I, Jonathan E Lowry, hereby submit this original work as part of the requirements for the degree of Master of Design in Design.

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The Language of Team:
Building a lexicon integrating multiple disciplines for effective project management

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Building a lexicon integrating multiple disciplines
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ABSTRACT

In a collaborative project, communication breakdowns can send a proposal or idea spinning wildly out of control. Each of the domain-specific fields represented in a collaborative setting brings differing backgrounds built on various levels of experience and expertise. Integrating these differences, then, requires rigor to overcoming challenges as early in project formation as possible. Gaining a clear, shared vision is needed to approach optimal efficacy. Many ways can be constructed to reach this goal, but this thesis suggests the moderating variable of importance is the formation of a common language, comprehensible to all participating fields. To establish this common language, or lexicon, requires an investment of upfront time, but the expectation is that this effort will improve the team atmosphere and, thus the effectiveness of the design process and output. This thesis identifies general communication errors using examples of recent projects, then suggests a model to reduce these errors. The model is then tied to enhanced team building using a follower-based leadership approach. Finally, an extension to the model is suggested.
It is fitting that the research gathered for this thesis comes from such a wide breadth of disciplines. In addition to design research and design thinking, the fields of neuroscience, psychology, management, linguistics, and anthropology aid in the foundation of this document. The sheer variety of contributions from these disciplines explains the need for a broader definition and understanding of the field of design. In addition to a reliance on secondary sources, a contemporary path of data collection was performed through first hand experience, utilizing a critical tool for every designer’s toolkit: Contextual Research. At times this method of collection followed a more scientific approach, but sometimes circumstances required a real-time style of spontaneous and amorphous development.
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INTRODUCTION

The underlying questions driving this thesis were “Why does the Design for Extreme Environments Project (DEEP) require such a long front-end and, “What from that is collapsible and transferrable to design?” A University-funded research project, involving several different schools on campus, revealed some identifiable problems, all of which seemed to devolve to a lack of a common understanding of the variables involved that affected the design process. Research and reflection suggested the same problems plaguing DEEP were consistent throughout the design environment, leading to a more general hypothesis. For the purposes of this thesis, the research question became, “Investing upfront time to establish a lexicon increases the effectiveness of the design process and outcomes.”

Organizations regularly create groups for projects, occasionally bringing in outside experts for specific work. As with any new hire, the stigma of having “an outsider” join a pre-existing team or in-progress project exists and can generate additional stress when challenged to meet tight deadlines. This common scenario begs the question, “How do we overcome this challenge?” One possible solution is to streamline the on-boarding process and bring new members up to speed in rapid fashion. The lexicon, or specialized language, already present for the in-house team can be used as a primer for the new hire, consultant, etc. but cannot be the sole function of engagement. To ensure attention and discipline in the project, the same effort of sharing rewards and language structures must be
practiced by all on the design team. This will allow the new member to share the insider’s common intent and enable the existing members of the team to have a clearer understanding of the new member’s capabilities.

Design problems are also overcome without creating a common lexicon; however, it is likely that the intermediation created by the generation of a project specific lexicon can improve the efficacy and efficiency of design teams.

This thesis explores several design environments and builds a case for creating project specific lexicons. It does this by providing examples of failed project specificity, due in large part to incomplete information. Additionally, this paper creates a model through which team unity and cohesion can be enhanced, appropriate reward structures can be developed for team members, and clarity of overall vision and end-goals can be improved. Finally, this model is extended beyond the limits of project management to a Design Learning Module, applicable in academic or training environments to facilitate improved communication with the eventual goal of generating better design solutions.
BACKGROUND

A Common Language

“With increased complexity, the need for a common language is required for shared documentation of the investigative process.” (Lowry & Davies, 2011)

One of the challenges in project management is the iterative process that often dictates pace and structures the flow of ideas. In Observing the User Experience Mike Kuniavsky points out that “Despite its benefits, iterative development isn’t perfect. It creates a lot of uncertainty throughout the process, which can be frustrating to a team that wants to be able to delve deeply into feature development.” He goes on to say that an iterative process “requires discipline and dedicated project management because it can be a complex process that requires every iteration to focus on a subset of the product, when other glaring problems may be screaming for attention. It can require backtracking to review earlier assumptions, which may extend development time.”

“A significant difficulty in implementing iterative development is creating a company culture—from the CEO to marketing to customer service—that understands the process and integrates it into the way the company works.” (Kuniavsky, 2003) Extending this logic further suggests that in order for a design manager to build a successful working team, all members must understand the iterative process as a common language. Furthermore, the members engaged in the project must be able to identify their area of expertise within the process and
be able to “own” a part of the project as theirs.

The iterative process is a method IDEO knows well. David Kelley talks about how “we fail faster to succeed sooner.” (Muoio, 1997) This mantra informs project participants to take risks early in concept development by adopting a divergent thinking model and letting these failures dictate convergence on project outcomes. Tim Brown, in Change by Design, helps to discern where the rightful place of convergent and divergent thinking is in the process of project formation and in product formation. “If the convergent phase of problem solving is what drives us towards solutions, the objective of divergent thinking is to multiply options to create choices.” What are the benefits of providing so many solutions? Brown says that “By testing competing ideas against one another, there is an increased likelihood that the outcome will be bolder, more creatively disruptive, and more compelling.” (Brown, 2009)

The DEEP Experience

The applied component for this thesis is the most recent addition to the list of Design for Extreme Environment Project (DEEP) ventures. DEEP strives to enable research and education platforms through the development of human support systems that mediate adverse constraints of extreme environments, such as; atmospheric content and pressure, gravitational force, spatial constraints, and confined personal dynamics. DEEP endeavors to lend the perspective of humanistic design in support of the physiological and psychological well being of future explorers to supplement the accomplishments of engineering and science.
Current data collection for climate change is predominately gathered in extreme and or remote environments. The conditions of these environments strain research efforts, as outdated human support practices are employed in supporting advanced scientific discovery. The researchers’ environmental exposure limits the amount and quality of data gathered. (Davies, Living and Researching at the Top of the World: The Science and Design of Extreme Environments Research Habitats Grant Proposal, 2010) Design for Extreme Environments Project unites design, engineering, geology, medical, and psychology experts in supporting human performance under inhuman conditions. Collaborators come from industry, government, and academia, employing tremendous creativity to transcend politics, advance science, and innovate collectively. It has an ongoing partnership with the SeaOrbiter, an ocean-going research vessel designed by Jacques Rougerie, which continues to be a source of inspiration and exciting new opportunities. Through DEEP, students envisioned design proposals responding to the aftermath of the Gulf of Mexico oil disaster. DEEP is a globally unique academic endeavor immersing students in the complexities of disparate fields for a common purpose. DEEP stands by its motto of design enabling science. The most recent addition to the line-up of DEEP ventures which this thesis parallels is the Top of the World Global Collaboration Project.

The Top of the World Project—A DEEP Venture

The Top of the World team consists of members from five distinct
programs housed across three colleges at the University of Cincinnati. Within the College of Design, Architecture, Art, and Planning the programs of Interior Design, Industrial Design, and Architecture are represented. From the College of Arts and Sciences, Geology, and from the College of Engineering and Applied Science we have members from Materials Science. Helping to foster discussion are four professors. The project also engages a Ph.D dissertation, an Undergraduate Senior Capstone project, and this Master’s thesis.

In addition to introducing DEEP and the Top of the World project, providing a few definitions will help to frame the ideas and perspectives found in this document. Through these ventures, the Design for Extreme Environments Project collaborates with a number of sources both externally and internally. These collaborations are project-specific, and some can be defined as multi-disciplinary while others are interdisciplinary. Tim Brown, the CEO of IDEO, sheds some light on defining these two in his book, Change by Design. In it he states, “In a multidisciplinary team each individual becomes an advocate for his or her own technical specialty and the project becomes a protracted negotiation among them. In an interdisciplinary team there is collective ownership of ideas and everybody takes responsibility for them.” One of the motivators of this thesis is a melding of these two definitions so that a team of people responsible for representing their technical specialty can gather a collective ownership and investment in a complex project.

Building Teams
Organizational behavior literature provides substantial information on the creation, development, and maintenance of teams; however, little attention is given to this important part in design literature. For many, teams are an assumed condition, with little attention given to their particular needs as related to effective design outcomes.

**Figure 1: Member Roles and Project Goals: Two Key Ingredients**

Strategies for building teams include four main areas; *Goal Setting*, *Interpersonal Relations, Problem Solving, and Role Clarification*. (Klein, et al., 2009) Of the four, two are significant: “...the role-clarification and goal-setting components improved performance over the other team building components [and] could benefit human resources practitioners and organizational managers by providing increased clarity into ways in which leaders may best direct their teams (i.e., being clear about subordinates' roles and setting goals).” (Klein, et al., 2009) These two elements, then, provide the basis for helping the team move into the execution of their project initiative. Figure 1 shows these two elements and will serve as the foundation for exploring the normal, or existing, structure of collaborative approaches.
Project Examples Using Existing Structure

Relevant to this thesis topic are some experiences while engaged in the Master of Design Program at DAAP. Many of the insights were not included in the project briefs, but provided significant take-aways.

The TransFORUM project began as an in-depth research study of streetcar and light rail for the greater Cincinnati area. Run through the LiveWell Collaborative, this project was divided into multiple areas of research focus. The research team worked to document findings, but as the deadline approached to hand off material to the design and development team, there were no clear requirements for deliverables. Outputs ranged from the experiential kits highlighting the sights and sounds of various modes of transportation to the less engaging 100+ page precedent document. As a result the project team in the following quarter struggled to adopt the insights identified from the previous quarter’s research. The lack of leadership at the front end of the project led to a void of common understanding of the goals and criteria necessary for successful transition from research to design.

Another LiveWell project involved the College of Nursing, College of Business, and the College of Design, Architecture, Art, and Planning. This project’s future hung on the interpretation of a single word (infiltrate) written in the design brief. The multicultural project team members had different understandings of the word and how it related to the outcomes of the research. It wasn’t until week six when the project leaders said something about being off-track. The project team proceeded to go word by word through the project brief to
identify where the breakdown occurred, and only after the definitional problem was discovered was the team able to move forward.

In a retail design studio involving a major consumer goods company, the single word “hiccup” happened again. This time the word was concept. The professor, the student teams, the two representatives from the company, and an additional guest all had different interpretations and definitions on the level of refinement of the concept development. Working to develop final presentations, one of the company representatives expected to see a higher level of completion of thought when it came to the team’s designs. As a result, students had to scramble to generate higher fidelity models of their concepts.

Common to each of these examples is some communication breakdown. These projects, whether in an academic or professional setting, illustrate how teams cannot sufficiently respond to a late-stage shift of focus without suffering individual emotional consequences of enthusiasm and energy or the more practical aspects of time and money. Miscommunications on definitions of words or interpretations of deliverables frequently led to either rushed outcomes or disgruntled team members. In any case, work output was limited to “the best work that could be delivered under the circumstances.” So, that begs the question, how do we create an environment with the best possible circumstances?
AN IMPROVED MODEL

To this point, examples using the standard approach have demonstrated shortcomings, particularly in the delivery of quality outcomes to design problems. Only when improved communication has been incorporated have the outcomes improved. This section addresses an improvement to the standard model by suggesting the creation of a lexicon appropriate for the design domain. Lexicon is defined as “the vocabulary of a language” (Merriam-Webster, 2011); however, taken literally, this is too narrow. For purposes of this thesis, lexicon is more than words. It also includes the images, concepts, and emotions conjured by the discourse of the domain. Implicit in the language is the set of values, attitudes, and beliefs of those who created it and those who maintain it. This section defines the realm in which a lexicon is developed, explores how it changes and evolves, and how it can be of use in building the team cohesiveness that permits the attainment of design goals.

Building a Lexicon for Success

Noam Chomsky in *Aspects of the Theory of Syntax*, says “Linguistic theory is concerned primarily with an ideal speaker-listener, in a completely homogenous speech-community, who knows its language perfectly and is unaffected by such grammatically irrelevant conditions as memory limitations, distractions, shifts of attention and interest, and errors (random or characteristic) in applying his knowledge of the language in actual performance.” (Chomsky,
However, in a multidisciplinary team environment, this is rarely the case. Members of the project team often represent different fields of study, each with specified dictionaries of terms. Within the iterative and living nature of design, a single word can spark a tangential path sending a team in an unfamiliar direction. In the late 1700’s, James Beattie talked about this incongruous pairing of individuals: “Languages, therefore resemble men in this respect, that, though each has peculiarities, whereby it is distinguished from every other, yet all have certain qualities in common. The peculiarities of individual tongues are explained in their respective grammars and dictionaries.” (Beattie, 1788) These “certain qualities in common” are where teams can begin to formulate a project-specific language. Team members from the various fields may, then, have to ratchet back the levels of complexity they share within the group setting. By bringing the level of communication to a mutually comfortable level, all parties can begin to step up complexity from a common foundation.

The process of forming a common language within a team environment also calls for members to adopt elements from foreign fields and begin using them as their own. In The Five Love Languages, Gary Chapman suggests there are basic forms of communicating affection to romantic partners. He describes how people give and receive love in different ways. For a healthy relationship, partners must identify the languages that best suit their own needs and their partner’s languages. He goes on to say, “Once you identify and learn to speak your spouse’s primary love language, I believe that you will have discovered the
key to a long-lasting, loving marriage.” Later he warns “in order to keep it alive most of us will have to put forth the effort to learn a secondary language. We cannot rely on our native tongue if our spouse does not understand it. If we want them to feel the love we are trying to communicate, we must express it in his or her primary love language.” Chapman helps to describe what makes a successful romantic partnership through his love languages (Chapman, 1992), which hints that these theories [knowing your own language, but being able to communicate in the language of the “receiver”] are applicable in the workplace when dealing with other types of partnerships.

In their book, *Mastering Communication at Work*, authors Becker and Wortmann describe a number of steps to “lead, manage, and influence” a team environment. They begin by referencing Aristotle and work to define people as either “deductive” or “inductive” listeners. They define deductive listeners as those who want the main point first and the details to follow. Inductive listeners are those who require all of the details upfront and are then presented with the point at the end. From there, we begin to see evidence of similarities with Chapman’s thoughts:

Aristotle did not suggest that one tendency is better that the other: Instead, he realized that different tendencies are more or less effective in different circumstances, and if you want to persuade someone with your argument or help him to understand your ideas, you need to figure out his pattern of thinking and match it. When you are in the role of leader or manager, if you are to direct your team effectively, the members of your team have to trust you. Matching their tendencies is one way to show that you value them. When people know that you value them, they will follow you anywhere and do extraordinary things. (Becker & Wortmann, 2009)
Chapman, Becker, and Wortmann all speak to the importance of being bilingual. The result of the efforts may materialize in the building of a lasting relationship built on trust and understanding. It is not hard to see the similarities between romantic relationships and workplace relationships. Both require equally engaged parties and are significantly impacted by communication. Parties must work to maintain investment, and through open dialogue, trust is formed. At the core of this message is a larger concept that “The Golden Rule is Wrong.” Rather than “treat others the way you wish to be treated,” “treat others the way they want to be treated.” This simple modification to the traditional interpretation opens a larger conversation of identifying your neighbor’s needs. This can happen only through open, honest dialogue.

The Lexicon’s Role

Why should a multidisciplinary team even care about attempting to form a common language? It is highly likely a team can function without the formation of a lexicon. In fact, many teams perform without the formal creation of one. The previous examples demonstrate a loss in quality, efficiency, and effectiveness.

Figure 2 shows the standard model but includes the lexicon as a moderating variable. In much the same way the moderator on a game show explains the rules and keeps the show moving forward, this variable is an enabler for the team. Investments of time and energy on the front-end of the project can ensure that everyone knows the rules (the vocabulary, and more importantly, the culture) which help keep the project (the show) moving forward. An added
benefit is an increase in team cohesiveness—or bonding—which can also aid in the movement toward the ultimate design goal.

Figure 2: The Standard Model with Lexicon as the Moderating Variable

Tom Kelley talks about 'cross-pollinators’ in *The Ten Faces of Innovation*. These are the people in organizations who see the world in different ways, often taking applications and ideas from one area and applying them to others. Examples he includes are the Frisbee(TM) (taken from the game played by college students 100 years ago where they tossed pie plates made for the Frisbie Baking Company) or how Clarence Birdseye adapted the act of laying freshly caught fish onto the northern Canadian ice to preserve them into the frozen food empire bearing his name. In short, cross-pollinators are "adapters." As designers, "cross-pollinators are like linguists, confident in the knowledge that the more languages they master, the easier it becomes to absorb the next one..." (Kelley, *The Ten Faces of Innovation*, 2004) Diverse and interesting project work can fuel the fire of a culture of innovation. Give your team greater variety and they will start seeing the outlines of new connections, making new leaps of
imagination.” (Kelley, *The Ten Faces of Innovation*, 2004) Working to build a common language increases both team spirit and catalyzes the power of creativity. Stated in the negative, the lack of a common language can lead to stifled team spirit and threatened innovation. It is also interesting to consider the benefits of building a common language around a project. The more projects, the more languages, and as Kelley points out, as linguists, the more languages learned, the easier the next one is picked up.

**Increasing the Understanding of Stakeholders**

“I don’t know how to use a Mac.” This was an admission from one of the undergraduate materials science team members working on the Top of the World Project. He held in his hand a portable USB hard drive loaded with content to share during one of team’s weekly meetings and was limited by the operating system. A disconnect like this is important to identify early on in a project for obvious reasons: being able to share future content during the development of the project. As he was helped to navigate the tools in the foreign system, he began to pick up its language. Armed with the additional skill of using the Mac platform will help him in the future to share work across multiple platforms with a variety of user groups, thereby allowing him to work with broader and more diverse groups of people.

As the first
step in the process is finding out who is at the table. This identification process is more in-depth than the usual exchange of pleasantries. There is a series of questions that need to be answered by each individual team member before engaging with the rest of the group. Some are obvious such as name, describing the represented field, and who’s championing which part of the project. Other questions may require a little more effort to share. For example, expressing what each individual stakeholder is looking to get out of the project. These intrinsic goals will help to shape the extrinsic success criteria for the group. Equally important is defining an individual’s reward structure, so that team members can be properly rewarded for achieving their stated goals. This will ensure their interest in continuing to work in collaborative teams in the future. The responsibility for delivering the rewards is likely to be determined by the team itself with oversight from the project manager.

Figure 3: Team members as stakeholders

Figure 3 shows a sub-set of the member’s roles, specifically recognizing the team members as stakeholders. They individually (and collectively) have a
stake in the process as well as the outcome of the project.

Who’s in charge?

Determining the chain of command for members of the group will help to maintain clarity of leadership, as well as provide transparency when appropriate. In many cases, the project’s objectives serve as substitutes for leadership and the hierarchy maintaining control is determined by the objectives being achieved at that moment, always with a connection to the overall project goal. Clearly, every step along the way should seek to build trust. The exercises employed to self-identify, recognize stakeholder investment, and eventually to set deadlines to meet project goals are both ends and means to an end. As the team begins to determine a list of collective success criteria, they can be sure to include elements from each of the stakeholders. This engages each of the members allowing them to see clearly where they fit in the process of working on the project.

An example of determining the measures of success

The Top of the World project (TOTW) is a collaborative effort, which brings together architecture, engineering, geology, interior, and product design. Each member represents a field they have tuned specifically towards exploring the outermost boundaries of science. One of the roadblocks a team like this faces is the varying degrees of measuring success. “Measures of design success are
often much more subjective than the metrics of geology and engineering. The criteria of acceptable performance in terms of design are often personal or abstract (e.g., comfort), and elude evaluation by objective measures and thresholds. In terms of designing for new frontiers, effectiveness is measured in terms of the facilitation of human performance. Achievement of this goal requires not so much a new conception of space, but rather new capabilities for the management of complexity, performance innovation, and the accommodation of unforeseen future developments.” (Lowry & Davies, 2011) Working to generate a project-specific lexicon allows members of the team to flow and adapt to changes with relative ease.

The collaboration for the Top of the World project involves members of such diversity that the step of identifying roles is incredibly important. The content experts and end-users (the Geology team) provided insights to help identify innovation opportunities. The Design team assumed the role of guiding research and leading concept development. Supporting them was the Materials Science team who were focused on providing research on emerging materials and textiles vital to the creation and fabrication of the habitat. While descriptive, these introductions are too generic and superficial to identify the individual goals of the field and teams involved. As a method of eliciting a deeper level of understanding of the stakeholders, everyone was given a four-question survey, helping to identify eventual successes for the project. The directions and questions were as follows:

There are 4 questions for you to answer individually. Your answers don't have to be long, just enough to clearly communicate your
thought.

1. Define the outcome of this project. What are we making for this project?
2. Define your individual role in the project.
3. Looking at numbers 1 & 2, what do you need to be successful?
4. What does success mean to you for this project?

Here are three examples from the student responses received, one from each college invested in the project. These are representative of the tone and vocabulary present in the rest of the submitted contributions made by all of the participants.

Direct responses from one of the team members from Arts & Sciences:

Geology:

Define the outcome of this project. What are we making for this project?

To my mind, the goal of this project is to produce a habitat suited for an extreme environment—more specifically, the high-altitude, variable-weather, challenging-landscape environment of the Himalaya—with a skew towards facilitating scientific research in said environment. It is my hope that this 'habitat' will serve the fundamental and some supplementary functions. It will provide shelter from the elements and, importantly, will allow scientists to stay near their area of study rather than require them to walk significant distances daily to complete their work. It may provide space for the storage of gear, communal areas for preparation of meals and dining, and potentially areas and mechanisms suitable for waste management. Ultimately, I hope that it will cover not only the basic needs of researchers, but offer some comforts that are sorely lacking in the current approach to research in these regions.

Define your individual role in the project.

My role in this project is to provide insight into the current requirements for working in the field. I hope to provide context for the designers—where we work and why, what the landscape is like, what we sample, how we sample, what gear we use, what gear we could use with better facilities, known logistical difficulties and risks inherent in working in the Himalaya, and so on. I will provide feedback on design ideas and serve as a general resource for others involved in the
Looking at numbers 1 & 2, what do you need to be successful?

Communication is likely of the greatest import to fulfill my role in this project. I think we have already had great success with discussion of the scientists’ needs and what we want from the project, as well as physical demonstrations of our equipment, typical gear setup, and descriptions of the field sites. The lines for communication must remain open at all steps of the project, and I feel that the group as a whole is a very strong one with a great deal of enthusiasm towards the end result.

What does success mean to you for this project?

Success for me means the creation of a habitat that reaches our goals, the most important of which is the ability to camp near our work area. I certainly hope that the end result allows us to be as efficient as possible with the limited time we have in the Himalaya, and can optimize the quality and quantity of our work while lending us some of the basic comforts often so difficult to come by while camping in such a harsh environment.

Direct responses from one of the team members from College of Engineering and Applied Science: Materials Science:

Define the outcome of this project. What are we making for this project?

We are making a portable habitat for use by members of the geology department as they conduct research on glaciers in the Himalayas.

Define your individual role in the project.

I am working with a couple of students from the engineering (materials and chemical) department focusing on thermodynamic properties and other properties of the materials being used for the habitat.

Looking at numbers 1 & 2, what do you need to be successful?

In order to be successful, we need the opportunity to run tests on the materials and the opportunity to see and understand what type of environment they will be used in. A thorough understanding of the design of the habitat and in what manner it will be used is also important.

What does success mean to you for this project?
Success will be defined by the construction of a habitat which provides comfort and meets the demands and expectations of the intended recipient. On a more personal level, success represents the opportunity to learn from those around me, not just within my field of study, but also from the other disciplines represented in this project.

**Direct responses from one of the team members from the College of DAAP: Architecture:**

**Define the outcome of this project. What are we making for this project?**

We are making a high altitude research station; one that will be composed of multiple components and pieces, that will be spread among the group for easy transportation. Its goal is to improve the abilities and functions of the geology researchers so that they will be able to more effectively do their job.

**Define your individual role in the project.**

I feel that my role in the project is assisting in the design and creation of the research station by collecting data and precedents to feed the design with past attempts and projects. I hope to help with the ideation as well as visual representation, eventually digitally modeling the proposed station.

**Looking at numbers 1 & 2, what do you need to be successful?**

I would say that in order to be successful we need to have plenty of input and discussion from all members of the high altitudes team. We need to lay out our options and our proposed goals, we need to be explicit with our design ideas and we need to actively fuse our contributions. In order to create something that will effectively satisfy geology, engineering, and design, we need to hear all the voices and discuss the strategies as a group.

**What does success mean to you for this project?**

Success for me means that we follow our goals and our itinerary and execute what we plan on doing. I think that we need to be open to failure throughout this process including once we get to the Himalayas, so that we can adapt and learn from our errors. A perfect trip would be a boring trip in my mind. Success in this project would also mean that I was successful and helpful in my contributions to the team and that we adequately represent what UC is all about.

Inviting members of the team to express their goals and aspirations for the
Top of the World project allowed the team to step back and reflect on the overlaps found in the responses. As a manager of a project, it is great to be able to define where individuals are in the process of defining the venture’s output. Additionally, knowing the success criteria for individuals and for the group helps to determine how to manage aspects of the project as the timeline moves forward.

As mentioned before, some of these intrinsic goals help to shape the extrinsic outcomes for success the team can all share. This exercise allowed some of these intrinsic goals to be voiced, allowing the team to work to define their goals and begin working toward them.

**Generating a Shared Vision**

Building a lexicon not only helps to identify team members at a much closer level of attachment to the project through investing individual content. It also helps to establish a shared vision of the project’s successful completion. Previous examples demonstrated where communication breakdowns led to misunderstanding details of the deliverables. The efforts made in creating a collective vision of success allow teams to avoid miscommunications and to work effectively toward their shared goals.

After identifying the stakeholders and understanding their individual motivations and success criteria, the group must begin to develop a common language. Early stages of this language creation materialize during the process of problem identification as members begin to observe overlaps in achievable
outcomes. As representatives share insights from their area of expertise, it is the responsibility of the rest of the team to follow along and work to understand the perspectives of their colleagues. Seeking clarity of message is paramount to the success of this stage.

As members of a team work together to generate a shared vision, their personal investment in the project begins by being at the table, providing insights from their unique perspective. Their contributions begin to shape how all of the pieces of the puzzle will eventually align. From these contributions, the big picture will become clearer. The act of physically participating in hands-on activities hits on a reward structure rooted deeply within the brain’s function. Dr. Kelly Lambert writes in her book, *Lifting Depression: A Neuroscientist’s Hands-On Approach to Activating Your Brain’s Healing Power*, about the amazing effect effort-based rewards has on the mental state of those performing the tasks. In short, the tighter the connection between concept and action, the greater the reinforcement, and thus, movement toward ultimate goal achievement. (Lambert, 2008).
Figure 4: Generating a Shared Vision for Common Purpose

Figure 4 shows the model, incorporating the pathway to create the common purpose, which ultimately leads to the project goal.

Not just talking, but listening

Having participants provide information and insight is only half of the story. Just like building a common language, listeners have to be prepared to receive the new information being shared. Active listening synthesizes a combination of both non-verbal and verbal cues to extract deeper meaning from the words that are shared. There is a special concentration given to the unspoken physicality that observers unconsciously take in. These multiple layers of information act as a confirmation of the message that is being delivered and offer feedback to the original speaker by saying, “Wow, this person is listening” or “I need to clarify things.” Traditional methods of contextual research such as observation, interviews, and contextual inquiry (Kuniavsky, 2003) provide a structure for identifying these multiple communication channels and offer a forum for uncovering unspoken areas of opportunity for innovative success.

Visual listening borrows these themes from active listening and applies them to a visual-based learning style. It is a combination of active listening by observing what words are being spoken and what actions are performed during the speech with external visuals that clarify a unified understanding of the whole message. For this to occur, direct observation is recommended; however, this may not be always possible. Taking advantage of video conferencing...
technologies will aid in providing similar insights, but may lack a level of resolution necessary in identifying subtle nuances in physical behavior. The theatrics of speech can manifest through posture, gestures, or facial expression, ultimately helping to build a non-verbal vocabulary attached to the person’s beliefs pertaining to the message they deliver. The use of visual listening supports the physical, verbal, and nonverbal language by helping to clarify and build a richer dialogue. As an example, mathematics often explains phenomena at high conceptual levels, but relies on a common symbolic language for communication.

An example of visual listening

In the Top of the World collaborative project, the team members discussed the details of the recently awarded research grant and eventually started to talk about the Himalayas. Members of the team from outside Geology sat with mental images of Mount Everest conjured from photos or movies seen in the past. This was a complete departure from many of the team’s experience base. It was in the description from one of the geologists that the first language hiccup occurred. One of the geologists was talking about glacial moraine fields as the areas where they predominantly focus their sampling. Not being familiar with the term, one of the members asked for a definition. She answered by describing that when a glacier moves over land it carries earth and rock and will leave it behind as it continues to move or melt. After that meeting, an image search for moraine was conducted to build a visual understanding and assign an image to the term.
Moraine fields can contain rocks in the form of dirt all the way to boulders the size of cars. The obvious questions ensued, requiring further clarity so as to design for this environment.

At the following meeting, the recent research on moraine was shared and clarification was requested. The department head of Geology, who had been to the sites in the Himalayas many times over the years pulled out his computer, tapped away for a few minutes then turned the screen toward us. He scrolled through a few dozen photos and provided a crash course in the different regions of a geology collection site. During the personal slide show, he shared stories of temperamental weather changes and a typical day’s schedule. The images prompted further discussion and facilitated a common understanding of the conditions and a comprehensive timeline specific to a geologist’s needs during a day of collecting samples. Additional information was provided by the geology team, and these additional sources of textual and visual information helped to more richly paint the picture of the site for which we were designing. More importantly, we began establishing a common vocabulary—a lexicon—that helped the geologists comprehend our level of understanding about their situation. As the design team began learning new words to describe site-specific terrain, the dialogue became much more encompassing and led the designs to be more appropriate.

Additional efforts were made to build a visual understanding by simulating experiences found in the remote setting of the research environment using methods of scenario learning. “Scenario learning offers a process to engage in
‘non-routine creative problem solving’ (Mayer 1995), a process that ‘involves finding a solution to a problem that has not been solved previously’ (Arp 2008).”

(Davies & Brumlick, Enabling Exploration: Scenario Learning in Collaborative Education, 2008)

As the problems presented in most fields have become increasingly complex, technological advances have simultaneously demanded the development of precise specialization. These parallel forces necessitate collaboration. Relevant to curricula and pedagogy, students must be equipped to facilitate and participate in vital interdisciplinary partnerships. The scenario framework provides a structured means of transferring knowledge among participants of different backgrounds, but requires commonality of understanding and shared comprehension. Scenario learning provides a means to harness creativity and fuse it with pragmatism to simultaneously generate informed and innovative design solutions. (Lowry & Davies, 2011)

**Example of scenario learning**

During the early stages of research, a number of the geology participants were invited to pack their packs as if they were leaving for India and ready to go on the excursion. The team members were asked to dress for a day of sample collection and to bring everything they needed to be effective in the field. A film crew helped by documenting as the field researchers unpacked their bags and laid out everything they brought along for this simulated trip. As they pulled items from within the hiking pack, they would describe the item, its function, and
occasionally a story to go along with it. The stories may have been about an item they had forgotten on a previous excursion or one they couldn’t have lived without. They reflected on how helpful this would be for preparing the next batch of students traveling to the Himalayas to conduct their data collection. One participant shared a story about acquiring a goat for the team to eat over the course of the trip. The experience was so profound for him that he was able to share very specific details about his emotions during the event as well as painting us a picture of the dietary arena in which our colleagues are placed. Sharing stories like these help to provide insights into culture that may go unspoken unless asked directly. In this way, “Scenarios also act as a framework for inquiry by prompting and eliciting input and feedback from participants” (Lowry & Davies, 2011). Using methods of scenario learning helps to draw out these types of experiences and aid in gaining empathy for the user.

**Supporting the System**

By building a common language, the team is now working together towards a common purpose and has created a network of understanding. This network needs to be able to support itself. It needs to have accountability, positive reinforcement, and general support. Diagrams such as the Hersey Blanchard model (Fig 5) help to guide and forecast when and where this support should plug into a project and what type of support should be given. With the multi-discipline environment, there are moments where we are a local team and others where we are sitting at a larger table as representatives of a larger team.
This transition can shift responsibilities of an individual from director to supporter simply by changing setting and audience.

**Situational Leadership II Model**  
(Blanchard)

![Diagram of the Hersey/Blanchard Situational Model](image)

**Figure 5: The Hersey/Blanchard Situational Model**  
(Hersey & Blanchard, 1972)

The Hersey/Blanchard model is one of several follower-based models, wherein the type and degree of leadership is dictated by the needs of the follower. In essence, the model suggests that when novice (relatively immature) participants in a task environment require a great deal of structure (rules,
regulations, guidance) and very little reward in the way of feedback. This is because the task environment provides the feedback. As the participants become more expert (more mature to the task), they require a decreasing amount of structure and increasing amounts of feedback. At the peak of the curve, an inflection point, their mastery evolves to a level where both structure and feedback are required in diminishing quantities, largely because they know what to do and that they are doing so competently.

The implication for the team model is that the need for a lexicon is particularly high as the group comes together. All participants are novices (to some degree) and until the “rules” (language/lexicon) are created, it is nearly impossible to move effectively and efficiently to creating a common vision and a clear understanding of the goal.

**Outcomes of Lexicon Development**

This education of the audience is crucial if they are to understand the breadth of knowledge used in the process of working as a team. If team A writes a paper about their role in the project, they must first be able to define the project, then what they contributed and then their findings and outcomes. The same thing goes for team B. They too must have this core structure, and they may even have to go into talking a bit about how they worked with team A and how their findings effected the outcome of the work they were doing. (Lowry & Davies, 2011)

The outcomes from building a common language span far beyond the
initial use within a project team. One of the outcomes of this thesis is the
development of a Learning Module which can be modified and applied to a
variety of design studios. The purpose of this module is to aid in the definition of
problems and helps the formation of design briefs. Through the exercises
proposed, students will be able to define areas of potential innovation and utilize
a number of methods for delivering that message to a wide range of audiences.
Working with the University of Cincinnati Information Technologies (UCIT)
Instructional and Research Computing group, several exercises have been
developed to explore this module through a method called Action Mapping, which
has been soft tested in undergraduate studios.
An Introduction to Action Mapping

Action mapping was created by Cathy Moore as a method to design engaging and effective e-learning models. The model concentrates on delivering information which is paramount to performing tasks and as a result, reinforcing a desired behavior or skill. (Moore, 2009) Carolyn Stoll, an Information Technology Analyst for UCIT, introduced the Action Mapping method as a procedure to gain a new perspective in engagement learning. While developing a course or course module, the action map process first asks what task a student will perform. In deciding this task, note the behavior the student should exhibit by performing that task. From there, build a practice activity to aid in the development of that behavior. Finally, when the activity has been chosen, define the elements students need to be taught to prepare them to be successful in the completion of the task.
As we were introduced to the format, there were a number of questions asked, centering around the objectives for this learning module and how those components could combine into a workable structure. Other questions revolved around the production of these individual nodes and what lessons they were intended to teach. Hopefully, this document will help to identify and clarify some of these components and act as a guide moving forward in the process of developing the overall module.

**Action mapping in action**

Using the Action Map model for identifying the purpose of the Design Learning Module, four main topics were outlined: Identifying Need, Management,
Building Empathy, and Defining the Project. Initially, participants collect perspective to identify the need the project will seek to meet, and a problem statement will begin to take shape. Next is the identification of some managerial skill development needs to forecast time allotments for the remainder of the design process. Following that, students will help to build empathy for the identified issue the project targeted through storyboarding possible scenarios. Finally, the students will package these elements together into a cohesive document outlining the problem, stating the scenarios, and delivering an estimate of time commitment for the project’s success. These are broken down further below following the Action Map’s hierarchy.

Figure 7: Learning Module in Action Map Form
IDENTIFY NEED

Principles of Brainstorming:

Supporting Information (Lecture, Collected Works, Sources)

Practice Activity:

Mind Mapping
Affinity Diagraming

Practiced Behavior:

Collect and document multiple views of problem statement

Define:

Problem Statement

Students have a veritable arsenal at their disposal when it comes to gathering research and visual data from which to draw inspiration. A major breakdown comes in the distillation of that visual gathering and in synthesizing what they have found. Activities such as mind mapping and affinity diagramming help to extract that information and organize it into statements of purpose. A “HOW TO” tutorial for each of these would be greatly beneficial. It’s recommended the Affinity Diagram Tutorial be a video and the Mind Mapping exercise be a flash animation, walking students through the steps needed to properly use these tools. With each of these, students need to see the benefit for going through the steps offered, otherwise it is likely they will not go through with it other than to meet the requirements for the class.
MANAGEMENT

Principles of Project Management:

Supporting Information (Lecture, Collected Works, Sources)

Practice Activity:

Creating a GANTT Chart

Practiced Behavior:

Understanding scheduling techniques and time management

Define:

Project Timeline

Among other models, a GANTT chart offers a method for organizing the multi-phase projects design deals with everyday. Project management is one of the most important factors when it comes to the professional world. Bidding for work, filling out time sheets, and handling multiple projects at once are all connected to this one principle. A "HOW TO" flash tutorial should provide students with enough information about how to budget time for a project and an understanding of how the GANTT chart handles accountability when it comes to recording the actual time spent on a specific item.

BUILDING EMPATHY

Principles of Narrative:

Supporting Information (Lecture, Collected Works, Sources)

Practice Activity:
Storyboard Generation

Practiced Behavior:

Communicate design through visual forms for external audiences

Define:

Scenarios for project deliverables

Scenario development is one of the methods for walking through a complex problem with ease. Storyboards help to visually support the identification of needs while providing a location for future work to be implemented. Building a storyboard can be pretty specific to the project’s field of study. Having students run through a tutorial on building a clickable PDF document in inDesign would be of great benefit. Students can use this method of delivery for building a customized story line for the audience or simply as a presentation technique. Either way, it is a skill that should be developed.

DEFINING THE PROJECT

Principles of Effective Technical Writing:

Supporting Information (Lecture, Collected Works, Sources)

Practice Activity:

Write the Brief

Practiced Behavior:

Communicate design through written forms for external audiences

Define:

Project objectives, deliverables, and timeline
This section calls for the students to flex their writing skills a bit. Students should have a wide range of skill when it comes to summarizing findings and providing a holistic document that can be read by a diverse population. Providing students with a “worksheet” of sorts helping to identify the key components necessary for delivering all of the appropriate content would prove to be invaluable.

**Examples of the approach**

Outside the Top of the World team, a third year interior design studio created an in-depth cultural probe of the region of India where the tent would be tested. By supplying the class with an introductory set of five parameters to theme the document, they were able to conduct secondary research to contribute secondary knowledge. The studio’s end focus was to create eco-resort designs for an emerging trend of extreme vacations. The document supplied the students with sufficient prep to begin their design development and tailor the remaining research needed to generate support for their concepts. Outside of the studio, the faculty could post this document online for inner discussion amongst the team. Based on the reactions of the individual members of the team, the probe could be further developed to inform new areas of focus or provide additional insights on topics covered too broadly.

This same relationship building exercise translates to a consultant model as well. In one particular case, the client was a person interested in starting a
business. She knew her message, but lacked the expertise in developing the brand’s identity. She sought guidance through this process. With a background in neuropsychology, the client was very eloquent when discussing things of an analytical nature. She also displayed methods of detailed note-taking and list generation. Observing these habits became crucial in the later phases of assigning tasks back on the client. After a first meeting, her goals for the new company were discussed as well as a timeline for work to be done. The meeting concluded with a homework assignment, asking her to break down the company’s “who, what, when, where, how, and why” descriptors. She was also directed to do the same for herself. Having to view her company and herself as two separate entities, she was able to assign information objectively. She later shared a conversation she had with a friend who also owns her own business. Her friend was amazed that she was already thinking about the business through that lens. The friend added that it took her a few years to think of the company in that light.

The client responded a few weeks later with full descriptions for each of the questions asked. During a follow-up conference call, key words were pulled out that held descriptive qualities. Images were chosen to reflect groupings of words, then she assigned single words to describe each image. She enjoyed this part of the process so much that not only did she provide four times the quantity I asked, but opened up this exercise to friends and family and relayed their answers back to me. As a result, the exercise generated a dense population of words and imagery built around the ideas and overall message she wished to
convey through her company. In addition, she had a growing number of supporters for her small business. They were asked to take part in the creation process, guided by design, and driven towards a common goal.

In the Top of the World project, an eager film crew acknowledged the importance of sharing information to the masses. What started as a highlight piece quickly grew into a yearlong documentary and yielded several stand alone teaching tools. These tools were focused for use at the university level for further advancement of teaching models. These tools then acquire an “on-boarding” role as new students are exposed to multi-disciplinary work and research foci outside of their knowledge base. Additionally these models can be interpreted for earlier education levels, providing younger students with exposure to non-traditional research methods and topics of international appeal. Our hope is to capture student/faculty interest and that of third parties with resources to support collaboration at this level.

Documented simulations and scenario learning offer many advantages in overcoming resource limits so common in many experiential creative learning models. These are models that can be passed down to earlier stages of learning for use and familiarization to enhance the development of teaching research strategy. (Lowry & Davies, 2011)
CONCLUSION

This thesis builds a case for creating project specific lexicons while exploring multiple design environments. A look back through challenges teams have had to overcome revealed a common instigator of failure was communication breakdown.

The guiding principles of investing time thoroughly and early in a project’s formation to work effectively towards goals help to explore new frontiers of successful collaboration. Standing in the way of progress is the potential for abuse of language. The misuse of language can lead to reduced engagement. Differences in personality and behaviors can lead to significant changes in the creative atmosphere and must be identified early in the process. Additionally, leadership must work to neutralize overly dominant or recessive participants and have members work towards a collective shared space.

There are times within relationship development that failures can help to create a stronger bond among members. It is important to note that in building a common lexicon the incidence of failures in a project is not eradicated, but failures can be dealt with more directly and sooner. Acknowledging failures in communication early allows for development of trust in the beginning stages of a project, and the team starts to build from these challenges together, aligned as one.

The application of the contents of this thesis could apply to two main
audiences: academic and corporate. Because the principles of this thesis can manifest in multiple ways, a company-specific model would have to be created in order to accurately tune the message to the goals of the organization. This thesis is specifically tuned for application in academic institutions. With that said, however, using these principles found in an institution such as the LiveWell collaborative would help to bridge the gap from academic to corporate. Regardless of the institution, the purpose remains the same: to facilitate improved communication with the eventual goal of generating better design solutions.
SELECTED BIBLIOGRAPHY


