

# **Playing Nice and Using Your Words: A Re-evaluation of Communication between Zoo Staff and Design Teams during Exhibit Design and Construction**

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## **ABSTRACT**

Communication and stakeholder involvement throughout the design and construction process are two key factors for making any project a success. This is commonly known and promoted as important by both zoo and design professionals. However, questions remain regarding this assumption. Is the understanding of importance actually being translated into “real world” projects? What have zoo staff and design team members experienced? Do they see strengths and weaknesses in the same areas? If not, how can communication and involvement be improved? Two questionnaires were distributed which posed these questions. Respondents represent zoo professionals from various facilities, departments, and “levels” as well as design professionals from various disciplines. Hearing from both industries provides a preliminary understanding of experiences, thoughts, and concerns. This paper will examine questionnaire results to see if there are areas of potential miscommunication that need to be addressed.

## **INTRODUCTION**

The process of taking a zoo or aquarium exhibit from an idea to a drawing and subsequently to a naturalistic habitat for the inhabitants as well as an awe-inspiring, personal experience for visitors is not only complex but also involves diverse professionals such as zoo staff, design team members, and other consultants. Because of the range of professional experiences, clarity of ideas, wants, and needs is mandatory. This clarity is achieved through communication. To be effective, communication should result in a positive outcome with minimal problems.

When asked, both zoo professionals and design team members confirmed the importance of communication during the process of designing and constructing animal exhibits. But, what if, communication is not at the level expected? What if, the various professionals speak “different languages”: not languages in terms of international languages but in terms of profession-driven jargon, terminology and understanding? Could perceptions during the exchange of information subsequently affect the overall experience?

To understand the process of communication, we must first understand the term itself. “Communication” is defined as “an act of transmitting or conveying information between individuals” and can be written or verbal. (Merriam-Webster) In order to be successful, communication requires that it be conveyed in a manner that allows participants to understand both its content and meaning. Because words in different professions often have subtly different meanings, it is important to acknowledge that those subtle differences may affect how information is received and, therefore, understood or assumed to be understood.

“Professional speak” is not only influenced by education, training, and work experience, it is also affected by location and personal interest. These differences influence how individuals “speak” and

“hear”, as well as what they “think” they understand. For example, during the development of a new exhibit, zoo staff primarily thinks in terms of maintenance and the animals: access, maintenance, accommodations for locomotion, physiology, group dynamics, foraging options, and enrichment. At the same time, zoo administrators primarily think in terms of business: funding, donors, budget, staff changes, visitor numbers, and regulations. Architects, landscape architects, and exhibit designers primarily think in terms of aesthetics and functional use: building requirements, sight lines, screening, accessibility, fencing, and visitor experience and flow. Construction professionals primarily think in terms of construction: site access, timelines, deadlines, sub-consultant scheduling, and construction document and specification agreement. Because perspectives do not exactly align, it is important that the professionals work together and communicate in a manner that allows those differing perspectives to function simultaneously.

Participants must recognize that constructive communication is more than simply using the same words. For example, in Texas and the southern United States, when you were offered a “Coke” in the 1970’s, you were subsequently asked “what kind”? If you were from the north or mid-west, you might have been surprised that the offer was a generic question asking if you “would like a Coca-Cola, Dr Pepper, or Sprite” as opposed to a specific soft-drink. This difference in terminology is neither “right” nor “wrong” but rather a difference of “language” resulting in assumptions.

Similarly, assumptions in a zoological setting can result in missed information. One such example that resulted in an expensive post-construction change occurred during the remodel of a rhino exhibit and its water feature. Zoo staff including keepers were involved and communication was considered “good”. The resulting exhibit opened to happy zoo staff and design team members. But when the rhino was released, he trotted to the water feature where he defecated. While animal staff was not surprised by this behavior, the design team was. The filtration system which had been designed as a visual element and for drinking was overwhelmed by the additional plant-based material. The result was the necessary removal and replacement of the new filtration system with a different system which could handle the additional material. Was this a lack of communication? Not according to an individual involved in the process: both the zoo staff and design team members were pleased with the communication. And yet, somehow a vital piece of behavioral information was assumed to be understood by one group and not asked by the other.

So, might the different perspectives and languages that professionals “speak” and “hear” potentially result in assumptions, misinterpretations or even different levels of satisfaction?

In order to see if zoo professionals and designers think similarly, questionnaires were distributed. The results were compared to gain initial insight into this question.

## **QUESTIONNAIRE DEMOGRAPHICS**

Two questionnaires (Appendix A and B) with 16 questions each were sent out in January 2017 via SurveyGizmo to 17 world-wide zoo associations, numerous zoological and aquarium facilities, individual staff members, three professional discussion groups, a zoo e-newsletter, and several design firms. Respondents were asked to share the questionnaires with colleagues and team members. The questionnaire deadline was mid-February.

One-hundred thirty-eight (138) total responses were returned by zoo professionals. Of those, 112 were fully or almost fully completed, and 26 were deleted either because no questions were answered or because they contained only demographic information. Thirty-seven (37) responses were returned by design team members. Of those, 27 were fully or almost fully completed, and 10 were deleted either because no questions were answered or because they contained only demographic information.

North America accounted for the majority of responses with 71.6% from the zoo industry and 77.8% from the design industry. Europe / Middle East was the second most represented area with 11.2% of respondents from the zoo industry and 14.8% from the design industry.

Numerous zoo departments were represented including Animal (26.7%), Administration (19.8%), Education (17.2%), and Veterinary (11.2%). Landscape Architects represented the majority of design team respondents with 44.4%, followed by Architects (14.8%), and Engineers and Exhibit Designers (11.1% each). Landscape Architects, Architects, and Engineers were individually listed in the questionnaire because they typically serve as project primes and were easy to locate via a web search. A fourth design team category, "Other", encompassed consultants such as zoologists, graphic specialists, and exhibit designers. This category was subsequently subdivided based upon the professions indicated by the respondents.

Zoo respondents ranged from mid- and upper management (35.3% and 32.8%, respectively) to staff (16.4%). Upper management accounted for the majority of design industry responses with 77.8% compared to 14.8% in mid-management and 7.4% at staff level.

Respondents with over 20 years' experience represented over half of the returned questionnaires in both groups with 53.4% of the zoo professionals and 70.4% of the design team members. Respondents with less than 5 years' experience in the zoo industry accounted for 6.9% of the returns while 25.9% had 5-15 years' experience. No design team members with less than 5 years' of experience responded and only 11.1% with 5- 15 years' responded.

Zoo professionals most frequently worked with consultants who were based in the country where their facility was located. Local consultants were used second most frequently, and foreign consultants were used the least. Design professionals predominantly worked with zoo or aquarium facilities that were located in the same country and with local and foreign facilities less frequently.

Zoo professionals worked most frequently with design team members, followed by professionals at other zoos. They worked less frequently with biologists. Additional consultants with whom they worked included in-house staff, NGO's, artists, writers, interpretive consultants, fabricators, environmental engineers, heritage consultants, translators, photographers and videographers, and lighting and sound designers. Design team members most frequently worked with zoo staff and professionals from other zoos. Biologists were the second most frequently used outside consultants. Additional consultants such as cognitive scientists, educators, NGO's, horticulture specialists, artists, media specialists, culture experts, engineers, academics, education specialists, animal welfare specialists, historic preservationists, pest control specialists, writers, and graphic designers, were also used.

## QUESTIONNAIRE RESULTS

In the remainder of the paper, the term "zoo professionals" identifies professionals who currently or previously have worked in a facility, such as zoological gardens or aquaria, that holds captive animals for the purpose of public display, public education, conservation, and / or recreation. The term "design team member" identifies professionals who serve in an individual or group capacity to consult on the design and construction of animal exhibits for a facility that holds and cares for captive animals. These include landscape architects, architects, engineers, zoologists, exhibit designers, graphics specialists, lighting specialists, and others. The term "process" refers to all events related to the development of a plan, which will result in the construction of a new or renovated animal exhibit including research, planning, design, construction, and post-occupancy studies.

Responses were compared between zoo and design professionals on overall satisfaction, time involvement, project stage involvement, potential reasons for "positive" and "negative" projects, and

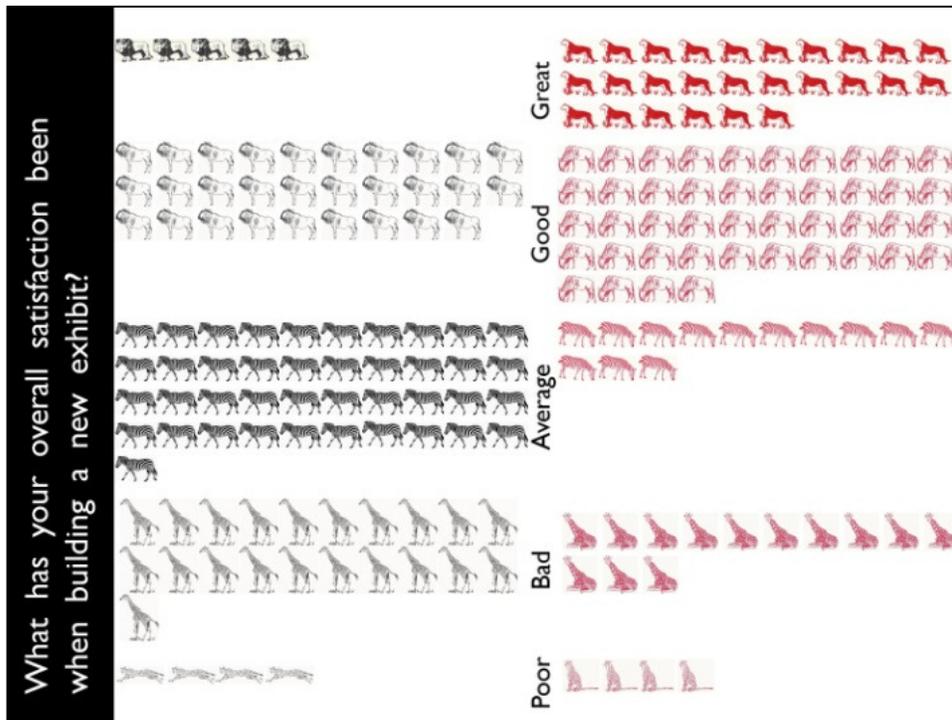
word use. Finally, advice given by respondents was summarized to create tips for improved future projects.

Because communication is seen as an important factor in creating successful designs by both professionals, it was expected that comparisons between questionnaire responses would be similar.

**Overall Satisfaction**

Participants were asked to rate their overall past design and construction experiences when working with a consultant or a zoo / aquarium on a scale of 1 to 5 where a 1 signified a “great” experience and a 5 signified “the worst” experience.

Responses were not similar. (Image 1)



**Image 1 – Overall satisfaction rating after working with a consultant or a zoo / aquarium on a design and construction project**

Each group of colored animals contains 100 animals: 100 black animals and 100 red animals. Each animal represents 1.0%. Each full row has 10 animals (10.0%). Black animals represent zoo staff responses, and red animals represent design team responses.

Almost half of zoo professionals (40.8%) rated their experiences as “average” while only 13.0% of design team members rated theirs as “average”. This reflected a 3-fold difference in perception. But a more significant difference was seen in the “great” rating: 5.1% of zoo professionals rated their overall experience as “great” compared to 26.1% of design team members. This is a 5-fold difference.

While these large differences do not specifically indicate a communication problem, they do indicate a significant difference in perspective that could affect how individuals see the project and how they work with other professionals. For example, if your overall project satisfaction was “great”, you might also assume that communication was “great” and no changes were necessary. But if your overall project satisfaction was “average”, you may feel that your needs were not fully addressed or understood.

### **Time with “Other”**

Participants were asked to estimate the amount of time that they thought they spent with the other professional. Then they were asked if that amount of time was sufficient. While the percentage of time spent with another professional does not indicate the success of information exchange, it is a second means to compare perceptions.

Questionnaire results indicated different perceptions: over one-third of zoo professionals (35.1%) estimated their time with design team members was less than 10% of the project time, while 24.6% and 22.8% estimated their time to be between 11-50% and 51-90%, respectively. Conversely, only 15.4% of design teams felt that 1-10% of their time was spent with zoo professionals, while estimated times between 11-50% and 51-90% was equally divided at 34.6%. That all said, the measure of time spent may be misleading. For example, a design team member might spend a day in meetings with multiple zoo departments while staff from individual departments may only attend one meeting during that same day. This would result in a greater participation time for the designer compared to the individual departments.

The more relevant question, however, is whether the two professional groups felt that the time they spent was sufficient. Responses differed here also. Over half of zoo professionals (58.3%) felt that time was sufficient, while 88.5% of design team respondents felt that time was sufficient. But fully one quarter (29.6%) of zoo professionals felt that more time was needed, while only 7.7% of design team members felt the same. This is a difference of 3.5 times. Several respondents added that while time was not sufficient, had the exchange of information been more effective, the shorter time might have been acceptable.

### **Involvement within particular project stages**

Participants were asked to indicate (1) in which stages of the design and construction process they had participated and (2) in which stages they felt they should have been involved. This comparison involved choosing from six sub-phases of the design and construction process: Preliminary Design, Planning Meetings, Construction Document (CD) Review and Comment, Shop Drawing Review and Comment, Construction Meetings, and Construction Site Visits.

Zoo professionals felt to varying degrees that they should be more involved in all sub-phases. The largest increase in interest was in the Shop Drawing and Construction Site Visit phases. Design team members, on the other hand, felt that they should be more involved in only three of the six sub-phases: Planning Meetings, Construction Meetings, and Construction Site Visits. They also felt that they should be slightly less involved during two sub-phases: Preliminary Design and Construction Document Review and Comment.

### **Potential Reasons for “Fewer” or “More” Post-Construction Problems**

Respondents were asked to select the top four reasons why a project may have had “fewer” and then why a project may have had “more” post-construction problems. While the questions are similar, answers for each question differed. Therefore, the questions were not compared to one another.

The same top four reasons that may have contributed to “fewer” post-construction problems were selected by both groups. (Image 2) Early involvement was the top reason, followed by full transparency, adequate review and comment time, and visits to other similar facilities. Three of the four reasons selected involve communication to some degree.



Image 2 – Top 4 Reasons for Fewer Post-Construction Problems

But when asked to select the top four reasons that may have contributed to “more” post-construction problems, responses varied. (Image 3)

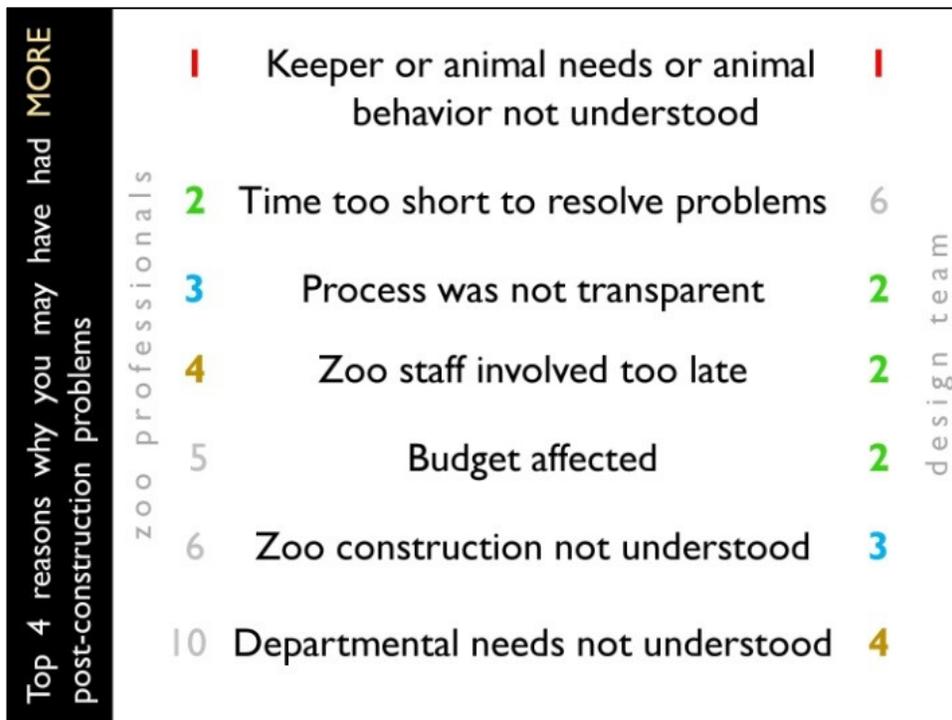


Image 3 – Top 4 Reasons for More Post-Construction Problems

The top response - selected by over 50% of the respondents from both professional groups - referenced the lack of understanding or conveyance of information about keeper and / or animal needs or behaviors. The top reason was the result of a failure in communication. Two reasons - transparency and early staff involvement - overlapped the questions suggesting that they could be both responsible for “more” and “fewer” post-construction problems. Communication was a component in three of the top four reasons selected by zoo professionals while five of the six reasons selected by design team members contained a communication component.

“Budget” and “construction understanding”, two areas that design team members also selected, illustrate different training and project focus. These are areas that designers regularly deal with but that not all zoo staff encounters.

### Word Clouds

Participants were asked to give advice based on their most “positive” and their most “frustrating” experiences. Word clouds were developed based on those responses. The most frequently used words, displayed in the word clouds, highlight items important to respondents.

Numerous words were used by both professions for both questions including the most frequently used words: “all”, “animals”, “design”, “listen” and “process”.

Zoo professionals used “all”, “animal”, and “listen” when giving advice based on “positive” experiences. They used “design” when giving advice based on “frustrating” experiences. Conversely, “design” was used by design team members giving advice based on “positive” experiences. “All”, “animals”, and “process” were used most frequently when giving advice based on “frustrating” experiences.

Although word clouds do not provide context, they do indicate direction of thought and, in this case, professional bias. The clear difference of word emphasis may illustrate why potential miscommunication or assumptions arise.

### CONCLUSION

Based on the questionnaire results, there does appear to be differences in perceptions between zoo professionals and design team members. By recognizing these as normal, they can be embraced as assets. This acknowledgement also allows professionals to more clearly see their responsibility in creating clear communication.

In order to provide tips which may improve communication, the advice used to create the word clouds, was reviewed, categorized, and summarized. That advice resulted in two simple steps:

**Step 1:** recognize and accept the inherent differences in perspective, knowledge, and communication styles within the multiple professions. Utilize those differences as assets. Do not assume that what you “mean” is what someone else “hears”.

**Step 2:** “prepare”, “clarify”, “listen(s)”, “educate”, “discuss”, and “review”. “Communication with” and “education of” the other project participants should continue through the entire design and construction process.

To more completely explain Step 2, the design and construction process was divided into six categories: Planning, Design, Construction Document (CD) Development, Construction, Shop Drawings and Submittals, and Post-Construction. Phases including RFQ (Request for Qualifications), RFP (Request for Proposals), contract negotiation, Schematic Design, Design Development, Value Engineering (VE), and bidding, fall within one of the six categories.

Tips do not necessarily end when a phase changes - responsibilities may overlap phases.

## PLANNING : PREPARE

The planning phase typically begins even before a designer is contracted but continues through the beginning of design. Both professional groups must **prepare** in order for the process to begin successfully. Suggestions for improving communication during this stage include: (summarized on Image 4)

**P** - Zoo professionals should provide a clear, concise project direction and budget while design team members should pose questions which clarify gaps in understanding.

**R** - Zoo professionals should relay their vision while designers should resolve to go above what is expected.

The facility should clarify their mission and project vision as this will affect design elements. Designers should carefully listen to both the mission and vision so that the project stays within those boundaries.

The facility should decide to which level the project should strive: “best practice”, “cutting edge”, or “next generation”. Decide if your facility is comfortable with a design that has been modified from another facility or if you want something original. Answers must be clear from the beginning so there is no confusion or frustration later during the design phases.

**E** - Zoo professionals should establish a time frame that accommodates unexpected delays while design team members should encourage a timeline that minimizes design – construction conflicts.

While short timelines allow exhibits to open quickly, they can create problems when adequate time does not allow for the full production and review of construction documents (CDs). If they are too short, completion of the CD set may not be complete prior to beginning construction and items may be missed. Missed items result in Change Orders, added costs, and increased post-construction problems. It is, therefore, critical that opening dates and timelines be carefully considered and discussed. Designers have the responsibility to inform the facility immediately if timelines or expectations are unrealistic.

**P** - Zoo professionals should plan staffing, training, and maintenance needs while design team members should preview those plans so that they are clear about what resources the facility will have.

Planning for post-construction exhibit needs will allow both the facility and the design team to realistically discuss and prepare designs that are able to function after it opens.

**A** - Zoo professionals should allow time for staff in affected departments to meet (in person or virtually) with the design team while design team members should allow time for meeting with individual departments in order to share information.

Staff should provide a written list of items that work or do not work. Walking the facility with staff allows designers to see items of concern so they can be avoided in the new exhibit. Information should be provided in advance of the first meeting so that designers have adequate time to review them and formulate questions.

Early departmental involvement also allows event programming to be integrated into the design.

Departments should provide a list of “needs” versus “wants” versus “wishes”.

**R** - Zoo professionals should re-read the contract to make sure that it is clear and that there are no assumptions while design team members should record exact end products.

If items are assumed, but not written in the contract, chances are those items will not be part of the project even if they were discussed. Contracts should clearly state exactly what is expected,

including identifying end products: are deliverables paper or electronic, surveys or full exhibit plans, or As-Built or not.

*(An “as-built” set is the construction drawing set that is maintained by the General Contractor (GC) in the job trailer or job office. As changes and revisions occur during the construction process, the GC marks them on or attaches paper copies of the revisions to this construction set. At the end of construction, all changes made by the designers and sub-contractors should be indicated on this “As-Built” set. The zoo or aquarium should indicate whether they want a copy of that As-Built set and should also indicate if the information should be reflected in final electronic files.)*

Do not assume. When in doubt, ask.

Designers should clearly identify the reasons that “something” cannot be done so there is no confusion. This includes budget: if the project budget seems too small, address the issue early through discussions of project phasing, budget increases, or scope decreases.

E - Both professionals should engage in clear dialogue but understand that communication styles and assumptions will vary between professions as well as individuals.

	zoo professionals	design team
<b>Recommendations: PLANNING</b>	<b>P</b> <b>Provide</b> a clear, precise vision, direction, and budget in your Brief.	<b>Pose</b> questions if the project Brief is unclear, vague, or too open-ended.
	<b>R</b> <b>Relay</b> your vision: normal – best practice - cutting edge – next gen.	<b>Resolve</b> to go above the expected and discuss new options and ideas.
	<b>E</b> <b>Establish</b> adequate time for the full process and unexpected delays.	<b>Encourage</b> a timeline to minimize design and construction overlap.
	<b>P</b> <b>Plan</b> staffing, training, and maintenance before exhibit design.	<b>Preview</b> staffing, training, and maintenance before exhibit design.
	<b>A</b> <b>Allow</b> each department to meet and share information with designer.	<b>Allow</b> time for individual departments to meet and share information.
	<b>R</b> <b>Re-read</b> the contract: if “it” is not written down, you won’t get “it”.	<b>Record</b> the exact end product(s) in the proposal.
	<b>E</b> <b>Engage</b> in dialogue: communication styles and assumptions will differ.	<b>Engage</b> in dialogue: communication styles and assumptions will differ.

Image 4 - Planning : Prepare

**DESIGN : CLARIFY**

The design phase includes the project brief, Schematic Design (SD), and Design Development (DD). During this phase, participants must **clarify** information so they are in agreement on what is being shared and its importance. Suggestions for improving communication during this stage include: (summarized on Image 5)

C - Zoo professionals should collect information relevant to each department that will aid the design while designers should create a list of questions or “homework” for each department that will provide in-depth information needed for the new exhibit, animal, or staff.

In order to be constructive, information should be as specific to the upcoming exhibit as possible: information from previous projects can be included if similar post-construction issues are a concern. Where possible, include information specific to the individual animal(s) that will be housed in the exhibit. While species generally have similar behaviors, individual animals have varied personalities and quirks.

Preliminary cost estimates should be developed using local-to-the-facility construction costs. Accurate construction costs can reduce Value Engineering (VE) affects on the design.

*(Value Engineering (VE) is the removal of project elements or the use of lower cost materials to reduce the construction cost in order to stay within budget. VE to varying degrees is a normal part of the construction process.)*

**L** - Both professionals should limit their preconceived ideas.

When poor past experiences are allowed to affect attitudes, “listening” and the clear transfer of information on the new project will be negatively impacted. But past experiences can be examined to see if information from those experiences can benefit the new project.

Do not assume. When in doubt, ask.

**A** - Zoo professionals should allow designers to present new, untested ideas while designers should allot time for individual staff meetings.

**R** - Zoo professionals should remember that 3-D images may not show the in-depth information they need to understand how specific elements work while designers should remember that animal exhibits are more complex than “normal” projects and thus may require more clarification and detail development.

While 3-D images and modeling can be realistic, designers should explain the detail to which they are accurate, and zoo professionals should ask if something is not understood or looks “odd”.

Designers should utilize zoo staff as a resource. They should ask questions and utilize models to clarify, for example, if slopes are accessible for the animals and for maintenance needs.

2-D plans should be clarified especially if information is complex or difficult to understand. Ask questions for clarity, explanation, and assistance. Designers should not disregard specific staff requests without listening to “why” the request was made. Make sure that you understand if the request is a “need”, a “want”, or a “wish”.

**I** - Zoo professionals should identify and bring new research to the designers while designers should innovate using new research and information.

Different professionals read different journals and magazines so do not assume that “they know”.

**F** - Zoo professionals should flag site elements that need protection while designers should find out “why” specific items are requested or flagged.

Flagged site elements should be discussed during a site walk with relevant department representatives and the designer. Clarify “why” an element(s) is important. Indicate protected items on design plans as well as construction drawings.

*(Flagging items refers to the use of colored flags, tape/ribbon, or paint to temporarily identify elements within the limits of the project which must be protected. Flagged elements include any item which must remain intact and be protected from construction activities including, but not limited to trees, buildings, fencing, and site furniture. The flagging material should remain visible on the element until the project is complete and its removal is approved by the designer.)*

**Y** - Zoo professionals should yield before complaining while designers should yield before disregarding what may initially appear to be negative criticism.

Criticisms, while a normal part of the design process, need to be productive and informative and not include statements that stop conversations such as “I don’t like”, “I wouldn’t”, or “if I”. Constructive criticisms contain explanations and information that open dialogue.

	zoo professionals	design team
<b>Recommendations: DESIGN</b>	<b>C</b> <b>Collect</b> information from each department in a “packet”.	<b>Create</b> department-specific “homework” for front-line staff.
	<b>L</b> <b>Limit</b> preconceived ideas; work as a team.	<b>Limit</b> preconceived ideas: front-line staff can be part of your team.
	<b>A</b> <b>Allow</b> design team to present new or untested ideas and information.	<b>Allocate</b> time to meet front-line staff in “small” individual meetings.
	<b>R</b> <b>Remember</b> 3-D images and videos should be more than pretty pictures.	<b>Remember</b> zoos are more complex than “regular” projects.
	<b>I</b> <b>Identify</b> new animal and visitor studies as well as routine information.	<b>Innovate</b> using new ideas, studies, information, and approaches.
	<b>F</b> <b>Flag</b> and show designers elements that need protection before design.	<b>Find</b> out “why” specific elements must remain and be protected.
	<b>Y</b> <b>Yield</b> before complaining: provide constructive criticism.	<b>Yield</b> before disregarding crits: listen, ask, understand.

**Image 5 - Design : Clarify**

**CONSTRUCTION DOCUMENT (CD) DEVELOPMENT : LISTENS**

Construction Document (CD) development includes the preparation of the construction drawing set (plans, sections, and details) and written specifications used to bid and construct the project. If each professional **listens** for information that might not be stated outright, they can gain a better understanding of concerns. Suggestions for improving communication during this stage include: (summarized on Image 6)

**L** - Zoo professionals should let staff have access to the design team project manager (PM) and designers should let production staff have access to zoo staff or a departmental representative.

**I** - Both professionals should make inquires; if questions are not asked, concerns will not be known.

Listening to one another will alert professionals to concerns. Should a short deadline require that construction begin before CDs are completed, everyone must be in agreement that problems and costly Change Orders can occur.

**S** - Zoo professionals should scrutinize the construction drawings when asked to redline while designers should scrutinize previously used details as they may or may not be relevant to the current project.

Redlining drawings allows zoo staff to verify that items discussed are part of the construction set. They also alert designers to areas of concern and detailing that will not work. The facility should

keep a copy of the redline set. Sign and date redlines. If information is not documented, it may not become part of the project.

*(Redlining is process of reviewing construction drawings. Comments and corrections are written directly onto a designated set of construction plans and specifications. The term comes from the fact that a red pen is typically used.)*

The PM should work closely with the facility representative to confirm that the representative can read and comprehend construction plans, details, and specifications.

Zoo staff must meet all review deadlines. Missing deadlines can result in delays in CD production or in information not being incorporated.

**T** - Both professionals should try various responsibility tools such as the Responsibility Assessment Matrix to see which method best fits the project.

**E** - Zoo professionals should evaluate meeting minutes and sign-off that they have actually read them while designers should ensure accurate and complete meeting minutes.

Detailed meeting minutes can insure transparency when not all departments attend the same meeting. At least one meeting should be held with individual departments so that specific questions can be addressed.

*(To sign-off on an item such as meeting minutes or submittals is to acknowledge that you understand and agree with the information contained within by either adding your signature to the document or stating your verbal agreement.)*

**N** - Zoo professionals should notify and designers should take note of “why” specific product or manufacturer requests are made.

If specific products or manufactures are used in a facility, the designers should be notified so that the products are included in the CD set. If the request cannot be accommodated, the project manager (PM) should immediately notify the facility representative and the specific department making the request to discuss the reasons and options.

**S** - Zoo professionals should seek clarification if they do not typically read construction drawings while designers should seek input from staff and incorporate or consider the redline comments.

Listening closely to animal staff will alert designers to issues that may not be caught during redlining or reviews.

If project phasing was planned, verify that it is indicated in the CD set.

	zoo professionals	design team
<b>Recommendations: CD DEVELOPMENT</b>	<b>L</b> <b>Let</b> designer have direct access to staff as well as a project manager.	<b>Let</b> production staff have direct access to front-line zoo staff.
	<b>I</b> <b>Inquire</b> - if you don't ask, designers won't know that you have concerns.	<b>Inquire</b> - previous experience may not be relevant to this site.
	<b>S</b> <b>Scrutinize</b> construction plans and details: redline and ask questions.	<b>Scrutinize</b> previously used details for appropriateness before re-using.
	<b>T</b> <b>Try</b> charts such as RACI (Responsibility Assessment Matrix).	<b>Try</b> charts such as RACI (Responsibility Assessment Matrix).
	<b>E</b> <b>Evaluate</b> Meeting Minutes and sign-off when you have read them.	<b>Ensure</b> detailed Meeting Minutes.
	<b>N</b> <b>Notify</b> designer "why" specific manufacturer requests are made.	<b>Note</b> "why" specific manufacturer requests are made.
	<b>S</b> <b>Seek</b> clarification on plans if you don't regularly read them.	<b>Seek</b> input from front-line staff and read their redlines.

**Image 6 - CD Development : Listens**

**CONSTRUCTION : EDUCATE**

Participants should continue to **educate** each other during the construction phases so that unexpected events can be quickly resolved. Suggestions for improving communication during this stage include: (summarized on Image 7)

**E** - Both professionals should work together to evaluate General Contractor (GC) applicants.

Low bid applicants should be thoroughly reviewed as they may lack experience or may not fully comprehend the CD set or complexities involved in zoo construction. Misunderstandings by low bidders can lead to costly Change Orders. The specifications should precisely cover sub-contractor qualifications so that both the GC and their sub-contractors meet qualifications with regard to animal and containment experience.

The facility representative should coordinate with the PM and the GC especially if either is not always on site.

A realistic timeline should be provided and agreed upon. Clearly discuss and agree that consequences will occur if construction begins without a full and approved CD set.

**D** - Both professionals should document and photograph construction progress.

Document items noted during site walks and photograph everything especially utilities and other items that will eventually be buried. Resolve questions quickly.

Do not assume. When in doubt, ask.

**U** - Zoo professionals should understand that unexpected occurrences are a normal part of the construction experience while designers should understand that zoo staff will be curious about how construction is progressing.

Unexpected events that create delays or changes should be quickly conveyed to the facility and resolved. Maintain high transparency.

**C** - Zoo professionals should confirm that bids are based on local costs while designers should have calculated estimates on local construction costs.

Limit VE but involve the affected department in discussions should it be necessary.

**A** - Zoo professionals should assert the importance of early completion of specific areas such as planting within animal habitats while designers should arrange phasing of specific areas to accommodate items such as the early plant installations.

**T** - Both professionals should touch base with one another and walk the site on a regular basis.

Walking the site at specific intervals with grounds, animal, and horticultural staff will allow them to review progress and ask questions.

**E** - Both professionals should establish clear communication guidelines between the facility representative, the PM, and the GC.

	zoo professionals	design team
<b>Recommendations: CONSTRUCTION</b>	<b>E</b> <b>Evaluate</b> contractors for animal and containment experience.	<b>Evaluate</b> contractors for animal and containment experience.
	<b>D</b> <b>Document</b> and photograph. Photograph and document.	<b>Document</b> and photograph. Photograph and document.
	<b>U</b> <b>Understand:</b> construction is not flawless even with complete CDs.	<b>Understand:</b> front-line staff will be interested in construction progress.
	<b>C</b> <b>Confirm</b> that construction estimates are based on local costs.	<b>Calculate</b> construction estimates based on local costs.
	<b>A</b> <b>Assert</b> that the schedule allows early plant installation in habitats.	<b>Arrange</b> for early habitat plant installation allowing longer establishment.
	<b>T</b> <b>Touch base</b> and walk the site regularly with project manager.	<b>Touch base</b> and walk the site with staff and project manager.
	<b>E</b> <b>Establish</b> clear communication with contractor and project manager.	<b>Establish</b> clear communication between contractor and project manager.

Image 7 - Construction : Educate

**SHOP DRAWINGS AND SUBMITTALS : DISCUSS**

While typically considered part of the construction phase, shop drawings and submittals were separated because it is important to **discuss** their specific needs. Suggestions for improving communication during this stage include: (summarized on Image 8)

**D** - Both professionals should discuss which shop drawings and submittals should be reviewed with zoo staff.

Not all shop drawings or submittals need to be approved by zoo staff but it is important to discuss which items may require this extra scrutiny.

I - Both professionals should inquire and confirm drain locations.

Drains, the bane of any back-of-house animal areas, are often too small, have piping that is too narrow, or do not function correctly because the flooring or drainlines have slope issues. Because incorrectly installed drains and drainlines result in increased maintenance, their location and installation should be a high priority.

S - Zoo professionals should speak-up and document when they witness something that appears to be cutting corners while designers should spell-out Value Engineering (VE) based changes.

C - Zoo professionals should check details including 3-D details while designers should create 3-D details on complex elements.

U - Zoo professionals should understand what they are signing-off on when they approve submittals while designers should understand that zoo staff makes repairs and should be consulted on complex detailing that affects animal containment.

Substitutions should be sent to affected department for review and comment prior to acceptance.

S - Zoo professionals should suggest changes if their experience has shown that the item detailed will not work while designers should support questions and suggestions from zoo staff that might affect post-construction maintenance.

S - Zoo professionals should share educational details and information while designers should seek information from educational staff.

	zoo professionals	design team
Recommendations: <b>SHOP DRAWINGS &amp; SUBMITTALS</b>	<b>D</b> <b>Decide</b> which items must be reviewed with designer.	<b>Decide</b> which items must be reviewed with zoo staff.
	<b>I</b> <b>Inquire</b> about drain locations and size.	<b>Inquire</b> about drain locations and size especially in back-of-house.
	<b>S</b> <b>Speak-up</b> if you see something that appears to cut corners.	<b>Spell-out</b> Value Engineering-based changes upfront: no surprises.
	<b>C</b> <b>Check</b> the information in 3-D models or mock-ups.	<b>Create</b> 3-D models or mock-ups especially if detailing is complex.
	<b>U</b> <b>Understand</b> submittals before signing-off on them.	<b>Understand</b> that zoo staff has experience with facility repairs.
	<b>S</b> <b>Suggest</b> changes if experience shows a method which works better.	<b>Support</b> questions and suggestions about construction methods.
	<b>S</b> <b>Share</b> educational information and signage needs.	<b>Seek</b> additional information about educational needs.

Image 8 - Shop Drawings & Submittals : Discuss

**POST-CONSTRUCTION : REVIEW**

Post-construction **review** should include reviews of the process as well as the exhibit. Information learned after an opening will improve communication on future projects. Suggestions for improving communication during this stage include: (summarized on Image 9):

- R** - Zoo professionals should report exhibit items that did not work as planned while designers should request such a report or follow-up with a questionnaire about the exhibit.
- E** - Both groups of professionals should work together to engage in post-occupancy studies of the animal habitat, the visitor areas, and the staff areas.
- V** - Both groups of professionals should visit the exhibit out of uniform as a “normal” visitor to observe how visitors interact with the exhibit.
- I** - Both groups of professionals should interact with one another to discuss how the exhibit is functioning.
- E** - Both groups of professionals should enjoy the new exhibit.
- W** - Both groups of professionals should write a review of the design and construction process to evaluate how future projects can be made more efficient.

	zoo professionals	design team
<b>R</b>	<b>Report</b> to the designer elements that did not work or were not successful.	<b>Request</b> report of elements that did not work or were not successful.
<b>E</b>	<b>Engage</b> in post-occupancy studies (staff, animals, visitors) with designer.	<b>Engage</b> in post-occupancy studies (staff, animals, visitors) with zoo.
<b>V</b>	<b>Visit</b> the exhibit as a “visitor” not as staff and watch how it is used.	<b>Visit</b> the exhibit as a “visitor” to watch how it is used.
<b>I</b>	<b>Interact</b> with designers to tell them how things are functioning.	<b>Interact</b> with front-line staff to see how things are functioning.
<b>E</b>	<b>Enjoy</b> the new exhibit.	<b>Enjoy</b> the new exhibit.
<b>W</b>	<b>Write</b> a review of the process and how to improve it.	<b>Write</b> a review of the process and how to improve it.

Image 9 - Post-Construction : Review

**SUMMARY**

While communication is accepted by both zoo professionals and design team members as key during the development of a successful exhibit, differences in education, training, background, interests, and experience influence “professional speak”. Results from questionnaires sent to zoo professionals and design team members show that these differences can affect perceptions of the design and construction process. The resulting misunderstandings or assumptions can affect the outcome of the exhibit as well as post-construction satisfaction.

It is, therefore, important that professionals involved in a new exhibit project recognize that their communication style will naturally vary from other professionals within the group. Acknowledging and recognizing these differences will allow them to be seen as assets and will allow individuals to listen

more closely, ask more questions, and clarify information. “How” someone communicates is just as critical as “what” someone thinks they “hear”.

By following two simple steps, misunderstandings and assumptions can be reduced. Step 1 requires that participants recognize and accept the different perspectives, knowledge, and communication styles of all professionals involved on a project. This means: no assumptions. Step 2 requires that professionals “prepare”, “clarify”, “listen(s)”, “educate”, “discuss”, and “review”. Because no one professional can know every detail about a project, it is important that each participant recognize their responsibility to the whole.

During a radio interview, Alyssa Mastromonaco (a member of President Obama’s advance team) stated that it “was not my job to understand everything everybody does, in the same way that they do. It was to be able to ask the questions and help everyone knit things together and come to conclusions.” (KERA’s Think interview, 31 March 2017). It is the same on an exhibit design project: it takes everyone involved to create a successful project.

Limitations in the questionnaire results can be resolved in future questionnaires. One such limitation was the lumping of data from all departments within a zoological or aquarium facility into one group. Likewise, responses from all participating design team members were analyzed as one group. There may be response differences between the various zoological departments and between the various design team professionals. Understanding those subtle differences will further refine communication especially when addressing specific exhibit elements and areas.

A second limitation was the low response from professionals outside of North America. A more balanced view from around the world would provide additional insight especially where cultural differences between the zoological or aquarium facility and the design team may add an extra layer of complexity.

A third limitation is the under representation of all professions on a typical design team. Also, a greater representation of individuals at the staff level may illustrate other subtle differences: new staff members may see the process through fresh eyes.

But as the questionnaire results have indicated, perceptions vary between zoo professionals and design team members. It is, therefore, the responsibility of everyone working on a new exhibit design to critically review to their own contribution to project communication.

Thanks to all participants who completed the questionnaires and to the organizations who were asked to distribute them including AAZK, AAZV, ABWAK, ALPZA, ARAZPA, AZA, AZFA, AZH, BIAZA, CAZA, EAZA, EAZWV, ICZ, IZVG, IZE, JZAE, ZAA, Zoo News Digest.

*A pdf copy of the slide show for this presentation, as well as other presentations at the 2017 International Zoo Design Conference (Wroclaw, Poland), can be found on the ZooLex website:*  
<http://www.zoolex.org/zoodesignconference/2017/2017conference.html> .

## APPENDIX A:

### Questionnaire for Zoo Professionals

My name is Barbara Brem. I am a registered Landscape Architect and an editor with ZooLex Zoo Design Organization.

I am preparing a conference presentation about the experiences that designers, zoo staff and consultants had working with one another on the planning, design, and construction of new or renovated exhibits.

This questionnaire has been designed for zoo and aquarium professionals.

If you are working with or have worked with a designer (architect, landscape architect, engineer, etc.) that you feel would be willing to contribute their experience(s), please have them e-mail me ([barbara\\_brem@verizon.net](mailto:barbara_brem@verizon.net)), and I will forward them the appropriate survey link. The questionnaire for design team members is similar but worded slightly differently. (Respondents are not tracked so I will not know “who” answered “what”.)

This questionnaire will aid in my better understanding positive and negative experiences from a variety of perspectives and will allow me to provide suggestions based on those experiences that may improve future exhibit design and construction projects. Neither questionnaire will not be used to “blame” any group for negative experiences but will allow me to see where weakness may lie and what improvements can be suggested.

The information collected will remain confidential and will not be shared directly with anyone. By completing this questionnaire, you consent that the information disclosed may be used for the preparation of the conference presentation. Your name, your firm or facility name, and project names are not requested or tracked.

The questionnaire is a total of 16 questions, and should take you under 10 minutes to complete.

If you would like further information about the questionnaire, the presentation, or the conference, or would like to provide additional information, you can e-mail me at: [barbara\\_brem@verizon.net](mailto:barbara_brem@verizon.net). Thank you for your participation.

For the purpose of this questionnaire, the following definitions apply:

- Facility - any public or private entity that holds and cares for captive animals for the purpose of public display, public education, conservation, and / or recreation. This includes facilities such as zoological gardens, sanctuaries, aquaria, and other similar entities.
- Consultant(s) - a person or team external to a facility that is contracted to provide expert advice: in this case, advice on the design and construction of animal exhibits.
- Staff – any person employed by a zoo, sanctuary, or aquarium including keepers, and maintenance, horticulture, education, marketing, guest services personnel, etc.

1. Do you work for a facility that holds and cares for captive animals for the purpose of public display, public education, conservation, and / or recreation?

- Yes
- No
- Other:
- Facility not open to the public

2. Where is your facility located:

- Africa
- Asia
- Australia

- Europe
  - North America
  - South America
3. In what department do you work?
- Administration
  - Animal
  - Communications
  - Education
  - Facilities
  - Graphics
  - Guest Services
  - Horticultural
  - Nutrition
  - Research
  - Safety
  - Veterinary
  - Other: (Write-In)
4. What is your job description:
- Director, Assistant Director, CEO, COO
  - Curator, Head of Department, Coordinator, Veterinarian
  - Assistant Curator, Manager, Supervisor
  - Keeper, Educator, Worker, Technician, Nutritionist, Trainer, Assistant
  - Other: (Write-In)
5. How many years of experience do you have (including zoo and related non-zoo experience):
- 0-2 years
  - 2-5 years
  - 5-10 years
  - 10-15 years
  - 15-20 years
  - 20+ years
6. Which consultant(s) have you worked with: (check all that apply)
- Biologist(s) not employed by a zoo or aquarium
  - Design team (including but not limited to Architect, Engineers, Landscape Architect)
  - Professionals from other zoos
  - Other: (Write-In)
  - None: I have not yet had the opportunity
  - None: we design and build our own exhibits
7. In relation to the location of your facility, where have your consultants been from: (check all that apply)
- From our city, region, or state (local)
  - From within our country
  - From another country (foreign)
8. What percent of the project design and construction time have you worked with the consultant(s)? (For animal keepers: what percent of time have you been involved on exhibits specific to “your” species? For non-animal staff: what percent of time have you been involved overall?)
- 0%

- 1-10%
  - 11-50%
  - 50-90%
  - >90%
9. Do you feel that this amount of time was sufficient for you to convey important information which could have minimized post-construction problems?
- Yes
  - No
  - Other: (Write-In)
  - No, but I would like to be part of the process
10. During which project phase(s) have you worked with a consultant(s): (check any that apply)
- Preliminary design
  - Planning meetings
  - Construction Drawing review and comment
  - Shop Drawing review and comment
  - Construction meetings
  - Construction review (oversee the construction process)
  - Other: (Write-In)
  - None of the above
11. During which project phase(s) do you feel that you should work with the consultant(s): (check any that apply)
- Preliminary design
  - Planning meetings
  - Construction Drawing review and comment
  - Shop Drawing review and comment
  - Construction meetings
  - Construction site visits (oversee construction process)
  - Other: (Write-In)
  - None of the above
12. Which of the following have minimized post-construction problems (beyond maintenance issues) for you or your department: (check up to 4 that apply)
- Our department was represented on tours of other facilities prior to exhibit planning.
  - The consultants and our department discussed all important points in multiple project phases.
  - The time from planning through opening allowed me or our department to adequately review and comment on Drawings.
  - Early department involvement allowed problems to be found and resolved quickly.
  - Consultants did not use low quality materials or contractors.
  - All changes made during construction were recorded and given to the zoo in an As-Built drawing set.
  - Other: (Write-In)
  - None: our department has generally had to repair post-construction problems.
13. Which of the following may have contributed to post-construction problems (beyond routine maintenance): (check up to 4 that apply)
- The process was not transparent and our department was not asked to review or comment on plans.

- The time from planning through opening was too short to resolve problems without delaying the project.
  - Our department was involved too late for recommended changes to be made.
  - The consultant did not use high quality materials or contractors.
  - Changes made during construction were not recorded or an As-Built drawing set was not given to the zoo resulting in “lost” information.
  - Consultants did not understand keeper or animal needs or animal behavioral concerns.
  - Consultants did not understand the appropriate plant material for our area or the proposed animals.
  - Consultants did not understand how our department operates or number of available staff.
  - Consultants did not understand special considerations required for construction within a zoo.
  - Consultants did not understand local construction methods.
  - Consultant did not understand cultural differences resulted in exhibit misunderstandings.
  - Other: (Write-In)
  - None: we did not have any post-construction problems.
14. Based on your most positive experience, what advice would you pass on to a future consultant?
15. Based on your most frustrating experience, what advice would you pass on to a future consultant to minimize those frustrations or problems?
16. Overall, on a scale of 1-5 (1- the best) (5-worst), how would you rate your experience working with a design team or other consultant?
- 1
  - 2
  - 3
  - 4
  - 5

## APPENDIX B:

### Questionnaire for Design Team Members

My name is Barbara Brem. I am a registered Landscape Architect and an editor with ZooLex Zoo Design Organization.

I am preparing a conference presentation about the experiences that designers, zoo staff and consultants had working with one another on the planning, design, and construction of new or renovated exhibits.

This questionnaire has been designed for designers and their design team including architects, engineers, landscape architects, etc.

If you are working with or have worked with a zoological garden or aquarium that you feel would be willing to contribute their experience(s), please have someone contact from the facility e-mail me ([barbara\\_brem@verizon.net](mailto:barbara_brem@verizon.net)), and I will forward them the appropriate survey link. The questionnaire for zoo and aquarium professionals is similar but worded slightly differently. (Respondents are not tracked so I will not know “who” answered “what”.)

This questionnaire will aid in my better understanding positive and negative experiences from a variety of perspectives and will allow me to provide suggestions based on those experiences that may improve future exhibit design and construction projects. Neither questionnaire will not be used to “blame” any group for negative experiences but will allow me to see where weakness may lie and what improvements can be suggested.

The information collected will remain confidential and will not be shared directly with anyone. By completing this questionnaire, you consent that the information disclosed may be used for the preparation of the conference presentation. Your name, your firm or facility name, and project names are not requested or tracked.

The questionnaire is a total of 16 questions, and should take you under 10 minutes to complete.

If you would like further information about the questionnaire, the presentation, or the conference, or would like to provide additional information, you can e-mail me at: [barbara\\_brem@verizon.net](mailto:barbara_brem@verizon.net). Thank you for your participation.

For the purpose of this questionnaire, the following definitions apply:

- Facility - any public or private entity that holds and cares for captive animals for the purpose of public display, public education, conservation, and / or recreation. This includes facilities such as zoological gardens, sanctuaries, aquaria, and other similar entities.
- Consultant(s) - a person or team external to a facility that is contracted to provide expert advice: in this case, advice on the design and construction of animal exhibits.
- Staff – any person employed by a zoo, sanctuary, or aquarium including keepers, and maintenance, horticulture, education, marketing, guest services personnel, etc.

1. Do you work for a firm that designs or constructs animal exhibits for facilities which hold and care for captive animals?
  - Yes
  - No
  - Other:
2. Where is your firm located:
  - Africa
  - Asia

- Australia
  - Europe
  - North America
  - South America
3. In what field do you work?
- Architecture
  - Engineering
  - Graphics
  - Landscape Architecture
  - Other: (Write-In)
4. What is your job description:
- Principal, Director
  - Associate
  - Designer
  - Other: (Write-In)
5. How many years of experience do you have (including zoo and related non-zoo experience):
- 0-2 years
  - 2-5 years
  - 5-10 years
  - 10-15 years
  - 15-20 years
  - 20+ years
6. Which consultant(s) have you worked with: (check all that apply)
- Biologist(s) not employed by a zoo or aquarium
  - Client: staff (keepers, and maintenance, horticulture, education, marketing, and guest services personnel)
  - Professional(s) from other zoo(s)
  - Other: (Write-In)
  - None: I have not yet had the opportunity
7. In relation to the location of your firm, where have your consultants been from: (check all that apply)
- Local (from our city, region, or state)
  - From within our country
  - Foreign (from another country)
8. What percent of the project design and construction time have you worked with consultants?
- 0%
  - 1-10%
  - 11-50%
  - 50-90%
  - >90%
9. Do you feel that this amount of time was sufficient for you to gain needed information to minimize post-construction problems?
- Yes
  - No
  - Other: (Write-In)

- No, but I would like to be part of the process
10. During which project phase(s) have you worked with a consultant(s): (check any that apply)
- Preliminary design
  - Planning meetings
  - Construction Drawing review and comment
  - Shop Drawing review and comment
  - Construction meetings
  - Construction site visits (oversee the construction process)
  - Other:
  - None of the above
11. During which project phase(s) do you feel that you should work with the consultant(s): (check any that apply)
- Preliminary design
  - Planning meetings
  - Construction Drawing review and comment
  - Shop Drawing review and comment
  - Construction meetings
  - Construction site visits (oversee construction process)
  - Other:
  - None of the above
12. Which of the following minimized post-construction problems: (check up to 4 that apply)
- Different zoo department were represented on tours of other facilities prior to exhibit planning.
  - There was full transparency with the various zoo departments affected by the design.
  - The time from planning through opening allowed me to adequately review and analyze comments from zoo staff and / or consultants.
  - Early consultant and zoo staff involvement allowed problems to be found and resolved quickly.
  - The project budget was not reduced resulting in a high quality end product.
  - All changes made during construction were recorded and given to the zoo as an As-Built drawing set as part of the Scope of Work.
  - Other: (Write-In)
  - None: post-construction repairs or unforeseen problems are a normal part of the construction process.
13. Which of the following may have contributed to post-construction questions or problems (beyond routine maintenance): (check up to 4 that apply)
- The process did not allow input or comments from zoo staff.
  - The time from planning through opening was too short to allow all problems to be found or resolved without delaying the opening.
  - Zoo staff was involved too late for their recommendations to be incorporated.
  - The budget was reduced resulting in lesser quality materials or contractors.
  - Changes made during construction were not recorded or an As-Built drawing set was not part of the Scope of Work.
  - Zoo staff did not convey critical information about keeper or animal needs or animal behavioral concerns.
  - Zoo staff or consultants did not convey information about plant material that they found unacceptable including potential toxicities to proposed animals.
  - Zoo staff did not convey specific departmental needs.

- Zoo staff did not understand the construction process.
  - Local construction methods required unexpected changes.
  - Cultural differences resulted in exhibit misunderstandings.
  - Other: (Write-In)
  - None: there have been no post-construction problems, beyond routine maintenance, that we were made aware of.
14. Based on your most positive experience, what one piece of advice would you pass on to zoo staff or consultants on future projects? (Write-In)
15. Based on your most frustrating experience, what one piece of advice would you pass on to zoo staff or consultants on future projects to minimize those frustrations? (Write-In)
16. Overall, on a scale of 1-5 (1- the best) (5-worst), how would you rate your experience working with zoo staff and consultants?
- 1
  - 2
  - 3
  - 4
  - 5