the most important factors of recycling behavior, followed closely by personal norms and incentives. These results were used to create recommendations for an interactive recycling station and an engaging, informative website, to provide a sound revitalization of Norrebro's recycling system.

### **Cape Town, South Africa -- IQP**

#### ***Design and Construction of a Communal Laundry Station in Monwabisi Park, Cape Town***

By: Lauren Nicole Alex, ME; Jessy Lee Cusack, ME; Augustina Irene Mills, MIS;

Alejandro Ernesto Sosa-Boyd, CE

Advisors: Jiusto, J. Scott, ID; Weininger, Stephen J., CH

Date: 2007-12-15

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-121507-102207/>

Abstract:

Located in Khayelitsha, an informal settlement outside of Cape Town, South Africa, the Indlovu Centre seeks to promote community development through ecologically mindful practices. Our group worked with the community to design and build a communal laundry facility to help alleviate the labour-intensive task of washing. In keeping with the ideas of permaculture and sustainability central to the planned development of an Eco-Village in all of Monwabisi Park, rainwater harvesting and an irrigation system were integrated for a final design capable of operating with no input of municipal water and no emitted waste.

***Adapting Sustainable Urban Drainage Systems to Stormwater Management in an Informal Setting***

By: Andrew Z Keating, CS; Andrew K Labak, CM; Valentina S Polyakova, BE

Advisors: Jiusto, J. Scott, ID; Hersh, Robert, ID

Date: 2010-12-16

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-121610-134208/>

Abstract:

A major problem in the informal settlement of Monwabisi Park, Cape Town, is flooding caused by the low-lying topography and lack of stormwater management systems. Conducting a case study and working with local residents, we created a guidebook that analyzed the physical and social conditions underlying flooding problems, and the current interventions used by residents. In addition, the guidebook demonstrates specific Sustainable Urban Drainage System methods that we have adapted to an informal community setting.

**Budapest, Hungary -- MQP**

***A Open Source Natural Language Processing***

By: Kara Bernadette Greenfield, ID; Sarah E Judd, CS

Advisors: Sarkozy, Gabor N, CS; Selkow, Stanley M., CS

Date: 2010-04-28

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-042810-055257/>

Abstract:

Our MQP aimed to introduce finite state machine based techniques for natural language processing into Hunspell, the world's premiere Open Source spell checker used in several prominent projects such as Firefox and Open Office. We created compact machine-readable finite state transducer representations of 26 of the most commonly used languages on Wikipedia. We then created an automata based spell checker. In addition, we implemented a transducer based stemmer, which will be used in the future of transducer based morphological analysis.

## *Vulnerability Assessment in the Cloud*

By: Michael D Ayenson, CS; Andre Pierre Guerlain, CS

Advisors: Sarkozy, Gabor N, CS; Selkow, Stanley M., CS

Date: 2010-04-28

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-042412-130544/>

Abstract:

In this study, we reassess vulnerability assessment in the Cloud and develop the open-source 'cvaFrame' framework. This framework reports to the cloud administrator, vulnerabilities and exploits discovered in virtual images. Our contribution to the cloud vulnerability assessment research community is our framework. We build our framework on top of existing tools like Metasploit and OpenVAS and implement it in an existing cloud service 'OpenNebula', to prove that our system works. We tested our software in a production cloud and it was able to find vulnerabilities and exploits hiding in dormant virtual machine images. At this date, we believe we are the first to develop an open-source framework that performs vulnerability assessment within the cloud on dormant images.

# Appendix F: Housing Checklist

NAME OF PERSON COMPLETING FORM: \_\_\_\_\_ DATE and TIME of VISIT: \_\_\_\_\_  
 ADDRESS: \_\_\_\_\_

For each topic please check off the appropriate box (yes/no) and fill in comments where requested.

---

**TOPIC: Fire safety**

	yes	no	comments
multiple clearly marked fire exits	<input type="checkbox"/>	<input type="checkbox"/>	_____
fire extinguishers	<input type="checkbox"/>	<input type="checkbox"/>	
working smoke detectors	<input type="checkbox"/>	<input type="checkbox"/>	
barred windows	<input type="checkbox"/>	<input type="checkbox"/>	
exposed electrical wires	<input type="checkbox"/>	<input type="checkbox"/>	

if yes, which floors? \_\_\_\_\_  
 Where specifically? \_\_\_\_\_

---

**TOPIC: Security**

	yes	no	comments
secure entrances (deadbolt locks)	<input type="checkbox"/>	<input type="checkbox"/>	_____
solid external doors	<input type="checkbox"/>	<input type="checkbox"/>	
locks on all windows	<input type="checkbox"/>	<input type="checkbox"/>	
no broken windows - all function	<input type="checkbox"/>	<input type="checkbox"/>	
screens/storms on all windows	<input type="checkbox"/>	<input type="checkbox"/>	

Describe access: key card, key, concierge/front desk staff, etc. \_\_\_\_\_

any sort of security system in place  Describe what that system is: \_\_\_\_\_  
 peephole at front door

---

**TOPIC: Working appliances (if applicable)**

	yes	no	comments
stovetop	<input type="checkbox"/>	<input type="checkbox"/>	gas or <input type="checkbox"/> electric? if gas, how supplied? _____
oven	<input type="checkbox"/>	<input type="checkbox"/>	
microwave	<input type="checkbox"/>	<input type="checkbox"/>	gas or <input type="checkbox"/> electric? if gas, how supplied? _____
refrigerator	<input type="checkbox"/>	<input type="checkbox"/>	
laundry facilities	<input type="checkbox"/>	<input type="checkbox"/>	if no - how close by? _____
hot water in kitchen	<input type="checkbox"/>	<input type="checkbox"/>	
hot water in bathroom	<input type="checkbox"/>	<input type="checkbox"/>	
landline telephone	<input type="checkbox"/>	<input type="checkbox"/>	
high speed internet	<input type="checkbox"/>	<input type="checkbox"/>	

---

**TOPIC: Neighborhood**

	yes	no	comments
safe surroundings	<input type="checkbox"/>	<input type="checkbox"/>	_____
well lit outside at night	<input type="checkbox"/>	<input type="checkbox"/>	
accessible to public transportation	<input type="checkbox"/>	<input type="checkbox"/>	
access to shopping - for necessities	<input type="checkbox"/>	<input type="checkbox"/>	
access to restaurants	<input type="checkbox"/>	<input type="checkbox"/>	

Describe locale: residential, urban, business district, etc. \_\_\_\_\_

---

**TOPIC: Transportation**

	yes	no	comments
easy access to public transportation	<input type="checkbox"/>	<input type="checkbox"/>	Please indicate how long of a walk: _____
bus line	<input type="checkbox"/>	<input type="checkbox"/>	
metro/subway	<input type="checkbox"/>	<input type="checkbox"/>	
reliable taxi service	<input type="checkbox"/>	<input type="checkbox"/>	
walking distance to sponsor	<input type="checkbox"/>	<input type="checkbox"/>	

---

**TOPIC: Multi-floor building**

	yes	no	comments
working elevator	<input type="checkbox"/>	<input type="checkbox"/>	Please indicate which floors will be used: _____
multiple stairways	<input type="checkbox"/>	<input type="checkbox"/>	
fire escape	<input type="checkbox"/>	<input type="checkbox"/>	

---

**TOPIC: Co-ed apartments**

	yes	no	comments
locks on bedroom doors	<input type="checkbox"/>	<input type="checkbox"/>	_____
locks on bathroom doors	<input type="checkbox"/>	<input type="checkbox"/>	
more than one bedroom	<input type="checkbox"/>	<input type="checkbox"/>	
more than one bathroom	<input type="checkbox"/>	<input type="checkbox"/>	

Indicate # \_\_\_\_\_  
 Indicate # \_\_\_\_\_

---

**TOPIC: Auxiliary Facilities**

Please provide the name, address and proximity to housing

emergency medical services	_____
medical clinic (non-emergency)	_____
dental clinic	_____
mental health facilities	_____
embassy or consulate (if applicable)	_____
fire house	_____
police station	_____

---

**TOPIC: ADA Compliance**

	yes	no	comments
wheelchair accessible	<input type="checkbox"/>	<input type="checkbox"/>	_____
ADA accommodated bathroom & shower	<input type="checkbox"/>	<input type="checkbox"/>	

Print Name \_\_\_\_\_ Print Form \_\_\_\_\_



## **Appendix G: Additional Information on the History of Switzerland**

### **The Origin of Switzerland**

Starting in the 13<sup>th</sup> century, the largely alpine area known as present-day Switzerland was controlled by the Hapsburg family. However, due to association with the Hapsburg lords, the Holy Roman Empire unofficially could control the territories as part of its domain. The Holy Roman Emperor decided to create a trade route, known as the Gotthard pass, across the Alps to connect trade from Northern Europe and Italy. During this process, the Emperor allocated the land along the route to the communities that encompassed it, rather than leave the route to the Hapsburg feudal that had controlled the land in the past.

The seizing of jurisdiction by the Holy Roman Empire upset the Hapsburg lords, who subsequently attempted to regain their lost territories through a series of attacks along the Gotthard pass route. Three valley communities that were centralized along the route created an alliance in 1291 to ensure “perpetual mutual assistance” in resisting the attacks by the Hapsburgs (swissuniversity.ch, 2012). This pact between the three communities in the Alps is widely considered as the foundation of the Swiss Confederacy, later developing into Switzerland. Eventually, the alliance stopped the Hapsburg attacks on the valley and the communities developed over time into states or “cantons” that were members of the new Swiss Confederacy.

### **Four Official Languages of Switzerland**

Since Switzerland’s earlier occupation by the Roman Empire, the original Celtic tribes that lived in the area slowly started to assimilate into Roman life, allowing the use of Latin in their societies (swissuniversity.ch, 2012). As these tribes moved around the alpine regions in Switzerland, Latin culture and language started to become more widespread as distinct Celtic-Latin dialect developed in conjunction.

Eventually, by the fifth century, the Roman Empire’s control over the areas in the Alps began to diminish as the Empire started to slowly collapse. Two Germanic tribes, the Alamanni and the Burgundians, started their migration into several different regions of modern day Switzerland for several reasons. The Alamanni, originally located near the upper Rhine River, moved into the North and East of Switzerland, where they were able to settle peacefully without much resistance from the Roman Empire. The Burgundians, who recently lost a war against the Romans and were subjugated by them, were ordered to the west of the alpine regions as auxiliaries of the Roman army (swissuniversity.ch, 2012).

In the North and East the Alamanni remained loyal to their culture by keeping their traditional Germanic language. Over time this Germanic language in the North and the East developed into a Swiss-German type dialect. However some of the original eastern Celtic communities were able to avoid the Germanic language, brought by the Alamanni,

allowing their language to develop into the Romansh Language. As a result of Roman subjugation, the Burgundians were forced to adopt Latin into their own culture, which later evolved into French. Since the influence of the Roman Empire remained strong in the Southern regions of Switzerland, where a border is shared by Italy, their native languages combined with Latin, creating the Italian language spoken today.

### **Neutrality and Present Day Switzerland**

In the early 16<sup>th</sup> century, the relatively young Swiss Confederacy was defeated by a French coalition in the Battle of Marignano (swissuniversity.ch, 2012). After this defeat the Swiss Confederacy introduced a strong doctrine of neutrality that would curtail any further militaristic, political, or direct economic action with other countries. This neutrality put an end to Swiss involvement in any European conflicts, except for service to the Vatican where members of the Vatican Guard are still Swiss Mercenaries. During the Thirty Years War, the longest and arguably the most destructive in European history, from 1618 to 1648 Switzerland maintained its neutrality, by not getting involved in any conflicts outside of its borders. However, Switzerland did have to defend its borders from foreign assaults, this defensive approach would later be considered as the forerunner of the Swiss “armed neutrality” policy, centuries later in 1815, the Congress of Vienna recognized Swiss Neutrality in the Paris Treatise (swissuniversity.ch, 2012).

Today Switzerland’s neutrality remains protected and in place through their defensive army, which originates from when each canton would send troops to be at the disposal of the old Swiss Confederacy. This system of a defensive army has helped Switzerland stay neutral throughout several global and regional conflicts in history, most notably World War One and World War Two. As a result, many international organizations have moved to Switzerland to be a part of this neutrality. Until recently (2002), Switzerland was not a member of the United Nations and is still not a member of the European Union. Despite it not officially joining international organizations, like the European Union, Switzerland still maintains healthy diplomatic relationships with almost all countries.

The Swiss Federal Constitution in 1848 created the structure of a multi-party federal parliamentary democratic republic, located in Bern (the capital), ordaining the Federal Council of Switzerland as the head of government, while also establishing legislative and judicial type branches. The Federal Council, which serves as the executive branch, consists of eight members, one being the Federal Chancellor, who is elected by the United Federal Assembly for a four-year term (swissuniversity.ch, 2012). The President of the Swiss Confederacy, who is elected on an annual basis, chairs the Federal Council. The Presidents duties are mainly to moderate sessions of the Federal Council and undertake in special ceremonial duties during national events (swissuniversity.ch, 2012).

The Parliament of Switzerland (legislative branch) is divided into two chambers and directly elected by the citizens of Switzerland. The National Council chamber represents the population of the country as a whole, with each canton represented in proportion to the number of its inhabitants (swissuniversity.ch, 2012). The other chamber, the Council

of States, represents the 26 cantons that make up the Swiss Confederacy. Each canton sends two representatives to the Council, except the six former half-cantons, which only send one representative (swissuniversity.ch, 2012). Together the two different chambers are known as the United Federal Assembly when they are in joint session.

Both the National Council and the Council of States elect the judicial branch of Switzerland.

### **Switzerland as a Gateway to Europe**

Coupled with the country's history of neutrality, the central location of Switzerland in Europe has made the country into one of the regional hubs to the rest of Europe. The strategic importance of Switzerland's location is two-fold, making it a regional center for both transportation and commerce.

The intra- and inter-country transportation in Switzerland is made possible in large part to its expansive network of railway transport. It is easy to get around different cantons in Switzerland and more common to do so by rail than any other form of transportation. Travel to the neighboring countries of Austria, France, Germany, Italy, and Lichtenstein is also made possible by Swiss railroad connections with the respective countries. The Swiss Federal Railway system operates rail transport in Switzerland and achieves 95 percent arrivals with less than five minutes delay and 75 percent with less than one-minute delay ("The Company, "). The prompt arrival and departure of Swiss railway transit is crucial to maintaining a large ridership base of 997,000 passengers daily("The Company, ").

The other aspect of Switzerland that has made it a gateway to the rest of Europe is the amount of global commerce and industry that is located in the country. Switzerland's rank among the best in the world in many industries uniquely places it as one of the richest countries in Europe.

The Swiss Federal Institute of Technology in Zurich (ETH Zürich) is consistently ranked as one of the best universities in the world (Bergamin, 2012). UBS and Credit Suisse are two of the world's largest financial institutions in terms of total profit and global presence, generating revenues in 2011 of CHF 29.737 billion and CHF 25.43 billion respectively (UBS, 2011) (Suisse, 2011).

Pharmaceutical companies, Novartis and Hoffman-La Roche are two of the most innovative companies in Switzerland, both rank in the top five among sales in the pharmaceutical industry (David, 2011). Nestlé is the "world's leading nutrition, health and wellness company" (Nestlé, 2013). Many international sporting organizations are headquartered in Switzerland, like the Fédération Internationale de Football Association, in Zurich, and the International Olympic Committee, in Lausanne.

## Climate & Weather

Switzerland, and Zurich in particular, has a climate with four distinct seasons similar to what students experience in Worcester, MA. According to the Lonely Planet travel guide for Switzerland, students will “need to be prepared for a range of temperature, as the mountains create a variety of local and regional microclimates.” The guide continues to say that most of the country has a “central European climate with daytime temperatures around 18° to 28°C in summer and -2° to 7°C in winter.”

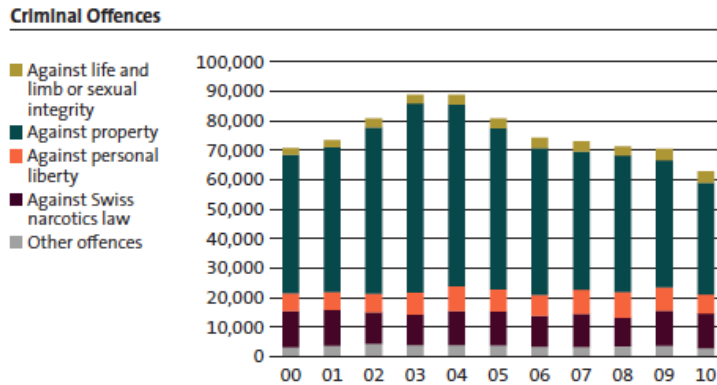
The weather during the student’s stay in Switzerland is dependent on what term the project runs. Switzerland’s summer lasts from June to September, while the winter season starts around the middle of December and ends in the middle of April when the snow begins to melt. Students that complete their project in D-term should expect the weather in early March to be that of winter, while the end of April will be similar to summer. Students should plan to do sufficient research so they can be prepared.

## Safety

When traveling abroad to complete a project with WPI, the most important concern for students and WPI is safety. WPI has various safety standards that must be met before a project site is established as a project center. Even though there are researched standards for all the centers, the IGSD site notes that “a safe and successful off-campus experience does not just occur—it requires careful planning and preparation”(WPI, 2013). Students should research Switzerland before arriving and proactively learn about possible safety risks, if any exist. Students should also review the site-specific *Going Global @ WPI* safety section to learn more about traveling abroad at an off-campus project site.

Switzerland remains one of the safest countries in Europe and the world for tourists. According to the US State Department, “Switzerland has a low rate of violent crime; however, [...] Pick-pocketing and purse snatching are the most common and frequently occur in the vicinity of train and bus stations, airports, and some public parks” (Department, 2011). In Zurich, the main location to be especially vigilant is the airport and railway station, since there is a high concentration of people and petty theft happens every day.

According to Zurich, Switzerland’s Criminal Offences Statistics for the year-end 2010 (Figure 10), the total number of criminal offences per year is just over 60,000. This is very low for a city that has a population of 376,008 people. Around 40,000 of these crimes were related to property, while less than 5,000 crimes were committed against life and limb or sexual integrity.



**Figure 11: Criminal Offences in Zurich Switzerland**

“The local equivalent to the ‘911’ emergency line in Switzerland is 144 for medical/ambulance services; 117 for the police department; and 118 for the fire department” (Department, 2011). Even though students are traveling to a very safe country, they should always use good judgment when traveling and abide by the local laws in Switzerland.

### Switzerland’s Healthcare System

Throughout Europe, Switzerland is renowned for its high-quality medical and paramedic services (Expatica, 2012). Similar to the United States, the healthcare system is very modern and every citizen has at least basic access. According to the Switzerland tourism website, “personal travel insurance is strongly recommended, including coverage of personal accident, sickness” (MySwitzerland, 2013).

Besides purchasing additional personal travel insurance, students that study in Switzerland must either purchase compulsory coverage in Switzerland or have a comparable insurance policy in their home country that will function in Switzerland since “visitors to Switzerland for three months or less may be covered by a reciprocal agreement between the home country and Switzerland, or by a private health insurance scheme” (Expatica, 2012). Prior to arriving in Switzerland, students should research if their current coverage in the United States is applicable to coverage in Switzerland.

In the public sector of for medical expenditure, the country “spends more than 10 percent of its GDP on health” (Expatica, 2012). As a result of this large public investment in healthcare, Switzerland has the most up-to-date technologies and facilities.

## Outline of Prominent Costs and Historic Exchange Rate

Table 17: Outline of Prominent Costs for Project Centers

<i>Project Center Location</i>	<i>Total Cost</i>	<i>Estimated Cost of Housing</i>		<i>Estimate Airfare</i>	
<b>Windhoek, Namibia</b>	\$ 5,900.00	\$ 1,900.00	(32%)	\$ 2,600.00	(44%)
<b>Bangkok, Thailand</b>	\$ 4,200.00	\$ 1,150.00	(27%)	\$ 1,800.00	(43%)
<b>Cape Town, South Africa</b>	\$ 4,950.00	\$ 1,700.00	(34%)	\$ 1,600.00	(32%)
<b>Hong Kong, SAR, PRC</b>	\$ 5,900.00	\$ 2,000.00	(34%)	\$ 1,900.00	(32%)
<b>Melbourne, Australia</b>	\$ 7,200.00	\$ 3,300.00	(46%)	\$ 2,300.00	(32%)
<b>Venice, Italy</b>	\$ 5,625.00	\$ 2,825.00	(50%)	\$ 925.00	(16%)
<b>San Jose, Costa Rica</b>	\$ 3,897.00	\$ 2,072.00	(53%)	\$ 575.00	(15%)
<b>Copenhagen, Denmark</b>	\$ 7,000.00	\$ 3,800.00	(54%)	\$ 1,000.00	(14%)
<b>San Juan, Puerto Rico</b>	\$ 4,402.00	\$ 2,222.00	(50%)	\$ 550.00	(12%)
<b>London, England</b>	\$ 6,775.00	\$ 3,300.00	(49%)	\$ 750.00	(11%)
<b>Washington, D.C.</b>	\$ 5,200.00	\$ 3,000.00	(58%)	\$ 450.00	(9%)
<b>Boston, MA</b>	\$ 3,750.00	\$ 2,300.00	(61%)	\$ -	
<b>Worcester, MA</b>	\$ -	\$ -		\$ -	

The exchange rate between the Swiss Franc (CHF) and the United States Dollar remains competitive and can be very helpful when assessing the potential cost to students. The European Union banknote (EUR) is also accepted in Switzerland; however, change is given in CHF. It may be advantageous for students to also consider using the EUR if they anticipate traveling to any of the surrounding European Union countries during their stay.

The table below (Table 18) details the historic exchange rates between the USD, CHF, and EUR over the last five years, including most recent rates from 2013. The average historic exchange rate between the USD and CHF is 1.01; meaning one CHF is worth 1.01 USD. The USD has been competitive with the CHF with a highly favorable exchange rate in 2009, where one CHF equaled 0.92 USD. In more recent years the CHF has eclipsed the USD. For example, in 2011 one CHF equaled 1.13 USD. The average historic exchange rate between the USD and the EUR is not as competitive as with the CHF. The high value was in 2012, where one EUR equaled 1.28 USD, while the low

value was in 2008, where one EUR was worth 1.46 USD. Even though the EUR is stronger against the USD than the CHF, the CHF has consistently performed better than the EUR over the last 5-year period.

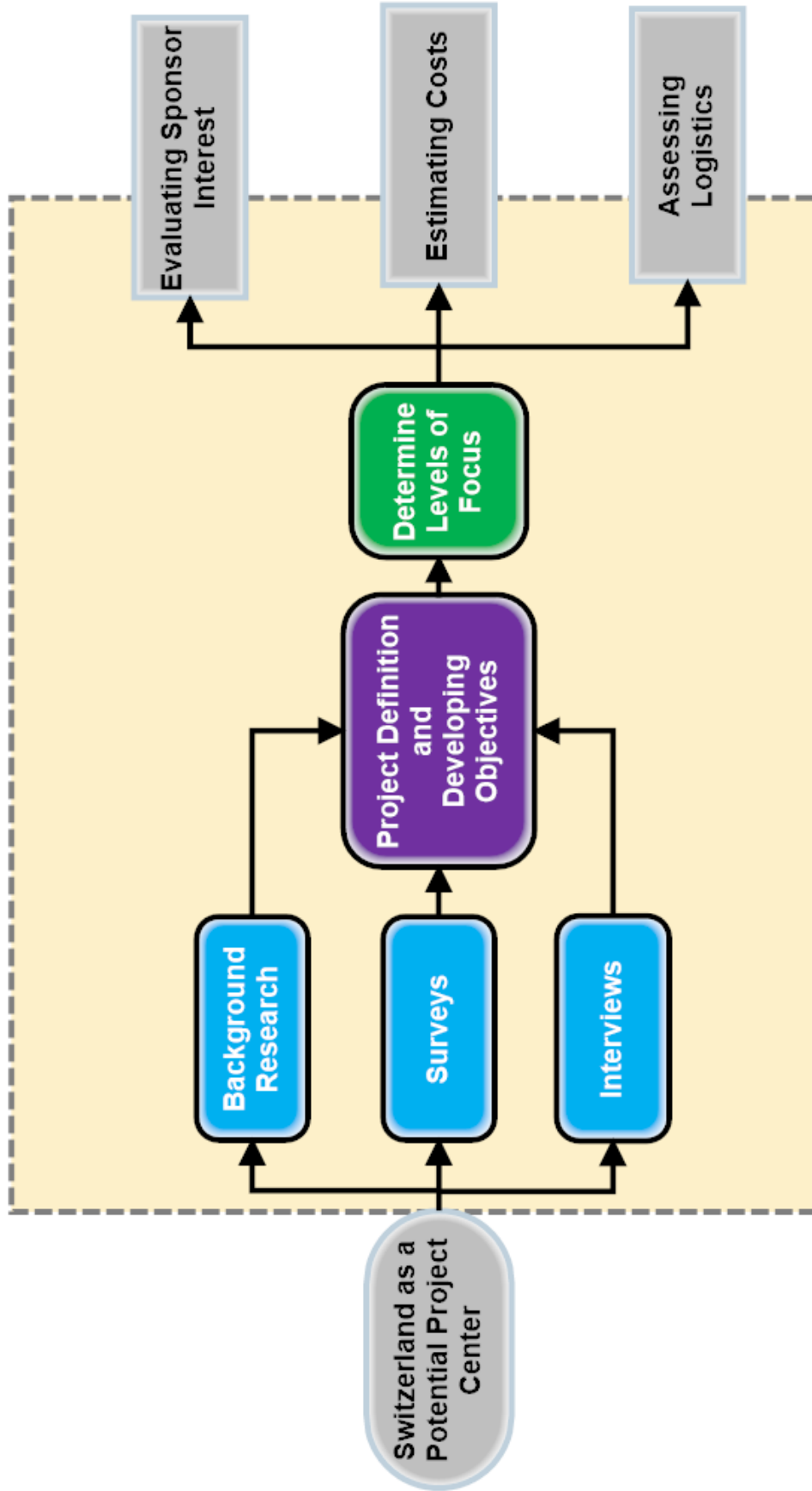
**Table 18: CHF, EUR, and USD Exchange Rates in the Past Five Years**

<b>Year</b>	<b>USD to CHF</b>	<b>USD to EUR</b>	<b>CHF to EUR</b>
2008	0.925799	1.46999875	0.63069525
2009	0.922908333	1.393095917	0.66259125
2010	0.961232667	1.32698375	0.724838083
2011	1.131077167	1.392068333	0.812239083
2012	1.067083	1.28604875	0.829770333
2013	1.07177825	1.31330575	0.8161385
5-year Average	1.013313069	1.363583542	0.746045417

## **Appendix H: Full Page Enlargements of Flowcharts and Gantt Charts**

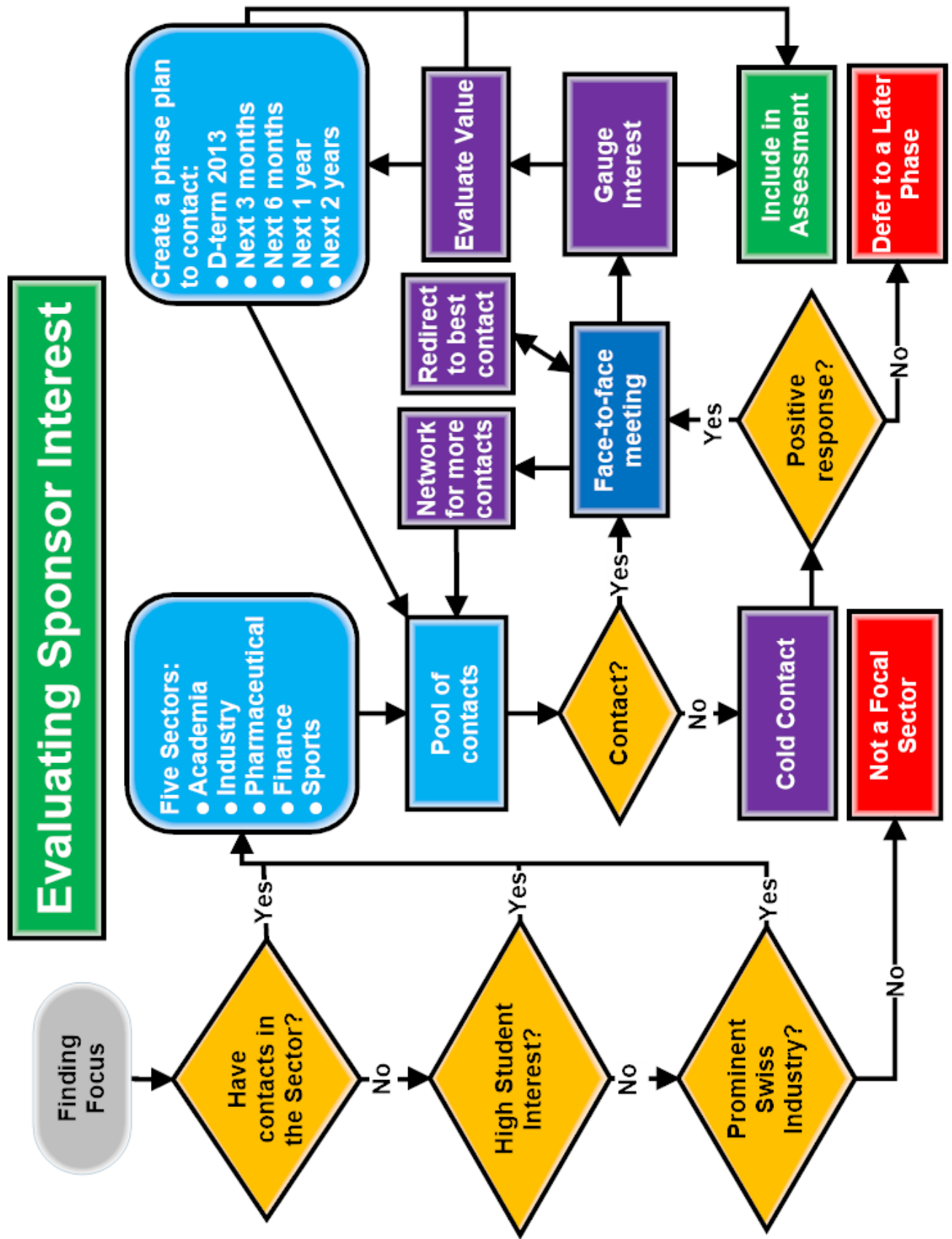
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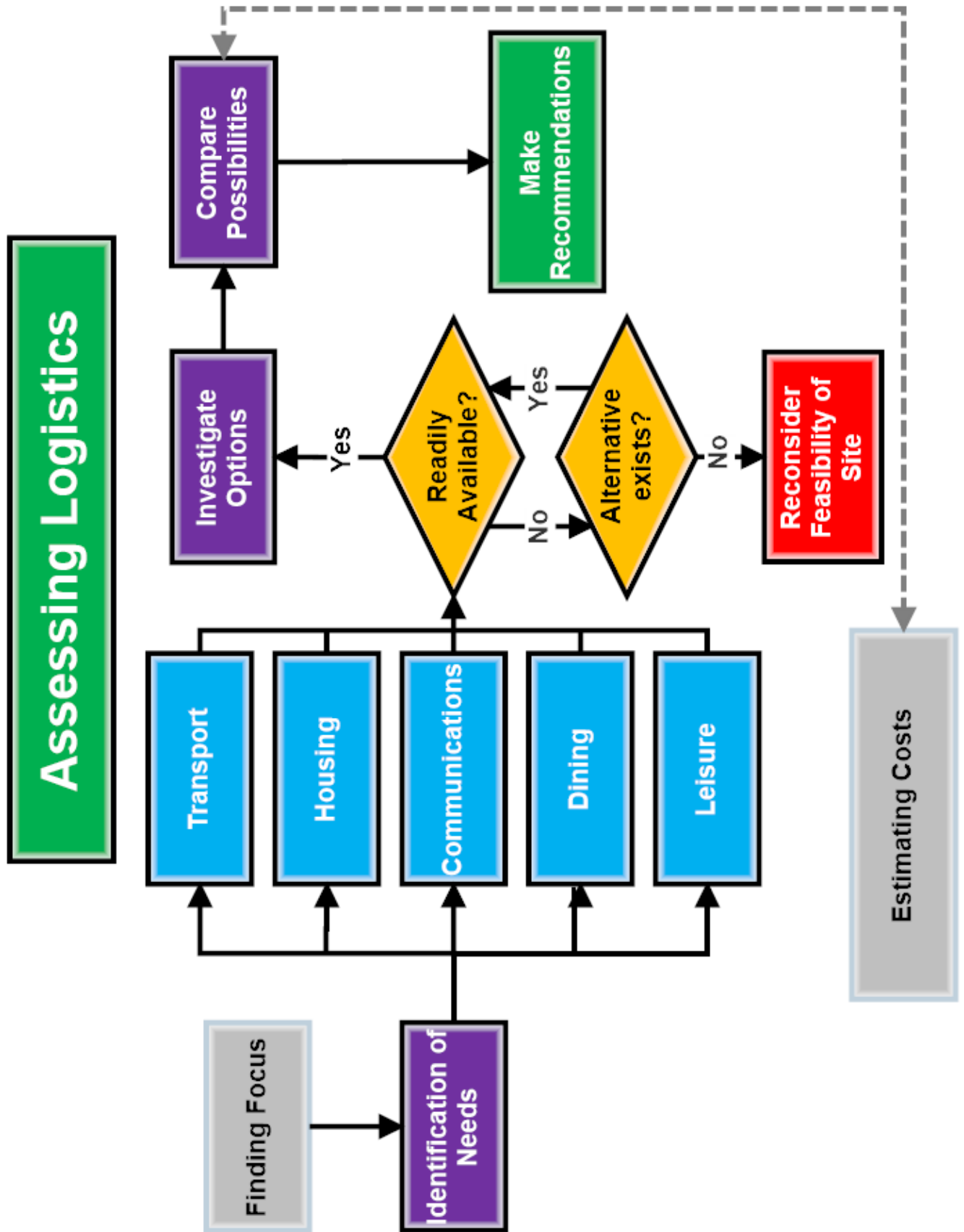
# Finding Focus



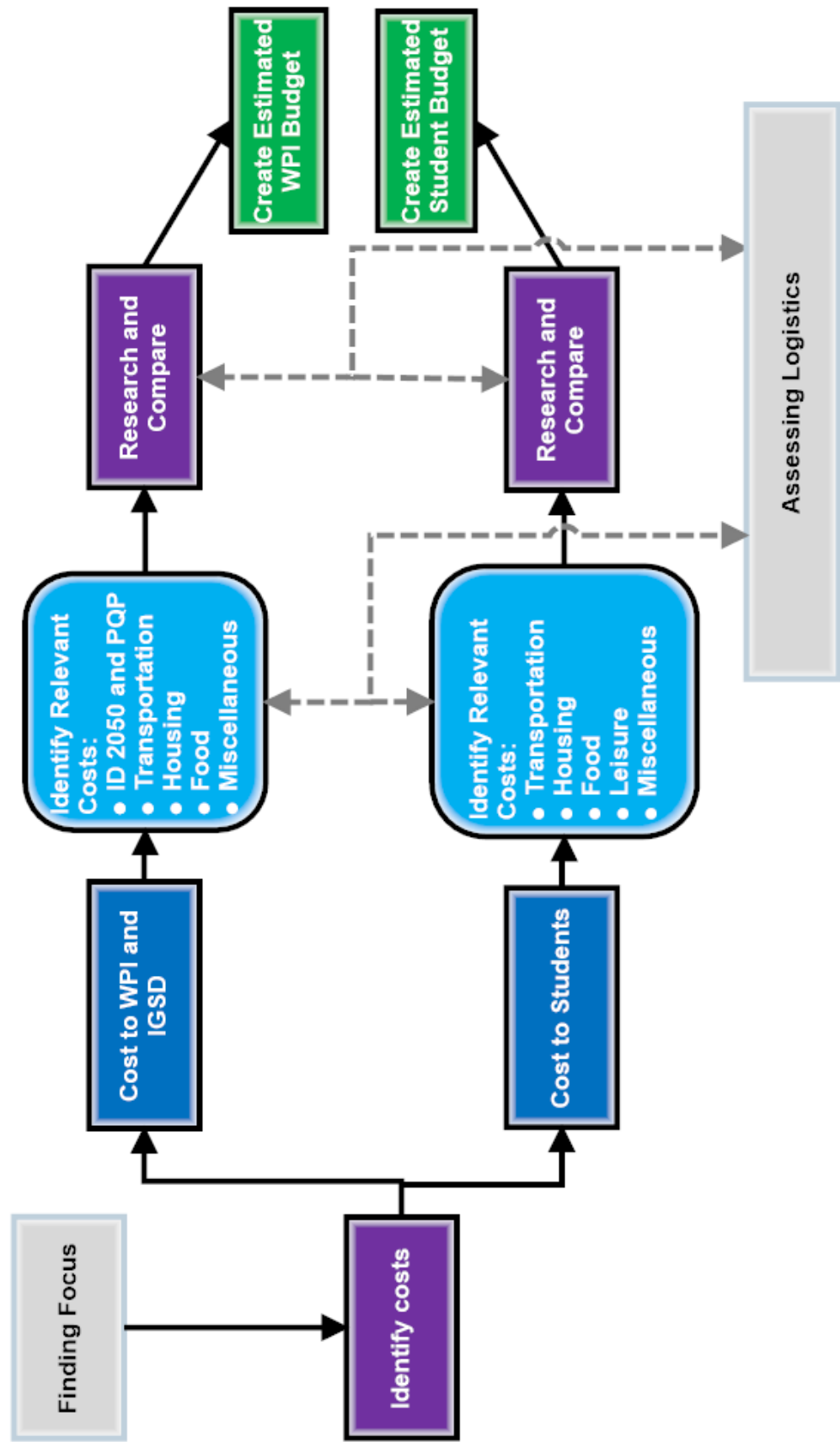
Finding our focus in the seven week preparation period



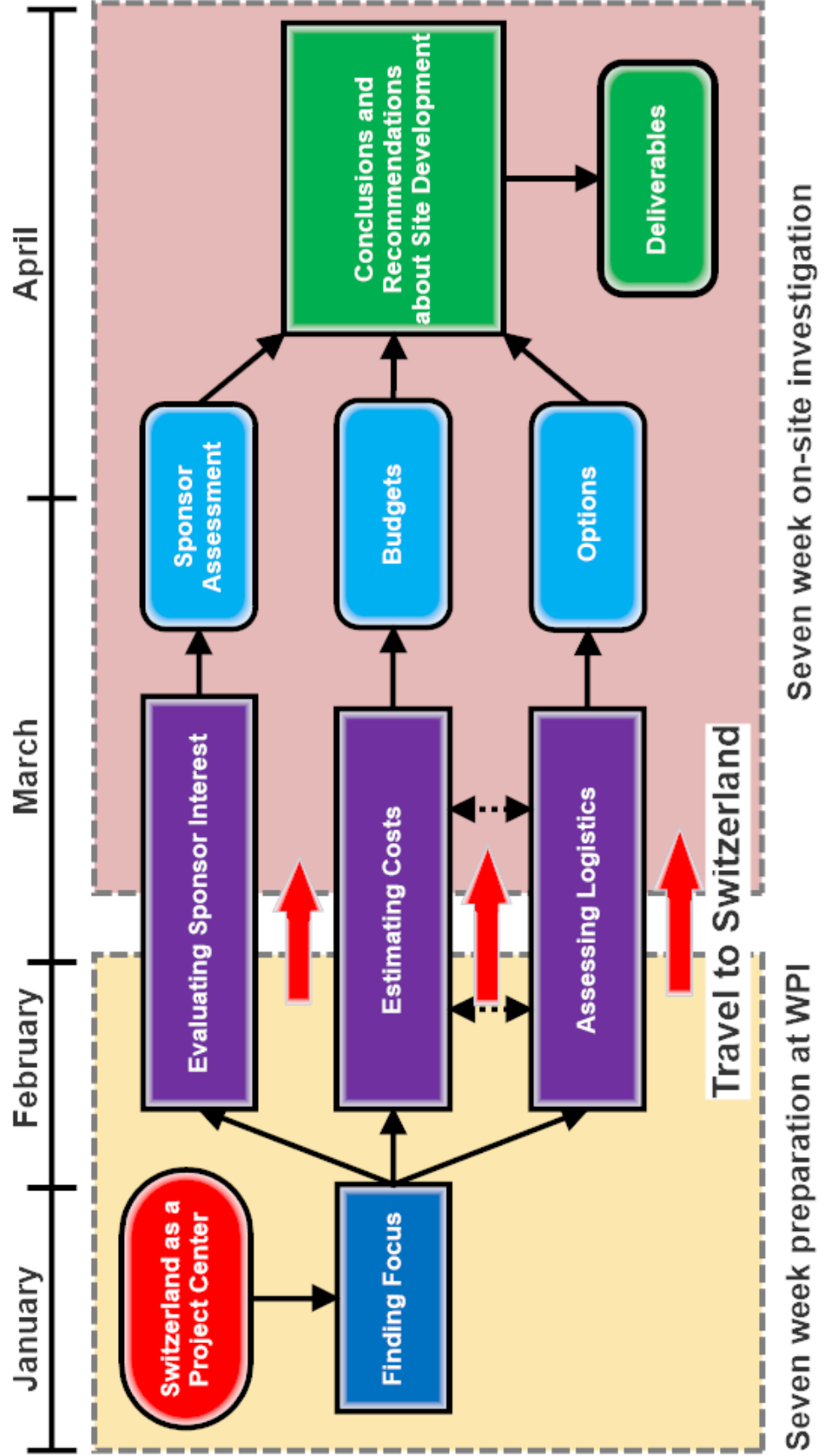


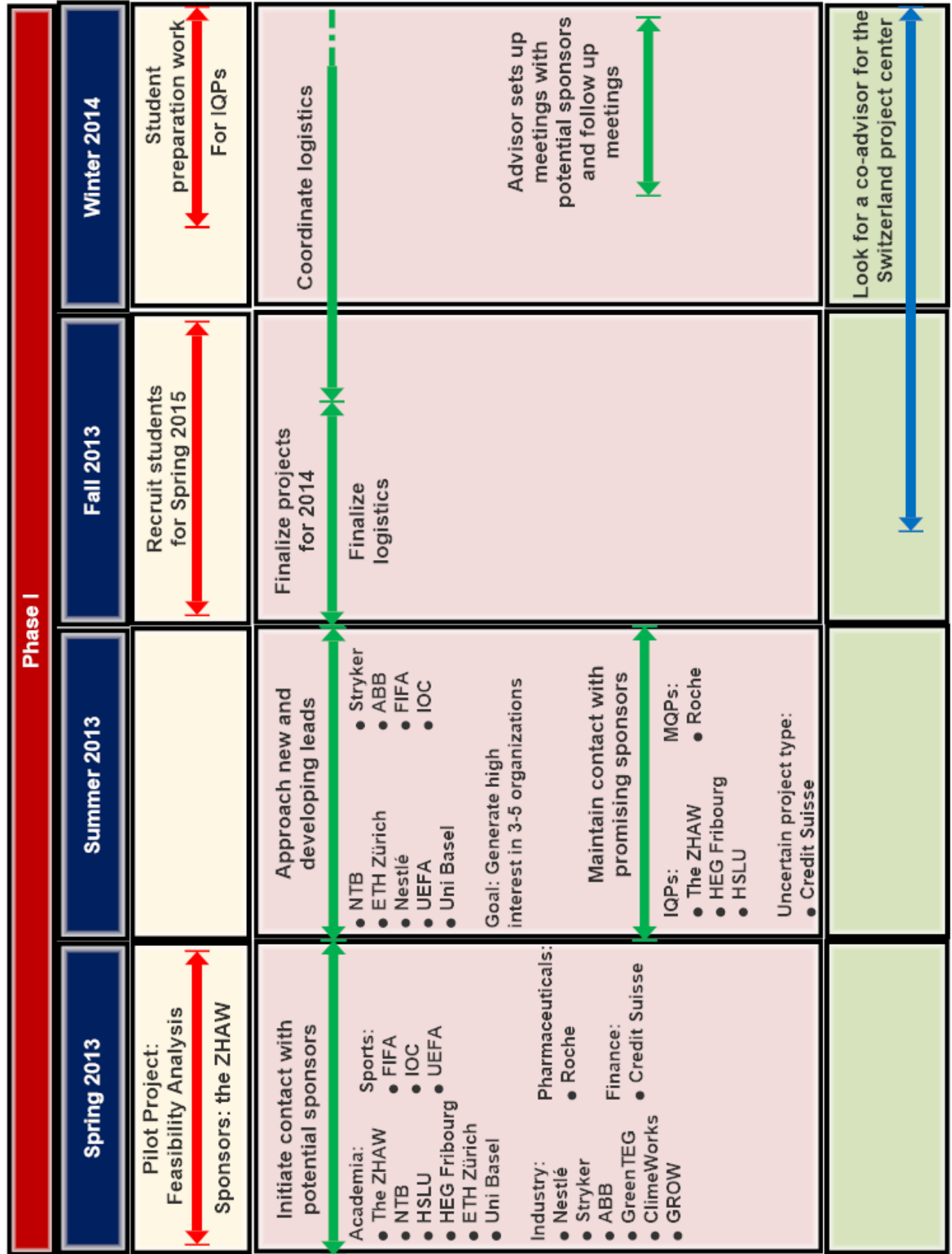


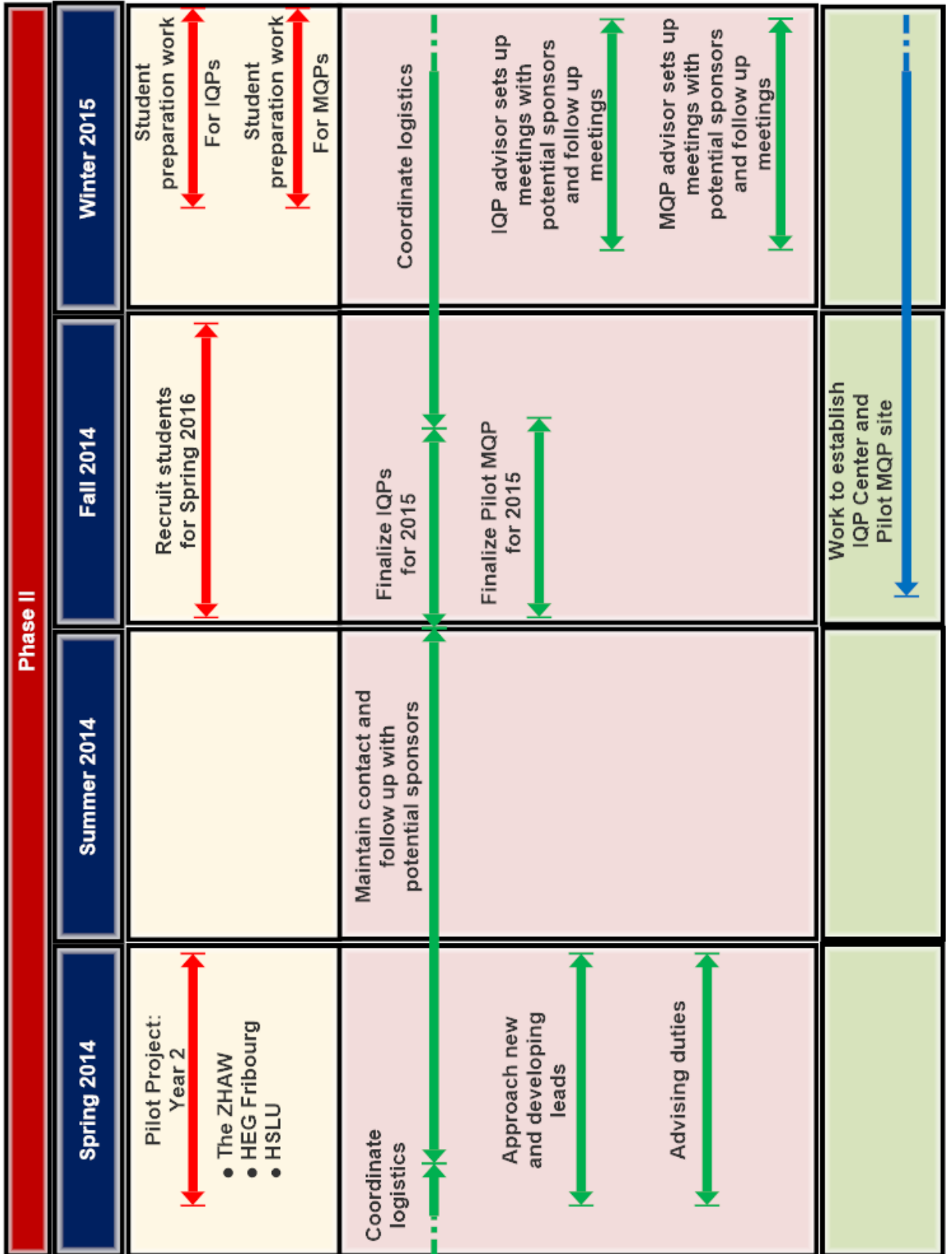
# Estimating Costs

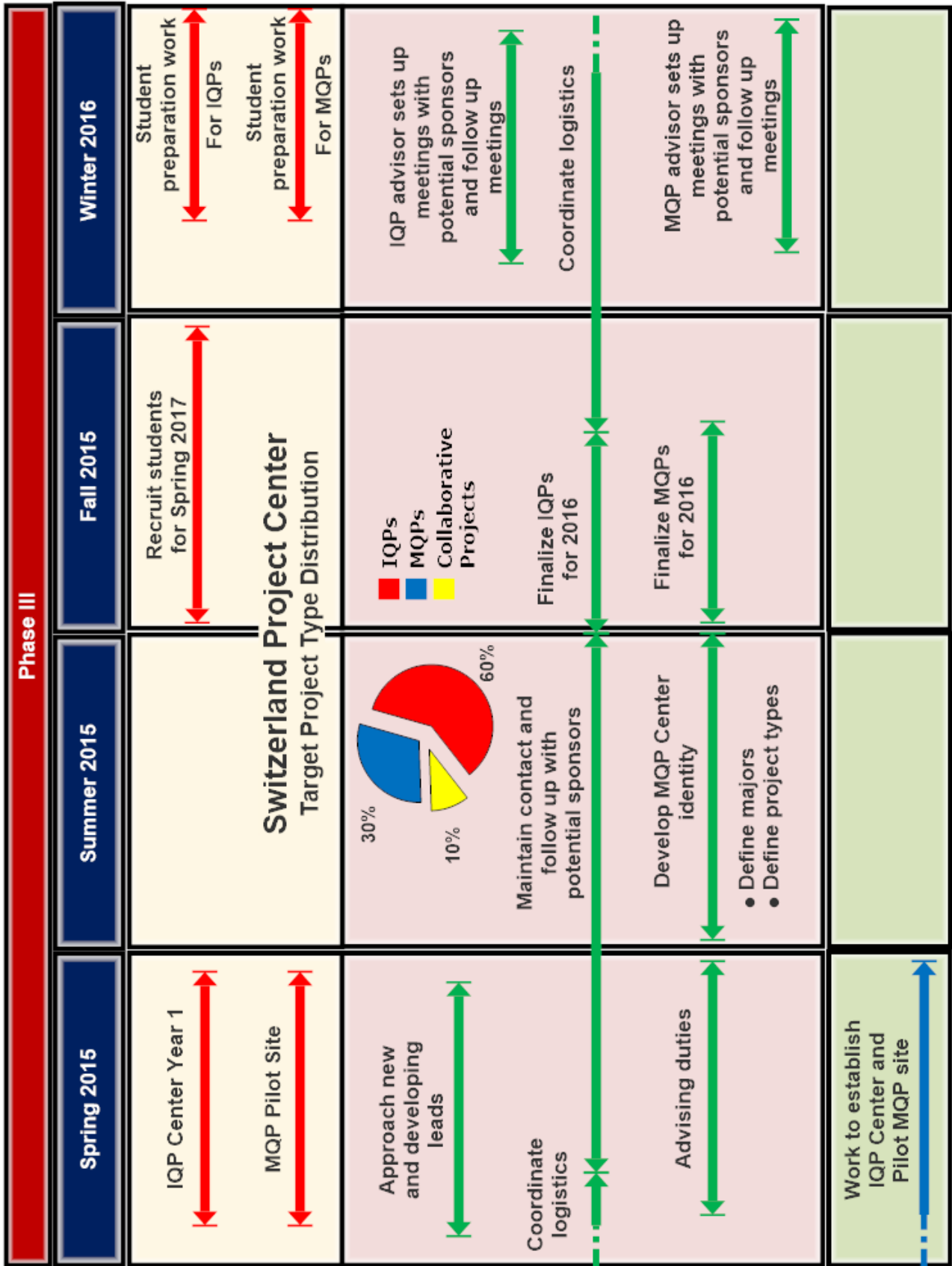


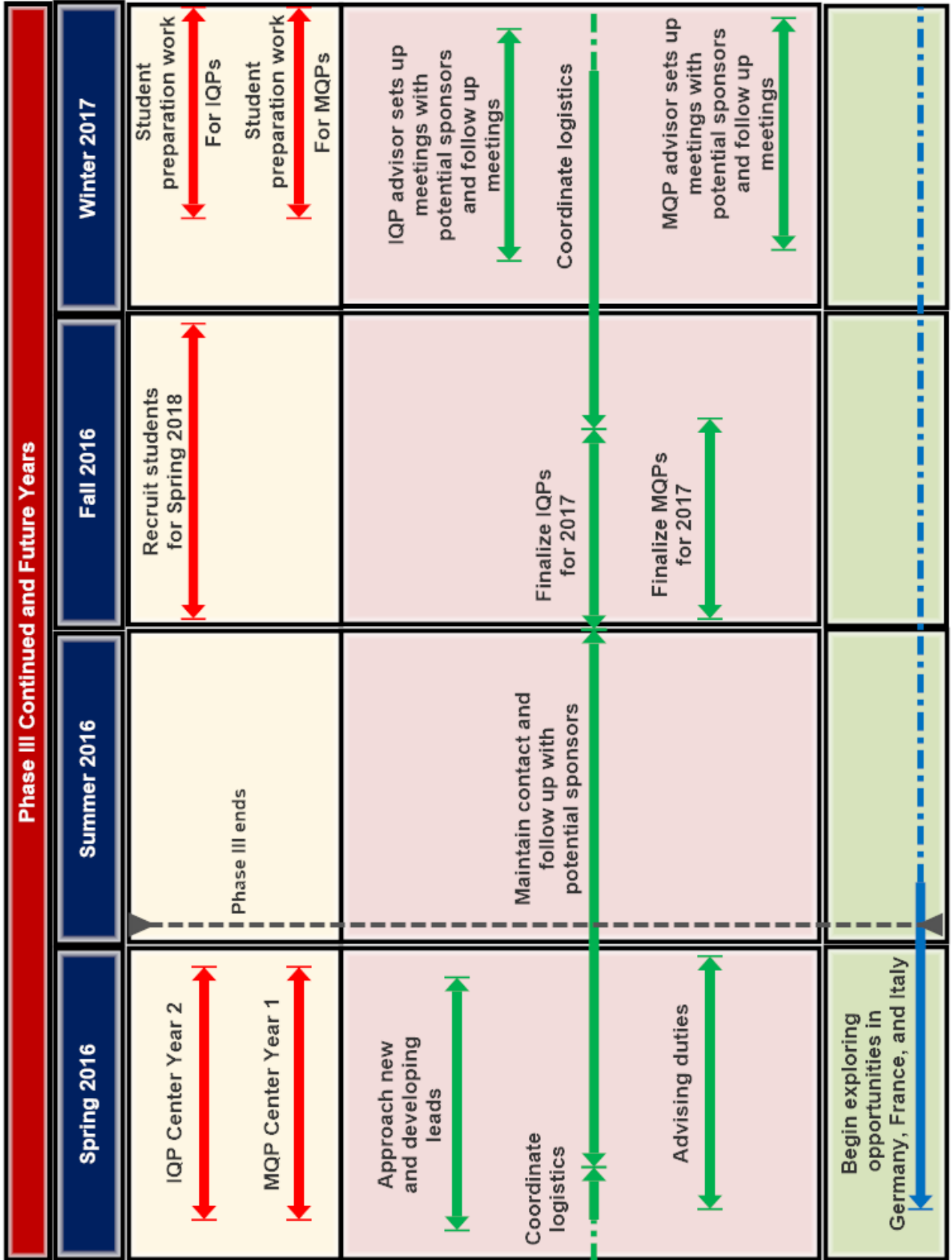
# Switzerland Feasibility Analysis














# Appendix I: Full Undergraduate Survey and Analysis of Results

**IQP Preferences Survey**

---

  
\* Required

What is your class year? \*

Freshman  
 Sophomore  
 Junior  
 Senior  
 5th+ year

What is your major? \*


Would you be interested in an off-campus IQP? \*

Yes  
 No  
 Maybe

[Continue >](#)

**IQP Preferences Survey**

---

  
\* Required

**IQP Preferences Survey**


Would you be interested in an IQP in Switzerland? \*

Yes  
 No  
 Maybe

[< Back](#) [Continue >](#)

**IQP Preferences Survey**

---

  
\* Required

**IQP Preferences Survey**

Please describe why you're interested in or considering an Off-Campus IQP in Switzerland.

**What kind of Projects would you like to see? \***  
Please check all that apply:

- Sustainable Development (Clean Energy, Solar Power, etc.)
- Industry (Chocolate and Cheese manufacturing, etc.)
- Commodities and trade (Watches, Cars, Gold, etc.)
- Education (working with Universities and Museums)
- Pharmaceuticals (Working with Pharmaceutical Companies)
- Sports (FIFA, Curling, etc.)
- Banking and Finance (UBS, HSBC, etc.)
- Other:

**Which project would you prefer the most? \***

- Sustainable Development (Clean Energy, Solar Power, etc.)
- Industry (Chocolate and Cheese manufacturing, etc.)
- Commodities and trade (Watches, Cars, Gold, etc.)
- Education (working with Universities and Museums)
- Pharmaceuticals (Working with Pharmaceutical Companies)
- Sports (FIFA, Curling, etc.)
- Banking and Finance (UBS, HSBC, etc.)
- No Preference
- Other:

**What Concerns do you have about Switzerland?**

**Would \$8000 be an acceptable additional expenditure (compared to on-campus IQP's)? \***

- No, too expensive
- Yes
- I'd be willing to pay more.

## IQP Preferences Survey

---

### IQP Preferences Survey

**How much would you be willing to pay?**  
(Please enter your maximum acceptable price)

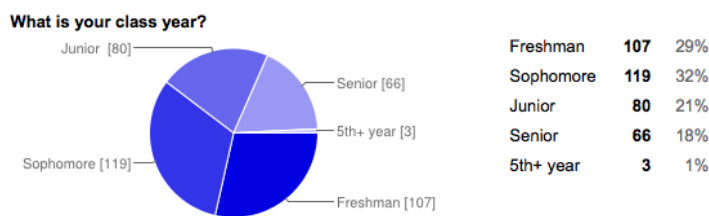
## Research and Questionnaire Analysis

In order to better evaluate student interest for a potential project center located in Switzerland, the feasibility analysis team created a study questionnaire to directly gather data and responses. The questionnaire presented to students consisted of a combination of eleven multiple-choice and open-response questions which students were required to answer. A selection of student responses can be found in Appendix J. This format of questionnaire was utilized so students were able to generate free, non-rigid responses that are common of completely multiple-choice surveys.

The questionnaire was sent to all WPI undergraduate students, including those that have already completed or were in the process of completing their IQP or MQP. The motive for sending it out to this demographic of students was two-fold. First, students that have yet to complete their IQP or MQP, most likely freshmen and sophomores, are good objective candidates for the questionnaire, since they would not have been biased by an IQP or MQP experience. Second, students that have completed at least one or more projects, likely juniors and seniors, were good subjective candidates. This is because the

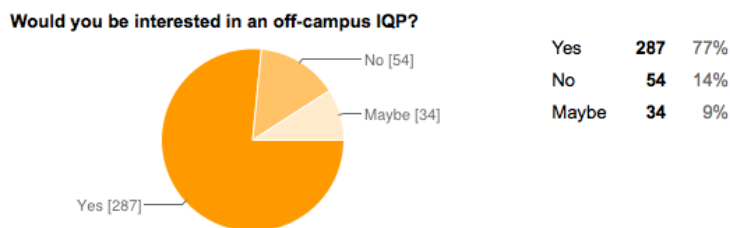
questionnaire would not only take into account their previous project center experience, it would also be able to superficially evaluate if Switzerland seemed like a compelling project center.

The first question of the survey asked students to identify which year they are currently in at WPI. This question allowed the team to evaluate what the two main demographic sections were like. As evident in the chart below, a combined 61 percent of students' responses came from freshmen and sophomore students, 29 percent and 32 percent respectively. Thirty-seven percent of students responded that they were in their junior or senior year of study. Along with this question, students were also asked to identify their declared major of study. Most every major was represented throughout the student responses.

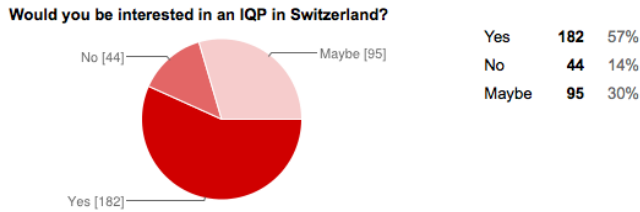


**Figure 12: Class Year Demographics for Questionnaire Participants**

Students were then asked if they would be interested in an off-campus IQP and whether or not they would be interested in an IQP in Switzerland. Seventy-seven percent of students replied yes, when asked about an off-campus IQP in general, while 57 percent of students replied yes and 30 percent maybe for an IQP in Switzerland. If students answered no to an off-campus IQP in general, they were still asked about an IQP in Switzerland. Clearly, based on the results, student interest is not an issue. Due to the increase in enrollment, the popularity of off-campus project sites, like Switzerland, has increased greatly.

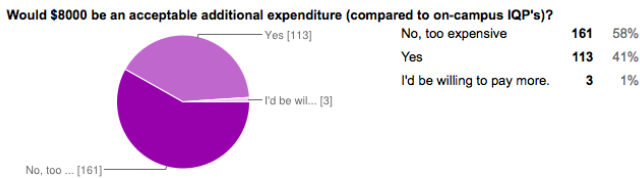


**Figure 13: Questionnaire Participant Interest in Off-Campus IQPs**



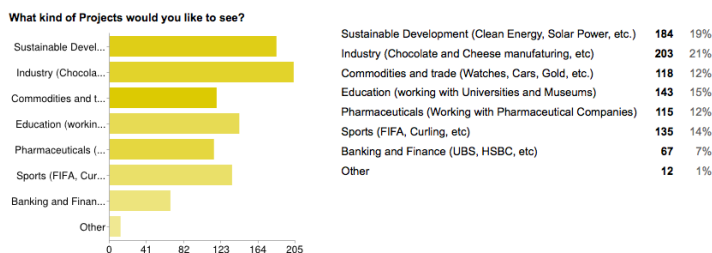
**Figure 14: Questionnaire Participant Interest in an IQP in Switzerland**

The last major question in the survey pertained to cost expenditure for students at a potential project center in Switzerland. The feasibility analysis team’s initial expenditure cost of \$8,000 was asked to students as either being too expensive or just right. Out of the responses, 41 percent of students agreed that the initial estimate of \$8,000 was acceptable, while 58 percent disagreed and thought it was too expensive. Also one percent of students indicated they would be willing to pay more. This is encouraging for several reasons. First, after in-country research on all expenditures, our estimated cost to students is \$5,100, which is much lower than the original expenditure estimate. Second, interest from about half of the student group polled still means interest from a potential applicant pool of 116 students, which are competing for a limited number of slots around 20. Overall, based on student interest and responses, Switzerland seems like a sustainable project center from that view.



**Figure 15: Questionnaire Participant Response to an \$8000 Proposed Budget**

Students were also asked about different project types based on the five major sectors that the feasibility analysis team identified. Their responses can be seen below in Figure 15 and Figure 16.



**Figure 16: Questionnaire Participant Interest in Specific Projects**



**Figure 17: Questionnaire Participant Project Preference**

## Appendix J: Selected Open Responses From Undergraduate Survey

### Why not? (In response to would you be interested in an IQP in Switzerland)

Because I've already chosen to go off-campus to London next year. Although if I hadn't, I'd be interested in Switzerland. It'd be nice if it had projects different from other centers though. Like, most of the project centers seem to have environmental/sustainability projects. It'd be cool if Switzerland offered some variety.

I am currently doing my IQP. But I would be definitely interested in doing MQP out of campus.

Being on Campus allows for more choices in other coursework. On campus also made the decision making of the project to remain with the student, I was more able to ask about projects that interested me without having to be at the mercy of someone choosing my project location or the projects available at said location.

In Freshman and Sophomore year, I *was* interested in an off-campus IQP. Specifically, anything in Japan. Obviously, it's too late for me now, but good luck changing things for those that will come.

### Please describe why you're interested in or considering an Off-Campus IQP in Switzerland.

I have already done my IQP abroad but I think an IQP in Switzerland would be a brilliant idea. As a hub of science in Europe I think it would be very beneficial to the WPI community

The more IQP off-campus options the better. It allows more students to go away. I think Switzerland would be a different site than the ones already offered.

I already completed my IQP in Venice, but I went to Switzerland for Thanksgiving and it was awesome!! I would say the advantages for wanted to go there are definitely the

scenery, but also the fact that it is a diverse country in Europe and you can experience several different cultures in one location. Also many people spoke English :)

Switzerland is renowned for engineering and its educational system, so it would be interesting to have an experience there. Also it is in the middle of the continent so visiting nearby countries may be relatively easy to do.

Switzerland has a very interesting culture that I'd love to learn more about. I know that they are a very progressive, forward-looking society and that's something that I think would be great to experience first hand.

### **What Concerns do you have about Switzerland?**

I have no idea what language they speak there. It might be German, but I don't think the German here will have completely prepared me for that kind of real experience.

The one concern I would have about Switzerland would be getting used to living there for an entire term. I don't know a whole lot about the culture and language in Switzerland, but I would be willing to learn about a location I would be working in.

That there might not be projects related to biology or psychology? I don't know much about the process at all, really... What are the other site costs? I don't know where \$8000 falls on the spectrum..

None, as long as the site becomes an official project center.

I have no concerns. I've heard the Swiss education system is stellar. Any aspiring teachers would have lots to learn surely. However, I personally have more interest in sustainable development in poorly developed areas.

## **Appendix K: Sample Initial Contact Email**

Hello Professor van Loon,

I received your contact information from Diyana Petrova, as I am a member of a three student team from Worcester Polytechnic Institute (WPI) in Massachusetts, USA that she is advising. We are currently at ZHAW in Wädenswil completing a project assessing the possibility of creating a more permanent project site for WPI in Switzerland.

WPI students complete a project called an IQP (Interactive Qualifying Project). These projects are often completed abroad for organizations, universities and nonprofits. As part of our project, we are looking for other projects that students would be able to do for ZHAW or other organizations in future years. Attached is a brief description of our projects.

We were wondering if it would be possible to meet with you and discuss the possibility of our students completing a project for Grow Wädenswil in future years.

Thank you for your time and please let us know if you would be interested in meeting with us.

Sincerely,  
Randi Isenhardt

## **Appendix L: WPI Project Introduction Document**

### **Worcester Polytechnic Institute (WPI)**

Founded in 1865 in Worcester, WPI was one of the United States' first engineering and technology universities. WPI's 14 academic departments offer more than 50 undergraduate and graduate degree programs in science, engineering, technology, management, the social sciences, and the humanities and arts, leading to bachelors, masters and PhD degrees. WPI's faculty works with students in a number of research areas, including biotechnology, fuel cells, information security, materials processing, and nanotechnology.

Students may participate with worldwide communities and organizations through the university's innovative Global Perspective Program. There are 25 WPI project centers throughout North America and Central America, Africa, Australia, Asia, and Europe.

### **Interactive Qualifying Project (IQP)**

The Interactive Qualifying Project (IQP), a nine-credit-hour interdisciplinary requirement involving applied research that connects science or technology with social issues and human needs.

The IQP is not organized as a course, nor is it related to the major. Instead, small teams of students work under the guidance of faculty members from all disciplines to conduct research, using social science methods, directed at a specific problem or need. Students deliver findings and recommendations through formal reports and oral presentations to project sponsors (often nonprofit, municipal, or government agencies) and faculty advisors.

Sustainability serves as a common theme for IQPs, many of which address problems related to energy, environment, sustainable development, education, cultural preservation, and technology policy.

### **Major Qualifying Project (MQP)**

The Major Qualifying Project (MQP) is a high-level design or research project in the student's major field. Through the MQP every WPI student has the chance to experience the kind of real-world problem solving that will soon characterize their professional careers.



The MQP involves problems typical of those found in the student's professional discipline and often addresses economical, ethical, and safety issues. These qualifying projects are far from trivial; each requires a substantial part of an academic year. Frequently, projects are sponsored by outside agencies to which students must present their oral and written reports.

Throughout their work on MQPs, WPI students can offer a wealth of knowledge to the agency they work with, since they have three years of academic experience in their chosen discipline. Student MQP work is similar to outside professional consulting for the agency, except a WPI student's work is free!

### **The Zurich Feasibility Analysis Pilot IQP**

In our project, we will assess whether Switzerland, specifically Zurich, could serve WPI as an international, off-campus site for students to complete their MQPs and IQPs. MQPs are often sponsored by outside agencies, while IQPs usually work with nonprofits, NGOs, or government. We hope to meet with different organizations and see if they are interested in working with WPI students and if they have potential projects for them to do.

### **Appendix M: Sample Thank You Email**

Hello Professor Schulz,

Thank you so much for meeting with us yesterday. It was absolutely amazing seeing the facilities that your University has and the approach towards hands-on education was very similar to WPI's focus on projects. We look forward to meeting with faculty on April 4<sup>th</sup> or 5<sup>th</sup> and we will send you some documentation by the next week that can be used to explain what we're looking for. We're very excited to see some collaboration between the University of Lucerne and WPI in the upcoming years!

Sincerely,

Rohit Bansal

## **Appendix N: WPI IQP and Life-Science MQP Example Abstract Document**

### **Academic Programs**

#### *Engineering & Computer Science*

- Aerospace Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil & Environmental Engineering
- Computer Science
- Electrical & Computer Engineering
- Environmental Engineering
- Fire Protection Engineering
- Industrial Engineering
- Mechanical Engineering
- Robotics Engineering

#### *School of Business*

- Management
- Management Engineering
- Management Information Systems

#### *Sciences*

- Actuarial Mathematics
- Biochemistry
- Biology & Biotechnology
- Bioinformatics & Computational Biology
- Chemistry
- Environmental Science
- Mathematical Sciences
- Physics

### **A Selection of IQPs**

#### ***The Evaluation of Cyclistic, a Bike Route Planning Tool for Tourists in Copenhagen***

By:

- Brian J Joseph, AE
- Jennifer Marie Mann, BE
- Victoria E Tower, BE

Advisors:

- Higgins, Lorraine D., HU

Date: 2012-05-05

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-050512-163644/>

Abstract:

The Danish Cyclists Federation recently released a web-based, bike route-planning tool, Cyclistic, designed to facilitate cycling amongst tourists in Denmark. To test the software's usability, we compared Cyclistic to other route-planners, interviewed 25 tourists about their biking needs, and conducted a usability study with 16 tourists. As a result, we identified major aspects of Cyclistic that could be modified and additional features that could improve the usability of the software.

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- Stephanie Elaine Post, BC
- Erik C Silva, ECE

Advisors:

- Looft, Fred J., EE

Date: 2011-05-05

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-050511-093705/>

Abstract:

Denmark is internationally considered a leader in environmentalism and promotes a comprehensive, organized waste management plan. However, household recycling rates are significantly lower than overall recycling rates for the country. In order to raise household rates, we collaborated with Miljopunkt Norrebro in Copenhagen, Denmark to study the application of psychological factors to an interactive recycling program. Based on our research and results we determined that convenience and information are the most important factors of recycling behavior, followed closely by personal norms and incentives. These results were used to create recommendations for an interactive recycling station and an engaging, informative website, to provide a sound revitalization of Norrebro's recycling system.

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By:

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- Andrew K Labak, CM
- Valentina S Polyakova, BE

Advisors:

- Salazar, Guillermo F., CE

Date: 2009-05-11

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-051109-091938/>

Abstract:

This report, prepared for The Science Shop, reviews the impact of an energy reduction campaign upon the attitudes of city employees in the Danish municipality of Lyngby-Taarbaek. This assessment was accomplished through the analysis of energy consumption records from five different municipal buildings, interviews with key informants and information gathered through an internet survey. The campaign had a

significant impact upon the attitudes of many municipal employees, although this did not result in energy savings in all cases.

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- Erin Marie Agar, emagar@WPI.EDU, BIO
- Christian Joseph Iamartino, ciamartino@WPI.EDU, PH
- Caitlin Ann McMahan, caitlinmcmahan@WPI.EDU, MAC
- Christian Mark Mortensen, mortensenc@WPI.EDU, CS

Advisors:

- Davis, Paul W., MA
- Camesano, Terri Anne, CM

Date: 2012-04-26

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-042612-174612/>

Abstract:

In order to promote sustainable travel to school, Croydon Council is working with Norbury Manor Primary School to introduce Zero Heroes: a program encouraging all students to walk to school on June 15th, 2012. Utilizing academic research and interviews with experienced staff in similar programs throughout London, the WPI team identified and compiled the key components for a successful walk-to-school program and applied them in the formulation of Zero Heroes - including recommendations for continuing the program in future iterations.

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By:

- Lorey Michelle Aragon, IE
- Jeremy Scott Brown, jeremybrown@WPI.EDU, BE
- Gabriela C Nunez, gabrielacnunez@WPI.EDU, EVS
- Julie Anne Wade, julieannewade@WPI.EDU, MA

Advisors:

- Bianchi, Frederick W., HU
- Carrera, Fabio

Date: 2011-12-20

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-122011-171038/>

Abstract:

The overall aim of this project was to design a digitization process that would efficiently extract all the useful and important information about restoration records contained in the paper archive of the Private Committees. The team selected a representative sample of 5% of the paper records to develop a final method for the extraction and digitization of relevant information from the archive. The test that was conducted allowed the team to estimate the extent of the archive in 47,000 pages, which would take two years to digitize for a total cost of 95,000 Euros. By extracting pieces of information from the scanned documents, the team demonstrated that the resulting system facilitates detailed analyses that reveal trends that were previously hidden in the paper archive.

## ***Interactive Venice: Using Art and Games to Bring Awareness to Venetian Social Concerns***

By:

- Michael Stewart Frankfort, mfrankfort@WPI.EDU, IMG
- Rinaldo R Izzo, rinaldo@WPI.EDU, ME
- Roni George Rostom, roni@WPI.EDU, ECE
- Jillian Ames Sauer, jillsauer@WPI.EDU, IMG

Advisors:

- Bianchi, Frederick W., HU
- Carrera, Fabio

Date: 2011-12-19

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-121911-103334/>

Abstract:

This project explores three approaches to raising awareness about the social concerns in Venice through fun and interactivity. The first approach, entitled "Interacting," consists of hardware installations designed to stimulate the senses of a user. The second approach, called "Exploring," consists of a geocaching route, an outdoor treasure hunting game. The third approach, entitled "Contributing," is a mobile application which allows users to tag and locate Venetian social concerns. These three approaches are woven together by an art exhibit that acts as a central terminal to display all of the individual elements. The exhibit uses multiple types of interaction and media in order to share knowledge of social problems in Venice, as a foundation to be featured in a major art exhibition.

### **A Selection of MQPs**

The following are three examples of MQPs completed by WPI students in recent years. The abstracts are provided here to give an overview of the project as well as the link to access the entire report.

## ***Electro-sensing on Gold Surfaces in Order to Differentiate Potassium and Ammonium Ions***

By:

- David Danico

Advisor:

- Professor Christopher Lambert, PhD, Advisor

Date: April 26, 2012

Link: [http://www.wpi.edu/Pubs/E-project/Available/E-project-042612-050725/unrestricted/DavidDanico\\_MQP\\_Paper.pdf](http://www.wpi.edu/Pubs/E-project/Available/E-project-042612-050725/unrestricted/DavidDanico_MQP_Paper.pdf)

Abstract:

Ion selective electrodes are widely used in the biochemistry and biomedical fields where the measurements of ion concentrations in aqueous solutions are essential. The problem with these electrodes is accuracy; other ions interfering with the results of the measurements. This paper focuses on developing a more accurate ion selective electrode for potassium and ammonium ions. This was done by interacting 18-crown-6 ether on a

gold surface with these ions and testing the electrochemical properties of these interactions. Potassium and ammonium ions have roughly the same shape and size as well as being the same charge and therefore are difficult to differentiate. In order to distinguish the two ions, an electrical current was applied to the electrochemical cell in the presence of a reductive agent thereby cleaving a hydrogen group from the ammonium ion. This changes the size, shape, and charge of ammonium and therefore changes the way it interacts with the 18-crown-6. With this technology, you are effectively increasing the accuracy of the ion selective electrode.

### ***ROLE OF SOD AND CATHEPSIN-D IN ALZHEIMER'S DISEASE A $\beta$ CASCADE MODELS***

By:

- Melanie K. Donahue
- Gregory Lobdell

Advisor:

- Professor David S. Adams, PhD

Date: April 28, 2011

Link: [http://www.wpi.edu/Pubs/E-project/Available/E-project-042711-234420/unrestricted/Donahue\\_and\\_Lobdell\\_MQP\\_Final.pdf](http://www.wpi.edu/Pubs/E-project/Available/E-project-042711-234420/unrestricted/Donahue_and_Lobdell_MQP_Final.pdf)

Abstract:

Alzheimer's disease (AD) is thought to be initiated by the formation of extracellular amyloid- $\beta$  (A $\beta$ ) neurotoxin. Our laboratory uses neurotrophic factor (NTF) mimetics to increase neuronal survival in the presence of A $\beta$ . This project investigated the potential role of the lysosomal protease cathepsin-D (Cat-D) in A $\beta$ -induced cell death *in vitro*, and the effect of NTF therapy on cellular levels of therapeutic anti-oxidative superoxide dismutase (SOD) *in vivo*. A fluorescence substrate assay demonstrated that Cat-D activity increases in A $\beta$ -treated human neuronal SHSY cells, while immunoblots demonstrated that NTF treatment increases the cellular levels of SOD in the brains of AD mice. Cell morphology and viability counts demonstrated that NTF treatment restores viability and neuronal connections *in vitro*, and thus may rescue Cat-D activity levels, as well. Further testing will be required to determine this effect of NTF on Cat-D activity, and accurately place Cat-D within the hypothesized cell death cascade.

### ***MDM2 is Not Required for the P53-Independent Role of MDMX in Genome Stability and Cell Transformation in Vitro***

By:

- Anika Blodgett

Advisors:

- Professor Stephen Jones, PhD (UMass Medical School)
- Professor David Adams, PhD

Date: April 26, 2012

Link: [http://www.wpi.edu/Pubs/E-project/Available/E-project-042612-075832/unrestricted/Anika\\_Blodgett\\_MQP\\_Final.pdf](http://www.wpi.edu/Pubs/E-project/Available/E-project-042612-075832/unrestricted/Anika_Blodgett_MQP_Final.pdf)

Abstract:

It was previously established that MdmX, negative regulator or tumor suppressor p53, promotes genome stability and suppresses proliferation and tumorigenesis in a p53-

independent manner. The purpose of this project was to determine whether protein Mdm2, another p53 regulator previously shown to interact with MdmX, is required for the p53-independent role of MdmX in genome stabilization and suppression of cell transformation *in vitro*. Triple knock-out (TKO) cells derived from the tumors of mice lacking p53, Mdm2, and MdmX were transfected with an MdmX expression plasmid. Compared to control cells, TKO cells ectopically expressing MdmX show decreased cell proliferation, a longer cell cycle, increased chromosome numbers and bipolar mitotic spindles, and decreased foci formation. Thus, MdmX, even in the absence of Mdm2, plays a role in genome stability and proliferation. This is crucial to consider in regards to potential cancer treatments aimed to suppress Mdm2 and/or MdmX in order to reactivate p53.

## **Appendix O: WPI IQP and Engineering MQP Example Abstract Document**

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#### *Engineering & Computer Science*

- Aerospace Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil & Environmental Engineering
- Computer Science
- Electrical & Computer Engineering
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Abstract:

The Danish Cyclists Federation recently released a web-based, bike route-planning tool, Cyclistic, designed to facilitate cycling amongst tourists in Denmark. To test the software's usability, we compared Cyclistic to other route-planners, interviewed 25 tourists about their biking needs, and conducted a usability study with 16 tourists. As a result, we identified major aspects of Cyclistic that could be modified and additional features that could improve the usability of the software.

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Advisors:

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Date: 2011-12-20

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Abstract:

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Advisors:

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- Carrera, Fabio

Date: 2011-12-19

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-121911-103334/>

Abstract:

This project explores three approaches to raising awareness about the social concerns in Venice through fun and interactivity. The first approach, entitled "Interacting," consists of hardware installations designed to stimulate the senses of a user. The second approach, called "Exploring," consists of a geocaching route, an outdoor treasure hunting game. The third approach, entitled "Contributing," is a mobile application which allows users to tag and locate Venetian social concerns. These three approaches are woven together by an art exhibit that acts as a central terminal to display all of the individual elements. The exhibit uses multiple types of interaction and media in order to share knowledge of social problems in Venice, as a foundation to be featured in a major art exhibition.

**A Selection of MQPs**

The following are three examples of MQPs completed by WPI students in recent years. The abstracts are provided here to give an overview of the project as well as the link to access the entire report.

***Design of Scale-Model Floating Wind Turbine Platforms***

By:

- Diana Berio
- Christopher Gabrielson

- Stephen Hanly
- Michal Parzych
- Michael Sacco
- Ryan Sebastien

Advisor:

- Professor David J. Olinger, PhD, Advisor

Date: March 16, 2012

Link: [http://www.wpi.edu/Pubs/E-project/Available/E-project-031610-140402/unrestricted/Wind Turbines Final Report.pdf](http://www.wpi.edu/Pubs/E-project/Available/E-project-031610-140402/unrestricted/Wind_Turbines_Final_Report.pdf)

Abstract:

The goal of this project was to design and build scale models of a tension leg platform and a shallow draft barge floating wind turbine, and to perform hydrodynamic tests. The models are scaled 100:1 from prototypes developed by the National Renewable Energy Laboratory and Massachusetts Institute of Technology. This report details the design process for the model turbine components, including revisions and suggestions for improvement. Components were modeled in SolidWorks, then fabricated using a rapid prototyping system or machine tools. A data acquisition system (accelerometer, inclinometer, and load cell sensors) developed by a concurrent master's student project were integrated into the models to collect data during testing. Models were tested in fresh water to determine buoyancy, draft, and response to various wave conditions. Successful preliminary tests were performed in the 6 foot by 6 foot flume at Alden Research Laboratory with the turbine models in a towing condition; the configuration used to transport the turbines from the shore to the desired location of operation. Future testing using the developed scale models will study operating conditions where the platforms are moored with cables to the ocean floor.

***WPI 10 Faraday Street Residence Hall: Project Management and Alternative Design***

By:

- Shawna Brierly
- Marcela Guevara
- Marco Villar
- Alexandra Vresilovic

Advisor:

- Professor Guillermo Salazar, PhD
- Professor Leffi Cewe-Malloy

Date: March 11, 2013

Link: [http://www.wpi.edu/Pubs/E-project/Available/E-project-031113-163340/unrestricted/MQP Res Hall Report.pdf](http://www.wpi.edu/Pubs/E-project/Available/E-project-031113-163340/unrestricted/MQP_Res_Hall_Report.pdf)

Abstract:

This project proposes an alternative design for the new 10 Faraday Street Residence Hall and compares it to the existing design in terms of functionality, LEED certification, construction schedule, and cost. The structural implications of increased gravity loads are reviewed. Building Information Modeling software is used to facilitate visualization of design, construction, and quantification of information. This project analyzes the

communication process during the construction of the existing building and generates a 4D model of the early stages of construction.

*Non-Invasive Detection of Faults in Power Lines*

By:

- Michael Dube
- Nick Gagnon
- Adam Haines

Advisors:

- Professor Alexander Emanuel, PhD

Date: April 21, 2008

Link: <http://www.wpi.edu/Pubs/E-project/Available/E-project-042808-122721/unrestricted/MQP08ECE25793.pdf>

Abstract:

The goal of this project was to design a product that could detect faults in a transmission line system and relay that information back to a control center. To accomplish this, pickup coils were installed in the proximity of the transmission lines and were used to monitor the magnetic fields produced by the lines' currents. Theoretical and actual simulations were completed successfully and demonstrate that it is possible to determine with great accuracy the type and time of the fault.

## Appendix P: Swiss Route Map

On the map below, the Swiss Pass and Swiss Youth Pass are valid:

- For unlimited transportation on any routes in solid red, yellow, black or white.
- For unlimited travel on urban public transportation in any city or town with a red bulls eye on it.
- For half-price fare on any routes dotted red, yellow, black or white.
- For 25% discount on any routes dotted red, yellow, black or white with the number 1 next to it.
- They are not valid on grey routes.

On the map below, the Swiss Flexi Pass is valid:

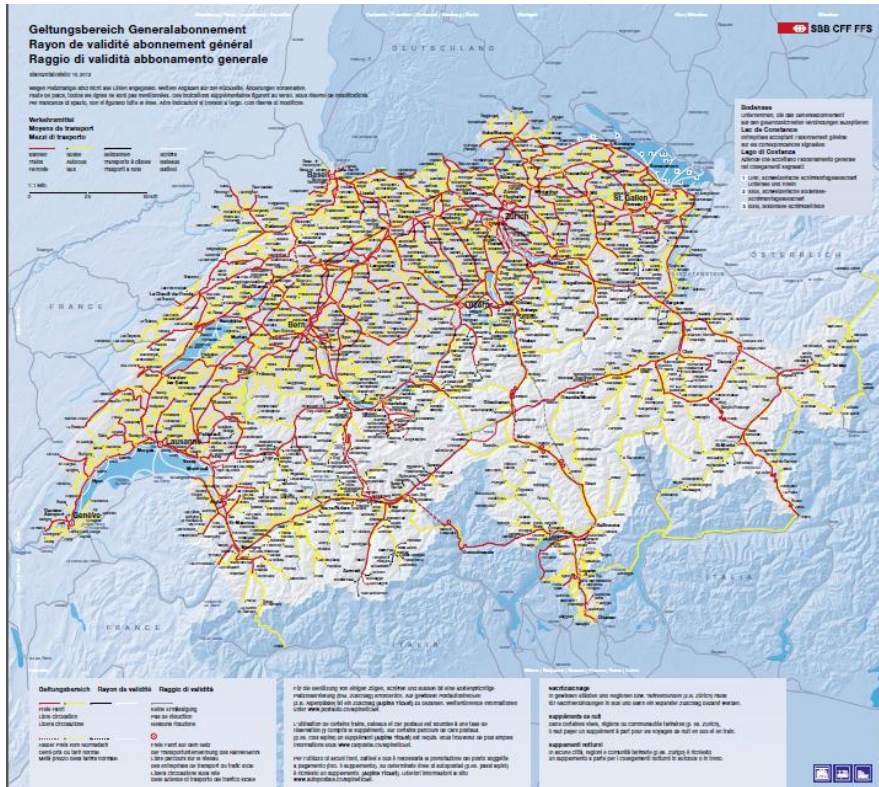
- For unlimited travel on urban public transportation in any city or town with a red bulls eye on it.
- For half-price fare on any routes in solid or dotted red, yellow, black or white.
- For 25% discount on any routes with the number 1 next to them
- They are not valid on any routes with the number 2 next to them or that are in grey

The Swiss Card travel days are valid:

- For travel on solid red, yellow, black and white lines with no additional charge during arrival and departure days.
- For half-price travel on any routes in solid or dotted red, yellow, black and white lines days other than arrival and departure.
- They are not valid on any routes with the number 2 next to them or that are in grey.

The Swiss Half-Fare card is valid:

- For half price fare on all solid and dotted red, yellow, black and white lines.
- They are not valid on any routes with the number 2 next to them or that are in grey.



## Appendix Q: List of Countries Included in the Eurail Global Pass

The following countries are included in the Eurail Global Pass:

- Austria
- Belgium
- Bulgaria
- Croatia
- Czech Republic
- Denmark
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy
- Luxembourg
- Netherlands
- Norway
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
- Switzerland
- Turkey

## **Addendum A: Contacts**

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