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 * No

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Animal Management		Marketing	
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Perspectives on Exhibit Development, Design and Interpretation
2003

Topic Description:

An understanding of how different design eras have affected zoos and aquariums can help an institution clarify its philosophical approach to developing exhibits. A long-range plan that includes design guidelines can be used to describe this philosophy and provide a framework for exhibit development through a long period of time.

Ultimately, planning and exhibit design must integrate many considerations including those associated with the well being and behavior of both animals and visitors. The exhibit development process includes a series of interdependent stages that proceeds through time to produce the physical context for the visitor's experience and the systems that support live plants and animals. Multidisciplinary teamwork can lead to exhibits that satisfy many different requirements simultaneously. The process and products of an exhibit development effort should be positive reflections of the institution's core values and mission statement.

Topic Goals:

- To provide an organized and iterative approach to exhibit development that addresses practical concerns and encourages innovation.
- To enhance the participants' understanding of multidisciplinary approaches to exhibit development and design.
- To improve the effectiveness of all participants in planning and exhibit design processes. To encourage the holistic integration of conservation messages and interpretive principles within the exhibit design process.

Topic Outline:

I. THE EVOLUTION OF EXHIBIT DESIGN IN ZOOS AND AQUARIUMS
    A. The Influence of Royal Menageries and Linnaean Taxonomy
    B. Hagenbeck Influence
    C. Modernism
    D. Realism and Landscape Immersion
    E. High-tech and High-touch Playscapes
    F. Hybrid Styles

II. LONG-RANGE PLANNING AS A FRAMEWORK FOR EXHIBIT DESIGN
    A. Integration of Planning Efforts
    B. Organizing Principles and Thematic Linkage
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III. DESIGN CONSIDERATIONS
    A. Animal Considerations
    B. Spatial Allocations
    C. Safety and Maintenance
    D. Education and Interpretation
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    F. Aesthetics
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IV. STAGES OF AN EXHIBIT DEVELOPMENT PROCESS
    A. Concept Design
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I. THE EVOLUTION OF EXHIBIT DESIGN IN ZOOS AND AQUARIUMS

Zoos and aquariums have changed dramatically through history and have been influenced by several overlapping design eras and cultural changes. Since many institutions are in transition, it is common to see old exhibits next to the new. For those who become involved in exhibit design processes, it is often useful to view exhibit design in an historic context and to understand the philosophical differences among various approaches to design.

The Influence of Royal Menageries and Linnaean Taxonomy: Many of the earliest zoos began as royal menageries or were strongly influenced by them. Animal enclosures were often framed with Baroque symmetry, ornamentation and formal architecture. Some buildings constructed as recently as the 1930s still incorporate elements of basilicas, domed cathedrals and the royal hunting lodges of European aristocracy. Linnaean classification had a profound effect on how early collections were organized and, in most instances, they were grouped taxonomically. For example, visitors went to one area to see primates and another area to see snakes or birds. Specimens were displayed as curiosity objects housed in geometric cases, jewel boxes, tanks and cages. Some of these curiosity cabinets took the form of outdoor cages or pits while others were found inside buildings that assumed titles such as "Primate House," "Snake House," "Aviary," or "Feline House." Visitors typically went from one "house" to another or from one gallery to another, to find animals from different taxonomic groups.

Adjacent landscapes usually consisted of formal, ornamental gardens or well manicured lawns. The balance between landscapes, architecture and distant scenery varied, but many zoos occupied park-like settings. In contrast, most early aquariums and natural history museums occupied large buildings in areas of concentrated, often monumental architecture. For many decades (and even today) zoos described themselves with words such as houses, yards, barns, pens and paddocks-terms borrowed either from human architecture or from livestock farming. The large public aquariums in many European cities built between 1850 and 1880 were influenced by romanticism and conscious efforts were made to create the illusion that the visitor was entering an underwater world. However, the *gestalt* of most early zoos, museums and aquariums tended to be one of human order, control and dominance.

Hagenbeck Influence: In 1907, Carl Hagenbeck caused a sensation in Europe with the creation of some magnificent outdoor panoramas for the display of animals representing different taxonomic groups. Different species were seen within the same "cone of view," but were separated from one another by moats. Hagenbeck showed that it was possible to contain many animals without the use of visible barriers. His panoramic exhibits incorporated overlapping sight lines, often with waterfowl in the foreground, hoofstock in the middle distance, and large carnivores or goats on jagged pinnacles in the background. However, his work was influenced more by the romantic landscaping and painting styles of the time than by studies of animal habitat or ecological relationships. Nevertheless, his exhibits were repeated at many zoos. Copies were made of copies and many grotto exhibits in North America show the result of what is often referred to as "trivialization and reductionism." These moated, grotto exhibits were typically much smaller than Hagenbeck's panoramas and, while some presented a mixture of species, they lost the complex overlapping

sight lines and visual drama of the Hagenbeck prototype.

Modernism: The influence of the modernist movement that began in the 1930s became especially conspicuous during the 1950s and continues to be influential today. The emphasis of modernism was a combination of functionality and artistic abstraction. Architecture continued to define the context within which animals were seen. Outdoor exhibits of this era often included rock work that had changed to plain walls of concrete or architectonic platforms-abstract expressions of geologic form. Other exhibits of this era were characterized by glass-fronted enclosures with laboratory tiles lining the walls. These enclosures were usually equipped with stainless steel furnishings that were relatively easy to clean. The emphasis was on hygiene and efficient maintenance. Environmental control technologies and new disinfectants helped to increase the longevity of animals, but the viewing context was often clinical or "machine like." The hard-edged exhibits of this era, juxtaposed with conspicuous architecture, often produced a perceptual context of human control over nature. Particularly when enclosures were perceived as too confining and sterile, the psychology of humans as captors and animals as captives was often reinforced.

Realism and Landscape Immersion: A counter movement away from the human dominated appearance of exhibits gained momentum in the 1970s and still continues today. This approach emphasizes the realistic portrayal of the animal's natural habitat. It strives to accentuate the inseparable connection between the survival of animal species and the survival of their habitats in the wild. In most cases, architecture and other elements that might symbolically contribute to a sense of human dominance are concealed-often by vegetation or geologic simulations. However, certain cultural architectures and artifacts may be incorporated to evoke the presence of people who live within or near the habitats being portrayed. This particular approach is often referred to as "cultural resonance" (Jones, 1989) and great care is usually taken to ensure that cultural elements do not overpower the respectful presentation of animals.

In zoos, the realistic approximation of most habitats requires a focus on landscape design. Not surprisingly, zoo horticulture has become increasingly important during this era and is considered essential to the successful application of realism and landscape immersion principles today. Aquariums have also been influenced by this design era and many of them even incorporate terrestrial landscapes. However, their primary focus has been on the portrayal of aquascapes in an increasingly realistic manner and some remarkable advances have occurred during recent years.

Many institutions have created realistic habitat exhibits without applying the principle of immersion. Visitors stand in an area that looks and feels urban and architectural while viewing a scene that appears to be wild. In this approach visitors are physically and psychologically outside of the exhibit setting. These naturalistic, non-immersion exhibits have become fairly abundant as older exhibit facilities have been renovated rather than replaced. By contrast, naturalistic immersion exhibits attempt to create an illusion that the visitor is inside the habitat by extending the complexity of the animal's environment into the "visitor touch zone." This is intended to help visitors more easily imagine themselves as respectful interlopers in the animal's wild domain rather than as dominant spectators-separated from the natural world.

Numerous aquariums have used the immersion principle by creating walk-through acrylic tunnels surrounded by water teeming with aquatic life. Acrylic bubbles, domes and viewpoints that extend into the surrounding water are other examples of techniques that can be used to make barriers appear less visible and help visitors feel as if they are immersed in aquatic habitat. In some instances, visitors make partial contact with water or enter it fully. The immersion analog in museums is demonstrated by life-sized, walkthrough dioramas that help visitors imagine that they are somewhere else-in place or time.

High-tech and High-touch Playscapes: There has also been a movement to combine imagination, information and play in designed-for-purpose learning environments. These environments are sometimes referred to as educational playscapes. Some playscapes are outdoors and frequently incorporate plants and adventure architecture. Others are strictly indoors and may or may not include live plants or animals.

Other playscapes include interactive models and communication technologies. Many zoos, aquariums, museums and science centers have used recent advances in multimedia technologies to engage a broader spectrum of learning preferences and age groups. Hightech media are often distributed through a circulation

route in much the same way as more traditional interpretive signs. In other cases, high-tech elements are combined with hightouch media in dense, clustered concentrations that may resemble video arcades. Some of these complexes have created their own attraction and holding power that may be independent of live animals (though live animals have occasionally been incorporated). However, large graphic images, neon lights, touch screens, videos and computers can create an ambiance that overpowers the presentation of living animals in the same perceptual context. It is possible to create a hyper-reality that distances the visitor from living things. Animal contact areas or exhibits surrounded by high levels of energetic physical activity and noise can create similar contextual concerns. It is often difficult to present live animals in high-energy playscapes that simultaneously appear humane and respectful.

Hybrid Styles: Most older zoos and aquariums are hybrids of several styles and have faced the challenge of integrating new exhibits with the old. Because these institutions often reflect the influence of dramatically different design eras, the overall context may be one of contrast, transition or disjointed incrementalism. Many zoos have historic buildings that have been renovated so that their interiors now show animals in habitat dioramas. In other examples of hybridization, high-tech interpretive media and naturalistic playscapes have been combined with immersion exhibits. If these features are well located and contextualized, they can offer variety and surprise without diluting the impact of immersion or conflicting with attempts to display animals in a respectful manner.

II. LONG-RANGE PLANNING AS A FRAMEWORK FOR EXHIBIT DESIGN

Integration of Planning Efforts: Planning methods vary among institutions and there are typically several planning documents that must be integrated. These often include a strategic plan, a development (fund-raising) plan, a business plan, an operational plan, a collection plan, an education plan, and a physical development plan. All of these plans involve an iterative process of review, revision and renewal. They must all be flexible enough to respond to changes in political, economic, physical and cultural variables. Even an institution's mission statement and core values may change over long periods of time. Plans should be updated and carefully integrated to ensure that they are not contradictory. They should each support one another and the mission of the institution as a whole.

Most planning processes include some type of inventory, analysis, synthesis, generation of alternatives and the selection of a preferred alternative. A long-range plan for physical development generally includes exhibit scenarios presented as concepts rather than as final designs. The plan should integrate these scenarios with visitor circulation routes, service routes, events and concession zones, education facilities, support facilities, primary utilities and access. The plan should include design guidelines for exhibits and other components that work together to support the institution's philosophy, mission and core values.

Organizing Principles and Thematic Linkage: Organizing principles for exhibit plans help to determine the spatial arrangement of a zoo or aquarium's physical environment. They should make the plan describable to others and demonstrate a comprehensive view of how exhibits or other development zones relate to one another. The selection of an organizing principle influences visitor circulation and other interdependent components of the physical plan. The many variables and complexities that must be addressed in a planning effort often make it difficult to express a unified set of ideas. However, this is ultimately necessary if continuity is to be established through long time periods. Any organizing principle, no matter what it is, provides a means for reducing complexity and for creating a plan that can guide physical development for many years to come.

While there are many potential organizing principles and thematic linkages available to zoos and aquariums, there has been a general trend away from taxonomy towards ecological organizing principles. Ecological perspectives offer the flexibility to emphasize concepts such as interdependence, adaptations, habitat and conservation. Many zoos organize their exhibits by zoogeographic regions or bioclimatic zones (biomes). These organizing principles are consistent with an emphasis on the relationship between animals, habitat and people.

Flexibility for change is desirable, particularly if the plan is to be implemented through a long time period. If species lists are presented, it may be useful to indicate them as examples rather than as obligations or

commitments. The future availability of certain species may be difficult to predict. Since most plans carry examples of exhibit projects that have been developed only at the conceptual or schematic level, a more rigorous design process will certainly be required to bring these concepts to fruition.

Sequencing and Phasing: It is generally not practical to develop or redevelop an entire zoo or aquarium all at once. Therefore, a sequential or phased plan for developing new exhibits is often warranted. One zone of exhibits may have to be completed before another one begins. Space for a new exhibit can be reserved ("foot printed") within an existing complex for future development. If project-specific fundraising is likely to occur, it is important that fund-raisers and others understand that physical and functional relationships may dictate a particular sequence for project implementation.

Construction in a particular area may displace existing functions that must either be accommodated elsewhere or eliminated. If the plan indicates a long-term relocation for these functions, preparations must occur before the project at hand can be completed. These preparations must often be included and funded within the scope of the primary project. In some cases, functions are temporarily relocated and then returned to the project area when construction is complete. Fund-raisers and decision-makers must be informed of the domino effect and the practicalities of implementation ahead of time. They will typically encourage the development of an implementation plan that can be accomplished in logical, sequential phases. Sequencing and phasing exhibit openings can also be a strategic means for sustaining public interest because new exhibits can be added over a span of several years.

III. DESIGN CONSIDERATIONS

Some long-range plans offer a comprehensive set of guidelines for exhibit design and these can be very useful to all who become involved in a design process. Guidelines specific to the design of animal exhibits and the representation of natural habitat may be unfamiliar to professional designers who have not specialized in zoo and aquarium exhibits. Written guidelines from an approved plan help to inform outside design consultants, architects, landscape architects and their sub-consultants about the institution's perspective on design.

Animal Considerations: Animal health and well being should be the foremost concern at the outset of a design process for animal exhibits. Whenever possible, features should be incorporated to facilitate behavioral enrichment and animal care. Animals should have access to shelter, water and areas of retreat. Depending on the species, a variety of microclimates should be created so that animals can choose from within a range of temperature and humidity options appropriate for their species. Advances in environmental enrichment techniques should be considered early in the design process because it is often possible for exhibits to stimulate and accommodate a wide range of species-typical behaviors. Enrichment often results in more varied behaviors and higher activity levels. Not only is this better for the animals, but most visitors find active animals engaged in diverse behavior inherently more interesting. Activity typically increases the "stay time" or "holding power" of an exhibit. When visitors spend more time at exhibits, they are likely to learn more-either through their own observations or by interacting with interpretive media and staff. Considerations for the well being of animals and the quality of the visitor's experience must be interwoven through all aspects of the design process.

Spatial Allocations: Space must be allocated for animal enclosures, animal service areas, visitor circulation, landscape and interpretive media. The balance among these spatial allocations is important to the appearance of an exhibit, the experiential context and to the exhibit's functionality. Achieving such a balance typically requires multidisciplinary teamwork and an understanding of how much space is required to satisfy specific objectives. It is especially important to address the accessibility needs of non-ambulatory visitors and those who may have other special needs. The requirements of the Americans with Disabilities Act (ADA) should be met or exceeded.

Safety and Maintenance: The design should consider safety from several perspectives. The exhibit must be safe for the animals, for visitors and for the staff who will maintain and operate the exhibit. Many exhibits will require the replacement of certain natural and artificial components as time passes. The design should anticipate these cyclical needs and address concerns related to safe and efficient access. Convenience and operational efficiency must occasionally be less than optimal as aesthetic and educational goals are balanced within the

constraints of the site and budget. However, essential provisions for safety should not be compromised; exhibits should strive to meet or exceed all safety standards.

Education and Interpretation: Educational objectives and story lines should play a significant role in shaping the overall design. However, these may require revision in response to constraints that are clarified as the design progresses. Limitations in resources and space may require changes in the original concept or exhibit story.

Organized educational programs such as classes and guided tours for groups should be considered at the outset of the design process. It is often possible to establish pull-out nodes or structures that can be used during education programs without blocking the circulation of casual visitors. The exhibit design should also consider storage for such things as docent carts and teaching props. If the institution's design philosophy is anchored in realism and immersion, these storage areas should be naturalistically concealed or integrated with culturally appropriate architecture. Some zoos and aquariums have been able to develop interpretive centers or classrooms that are integral to an exhibit. Sometimes, space and budgetary constraints make this impossible, but it is best to consider these possibilities early in the design process so that various options can be explored.

Interpretation is an educational process that strives to reveal meanings and relationships through first hand experience. It should forge emotional and intellectual connections between the interests of the audience and the interpretive resource. The success of interpretive media such as signs often relies on accessibility and the ability to attract and hold the visitor's attention. Ideally, relevant interpretive information should be accessible at the moment the visitor's natural curiosity is ignited. A docent or a staff person with first-hand knowledge can often do wonders, but it is impractical for most institutions to staff all of the places that offer the potential to pique the visitor's interest. Therefore, it is generally necessary to use a variety of interpretive media within which content is rationed, distributed and reinforced in different ways.

Even within the same institution, interpretive planning may occur in different ways, depending on the project. The decision to develop an interpretive subteam that connects back to the core project team often depends on the size and complexity of the project. Regardless of whether there is a separate subteam or whether interpretive planning occurs primarily within the core team, the plan must be well integrated with the perceptual and other goals of the exhibit. Interpretive media and its content can shape visitor impressions of the intended purpose and meaning of an exhibit. The location and character of interpretive media such as signs should be harmonious with the look and feel of the exhibit because they become part of the exhibit's physical context. The sizes, locations, and angles of interpretive elements should be indicated on exhibit design drawings.

A critical first step in creating an interpretive plan is to conduct a front-end evaluation to determine what visitors already know about the exhibit topic, identify their misconceptions, and discover what they would like to learn. With information about the visitor's perspectives and the institution's own goals, the interpretive team often does some brainstorming outside of the core group meetings. The team eventually proposes a brief statement that explains what the exhibit is really about. This is the "Big Idea" championed by Beverly Serrell in her book, *Exhibit Labels: an interpretive approach* (Serrell 1996). This should be a statement in one sentence that expresses one big idea-not several. It should set the tone for the interpretive focus and delineate what will and will not be included. A clearly focused "Big Idea" can help in the rationing and distribution of digestible "chunks" of information through the exhibit so that visitors are not overwhelmed with too much information in a single location.

As the interpretive plan becomes integral to the overall exhibit design process, it begins to inform physical aspects of the exhibitry such as landscape or aquascape props, geologic details, sound effects and graphics. This integration will help to ensure that interpretive elements do not appear as afterthoughts that detract from the intended aesthetics of the exhibit and the overall "sense of place."

In his classic 1957 book, *Interpreting Our Heritage,* Freeman Tilden proposed six principles for interpretation. These principles are still relevant to educators and others who become involved in developing interpretive media for exhibits.

1. Any interpretation that does not somehow relate what is being displayed or described to something within the personality or experience of the visitor will be sterile.

2. Information, as such, is not interpretation. Interpretation is revelation based upon information. But they are entirely different things. However, all interpretation includes information.

3. Interpretation is an art, which combines many, arts, whether the materials presented are scientific, historical or architectural. Any art is in some degree teachable.

4. The chief aim of interpretation is not instruction, but provocation.

5. Interpretation should aim to present a whole rather than a part, and must address itself to the whole [person] rather than any phase.

6. Interpretation addressed to children (say, up to the age of 12) should not be a dilution of the presentation to adults, but should follow a fundamentally different approach.

During the past two decades, zoos and aquariums have made use of an increasingly diverse array of interpretive media. However, interpretive signs that combine words and images continue to be one of the least expensive options and are still in common use. Since most visitors come to zoos and aquariums for social and recreational reasons, it should not be surprising that most of them do not spend a lot of time reading lengthy signs. In general, they are more likely to read information that is brief and close to something in which they are interested. The information should be accurate and clearly written. The ABCs of interpretive writing include: (A) accuracy, (B) brevity and (C) clarity. However, there are many other factors that should also be considered as specific words and images are combined. Below is a set of recommendations derived and paraphrased from Beverly Serrell's book, *Exhibit Labels: an interpretive approach (Serrell, 1996)*.

- Start with what visitors detect with their senses and what they experience from their physical place of observation. Work from the specifics of what they can observe to the more general.

- Use a vocabulary appropriate to the broad range of ages represented by your audience. Adults or older siblings often read or interpret words and images for pre-literate children.

- Divide the information into digestible chunks such as short paragraphs or captions. These chunks should be understandable regardless of the order in which they are read. Each chunk should make sense to a reader who chooses not to read the other chunks of information available.

- Keep chunks of information to 75 words or less. A paragraph of 50 words will appear longer in large type than it does on a draft written in small type.

- Make the type relatively large so that visitors with different visual abilities have access to the information from various distances. In general, a type size less than 20 points should not be used.

- Position information (and other interpretive media) so that it is accessible to people of different heights and to those in wheelchairs. Depending on viewing distance and other factors, information presented at higher than 6-7 feet above the ground often goes unread.

One of the most common problems in interpretive writing is the tendency to add more and more information

to benefit the small percentage of visitors interested in additional detail or depth. However, the proliferation of text can actually discourage reading. Many visitors are overwhelmed by the appearance of too much information and will not stop to read anything except, perhaps, the headlines. Headlines or subheads that ask questions can encourage further reading when they pose the same questions that visitors are likely to ask. However, the body copy below the question (or under a lift flap) should begin to answer the question right away to avoid frustrating the visitor with information that may seem irrelevant to the question at hand.

Conservation: In many institutions, the information conveyed through interpretive media is designed to support and encourage conservation. Increasingly, these institutions are challenging themselves to demonstrate their own commitment to conservation through operational procedures and exhibit design. An exhibit's potential for reinforcing conservation messages and for highlighting the conservation successes of the institution may rely, in part, on its potential to accommodate species with urgent conservation needs. In addition to basic animal husbandry needs, exhibit design should anticipate the future desire for breeding along with the many animal management logistics associated with reproduction.

Exhibit design should strive to minimize deleterious effects on the environment and to conserve natural resources. Zoos and aquariums must challenge themselves to "walk the talk" of conservation by designing exhibits that use energy-efficient technologies and renewable resources obtained through sustainable methods. While the deeper stories of an institution's commitment to conservation may not immediately reach the visitor's awareness, the ethics and process of design are often of interest to the community and various professions. In some cases, it is possible to reveal the institution's conservation activities in ways that are interesting to the lay public and integral to the exhibit itself.

Aesthetics: Subtleties of location, angles, perspective, illusion and the juxtaposition of objects can affect the aesthetics and "psychological feel" of an exhibit. Because landscape, artificial exhibitry, interpretive media, sculpture and other artworks occupy physical space, they can add to or subtract from the intended aesthetic of an exhibit. The relationships among interpretive media, landscape and architecture are fundamentally important to the "epiphany of place." Therefore, aesthetic and interpretive guidelines developed early in the design process should be monitored as various elements are being produced, installed or planted.

Context, Concept and Content: In the end, the take-away message of an exhibit is whatever the visitor remembers. Visitors are not obligated to pay attention to all aspects of an exhibit and may have very different priorities for experience and information. Each
visitor brings a set of preconceptions and *a priori* knowledge that influences the construction of personal meaning. Since visitors are individually unique, they create different meanings. Their memories are usually a positive reflection of the institution when the physical context, interpretive concepts and educational content are mutually supportive and harmonious. Traditionally, many zoos and aquariums have viewed themselves as "meaning makers" and their visitors as "meaning takers." However, visitors sometimes derive meanings unintended by the project team. These meanings are often related to the exhibit's overall perceptual context.

Context is usually defined as the visitor's surroundings and includes everything the visitor perceives. The exhibit context provides a broad and varied set of changing stimuli that affects what the visitor is likely to feel and think. Since visitors experience and learn something just by being in a new environment, the context and psychological feel of a place are extremely important. While many physical characteristics of an exhibit may be the same for everyone, individual perceptions of them are unique. These perceptions are affected by the specific memories, expertise, viewpoints, assumptions and connections that individuals bring with them. Since most visitors come as members of a social group, their perceptions and learning are also influenced by social interaction and by the behaviors of their companions. Because visitors hear and see other humans, exhibits provide only a portion of the total set of stimuli available in the physical and social environment. Therefore, the making of meaning from an exhibit experience is not determined by the exhibit alone.

Visitors encounter a multifaceted context as they search for animals. Sometimes a context is upsetting because of conspicuous confinement, a paucity of environmental enrichment, or other problems. Explanatory content on signs cannot always be expected to neutralize the visitor's emotional reaction. Concepts and content expressed in words cannot always explain away or justify a context that visitors find inherently unpleasant or frustrating.

Most zoos and aquariums try to promote and reinforce attitudes and behaviors that lead to the conservation of wildlife and wild places. Therefore, the goals of conservation education and exhibit development should go hand in hand. The full, perceptual environment should support the messages and meanings desired.

Flexibility and Change: The ability to adapt to change is an important dimension of an institution's long-range plan and of its exhibits. Exhibit designs should generally anticipate a set of species that could be accommodated through time without expensive changes. Many institutions find that they need to open new exhibits or other attractions every year to sustain high attendance levels and to remain relevant to their communities. As zoos and aquariums experience intensified competition with other attractions for the discretionary time and income of their audiences, their interest in temporary, seasonal and traveling exhibits has increased substantially. Some institutions are creating or updating physical development plans that include the flexibility for a regular cadence of new exhibit openings.

IV. STAGES OF AN EXHIBIT DEVELOPMENT PROCESS
Most zoos and aquariums use a planning and design process that moves through distinct stages from the initial idea to a fully operational exhibit. Terms for these phases vary among institutions, but they can generally be organized under the broad headings of concept design, design development, construction and post opening.

Concept Design: A multidisciplinary team is typically assembled at the beginning of an exhibit design process. Though brainstorming is anticipated and encouraged at this early stage, eventually the purpose, goals and objectives of the project must be described in a written document. This first stage focuses on words and ideas that progress toward increasing clarity and become part of a guidance document often referred to as the "project statement." This document should include a species list, budget information for both capital and operational aspects of the exhibit, guidelines for design, concept descriptions, information on guest capacity, and analyses of relevant studies. It should communicate the opportunities and constraints inherent to the project. It may be useful to engage outside consultants in this early stage to respond to preliminary drafts of the project statement. Depending on the institution and the specific project, several other documents are produced during this early stage: for example, a front-end evaluation plan, a site feasibility assessment and a funding study.

Design Development: Once the project statement has been approved, the words and ideas of the team can be translated into conceptual sketches that show relationships between major components of the exhibit. These early sketches are typically "bubble diagrams" used to explore story line linkages and programmatic relationships. Several alternatives are generated and the potential effectiveness of each is assessed in relation to the goals and objectives expressed in the project statement. Before more detailed drawings are produced, one of the conceptual design alternatives is selected as the most promising direction.

Though concept sketches convey ideas and relationships, they do not necessarily match the reality of the site. The creation of schematic drawings to test the concept is an important next step. Schematic drawings should help the team visualize how the concept might take shape within a physical space. Schematics begin to "ground truth" the concept. Will its components fit within the available space? Schematic drawings are likely to go through numerous iterations as they begin to suggest the character, size and physical relationship of exhibit components. Preliminary square footage calculations based on schematics should be used to develop rough cost estimates to confirm that the project will fit within the construction budget.

As the requirements for animal spaces, landscape, service areas, interpretive elements and visitor amenities become more clearly defined, designs are reworked and refined. Threedimensional working models can be especially useful to facilitate more detailed discussions about space allocations and their interfaces.

During the design development stage, the interpretive team may branch off to begin testing interpretive ideas in more depth. Formative evaluations are extremely useful as elements of the interpretive plan are refined. Design development drawings should begin to reflect enough detail so that they guide the development of construction drawings. Interpretive elements should be located and sized on design drawings because they will become part of the physical context. After design development drawings and

the interpretive plan are approved, detailed construction drawings for all aspects of the exhibit are created. Unless the exhibit is to be constructed by an in-house team, construction drawings become part of a bid package that also includes specifications and standards.

Construction and Commissioning: After contractors submit bids based on their own cost estimates, a contract is awarded and construction begins. It is usually during this stage that animals are acquired or relocated, acclimated and made ready for exhibition. Some institutions do much of their landscaping, interpretive fabrication and exhibit finishes through in-house specialists.

Staff must be adequately trained to operate and maintain the exhibit and it is important for them to understand the messages the exhibit is intended to support. An interpretive primer that tells the story of the exhibit can be a useful orientation tool. Ideally, this document should be completed and in use well before the end of the construction phase.

Preparations for commissioning (taking ownership and operating) the exhibit should also begin before construction is complete. Keepers, aquarists, horticulturists, custodians and other staff must work together to test various systems and to develop their approach to operating and maintaining the exhibit. It may be necessary to give plants in the exhibit a full growing season to become sufficiently established prior to the introduction of animals.

During commissioning, it is important to focus on staff training and to confirm the operational budget. Project team members should also be involved in the planning of opening events. Operational manuals, equipment manuals and other materials should be assembled and used as a team begins to take ownership of the new exhibit. It is not uncommon for commissioning to overlap the opening and post-opening stage of an exhibit. However, it is advisable to plan ahead to ensure that there is adequate time between the completion of construction and the exhibit opening so that efficient maintenance and operational patterns can be established.

Post Opening: After the exhibit opens, summative evaluations should be used to measure its success in relation to the project's goals and objectives. In addition, the exhibit design team should meet regularly with the successional team that operates and maintains the exhibit so that needs for improvements in the exhibit and operating methods can be clearly defined and addressed. The results of summative and other evaluations help determine priorities for modifications and fine tuning. Ideally, sufficient funds for this inevitable phase of the project will have been set aside.

Even after an exhibit has opened, it is likely that the successional team will continue to innovate within their own operational framework. Operational manuals should be updated and modified as needed. Changes to the exhibit, equipment and life support systems should be carefully documented.

V. Multidisciplinary Teams

Particularly with large, complex exhibit projects, it is likely that the entire staff will become involved in some way. Not surprisingly, most institutions assemble a team of people from different parts of the organization to work together through the exhibit development process. This helps to ensure that different perspectives and concerns are communicated along the way. Because several years may pass between the initiation of an exhibit's design and its public opening, some changes in team composition are inevitable. However, it is advisable to maintain as much continuity within the team as possible so that there is a good understanding of why certain decisions were made in relation to the original vision, goals and budget for the project.

In addition to the continuity team involved with the design process, there are various other staff who become intensively involved during implementation and exhibit operation. Generally, this successional team is also multidisciplinary. Good communication within and between the successional and continuity teams is extremely important to the long-term success of an exhibit.

Team Composition: Institutions define the roles of team members in different ways and the composition of

the team may be influenced by the specific requirements of the project. Team composition may also be somewhat dependent on the institution's organizational structure. However, the roles or perspectives of team members often include design, project management, animal care and management, education, interpretive planning, horticulture and maintenance. Some team roles may be filled by consultants from outside the institution. Staff team members are responsible for communicating with others in their areas of responsibility. Inevitably, many other people interact with team members at different stages of the process. Input and ideas from individuals outside the continuity team are often very useful and can add to the creativity and synergy of an exhibit project.

Team Building: It is important to develop certain norms, feedback loops and recordkeeping patterns to enhance the team's efficiency. The project manager or facilitator can generally guide the process to ensure that productive communication occurs in a timely manner. A regular schedule of meetings is usually necessary and meeting notes are typically distributed to staff members both inside and outside the team.

If members of the team have not worked together previously or are relatively new to the team process, it may be useful to consider the stages that are normally involved in team building: forming, brainstorming, establishing norms and performing the work (a.k.a. forming, storming, norming and performing). Shortly after the team has been formed, brainstorming about the project and the design process is likely to occur. The facilitator or project manager usually sets the stage for certain norms regarding communication, the schedule, the process and the products (deliverables). While the normative fabric of the team must have structure, this structure should not be so rigid that it suppresses creativity and innovation. After certain norms are established, the team begins to perform its work, which continues throughout the design process and beyond.

VI. Obstacles to Effective Implementation

The successful implementation of an exhibit development process requires that needs in several different categories are adequately met. These needs can be organized under four broad categories: (1) resources, (2) communication, (3) organizational structure and (4) the disposition of implementers (Edwards, 1980). A significant deficiency or obstacle in any of these categories can result in implementation failure or serious shortcomings.

Resources: Many types of resources are necessary for successful implementation including time, expertise and funding. Teams should be open to the idea of bringing in outside specialists to provide additional expertise and experienced perspectives. Because exhibit projects and their resource requirements vary, the same team and the same approach may not be appropriate in every instance. In addition, the project scope and expectations must be commensurate with the available funding. When resources are significantly limited, a phased implementation process may be warranted. In other instances, the project statement or program must be revised to match the reality of resource limitations.

Communication: Though resources may be adequate, progress on the project can be slowed down or paralyzed as a result of poor communication. Particularly when a team approach is used, an emphasis on clear, consistent and respectful communication is essential. Roles and responsibilities often change through a long exhibit process and it is important to be sensitive to these changes and to acknowledge them within the team.

Organizational Structure: Communication and consensus building among team members may be very good, but if the institution's organizational structure does not allow for expeditious decision-making and approvals, timelines can slip significantly. Particularly when some team members are involved in more than one major exhibit project at a time, it may be necessary to "back fill" their usual positions in the organizational structure to ensure that their expertise can be focused on the projects at hand.

Disposition of the Implementers: When successional teams become involved as implementers and operators of an exhibit, it is important that they understand the purpose of the exhibit and the messages it has been designed to support. If implementers are not favorably disposed to the project, the exhibit can fall

short of its potential. Motivation and a sense of ownership are typically important aspects of a successful implementation process.

VII. CONCLUSION

Developing new exhibits can seem like an overwhelmingly complex process if key strategies, goals and objectives are not outlined and accepted at the outset of a project. A clear project statement followed by a design process that encourages creativity and teamwork can produce results that often exceed expectations.

Zoos and aquariums must continue to challenge themselves to create exhibits that will be relevant and meaningful to diverse audiences in a changing world. Ultimately, the design process and the daily operation of an exhibit should demonstrate a dedication to the institution's core values and mission. In the end, exhibits are the outward manifestation of an institution's soul.

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Test Questions for Exhibit Design and Interpretation: Lee Ehmke and Emily Routman 2003

1. Most planning processes include
   A. inventory, analysis, synthesis, generation of alternatives and selection of a preferred alternative.
   B. project statement, concept sketches, schematics and construction drawings.
   C. front-end evaluation, formative evaluation and summative evaluation.
   D. none of the above

2. Landscape immersion
   A. emphasizes dense, formal gardens.
   B. emphasizes natural appearing exhibit environments for animals and familiar, architectural environments for visitors.
   C. is primarily associated with modernism.
   D. attempts to create the illusion of being within an animal's habitat.
   E. calls for visible barriers to ensure that visitors feel safe.

3. Organizing principles used in developing exhibits
   A. are usually the owners of a design firm.
   B. help to reduce the complexity of the design or exhibit plan, making it easier to describe to others.
   C. are usually presented in chart form to communicate the reporting relationships of staff or team members.
   D. provide an outline for the project statement.
   E. are the animal requirements referenced throughout the design process.

4. Development of a project statement occurs during which parts of exhibit development?
   A. Construction
   B. Design specifications
   C. Commissioning
   D. Concept design

5. Environmental enrichment
   A. is not a necessary consideration in the design process if an exhibit is to be naturalistic.
   B. is best left to animal experts after the exhibit is finished and operational.
   C. should be a conscious consideration from the outset of an exhibit design process.
   D. is generally associated with Hagenbeck designs.
   E. is synonymous with the aesthetics of an exhibit.

6. The context of an exhibit experience is
   A. written in the project statement or design program.
   B. everything the visitor perceives.
   C. the information contained in signs or other interpretive media.
   D. primarily what the visitor thinks and talks about while looking at an animal.
   E. unaffected by the behavior of humans visiting an exhibit.

7. The exhibit design process
   A. begins with the production of blueprints.
   B. is primarily an educational effort intended to forge emotional connections between visitors and the interpretive resource.
   C. is divided into non-overlapping, linear segments.
   D. includes a project statement, schematics and design development drawings.
   E. should begin with a summative evaluation.

8. During commissioning, the following activities occur:
   A. summative evaluation, staff training, operational budget approval
   B. interpretive planning, program statement written, staff training
   C. formative evaluation, staff training, operational budget approval
   D. summative evaluation, interpretive planning, project statement written

9. Cultural resonance refers to
   A. the inclusion of soundscapes in an exhibit.
   B. efforts to involve the community in raising funds for an exhibit royal menageries
   C. efforts to evoke the presence of people who live in or near the habitats being portrayed
   D. the longevity of an exhibit

10. "Big Idea" is used in interpretive planning to delineate what will and will not be included in an exhibit and helps to guide development of exhibit elements.
    A. True
    B. B. False

11. Signs and other interpretive media
    A. relate to concepts and content but do not affect the context of an exhibit.
    B. should not be considered an integral part of the exhibit design.
    C. should be located and sized on design drawings because they become part of the physical context.
    D. should be completed prior to the project statement.

12. Interpretive content within exhibits should generally
    A. start with something the visitor can see or otherwise sense
    B. consider the most likely sources of visitor curiosity and interest
    C. be brief
    D. work from the specific to the more general
    E. all of the above

13. Interpretive narrative should generally
    A. be divided into chunks such as short paragraphs or captions.
    B. start with general concepts and proceed to specific examples.
    C. be posted at heights of at least 8 feet so that everyone can read it.
    D. average about 200 words per sign so that visitors with deeper interests have immediate access to more information.
    E. all of the above

14. According to Tilden, the chief aim of interpretation is
    A. to distribute information through a story line.
    B. to involve children in learning.
    C. instruction
    D. provocation
    E. to explain an institution's policies and procedures

15. Obstacles to effective implementation can generally be listed under
    A. schematics, design development, construction drawings, commissioning
    B. planning, organizing, budgeting, scheduling
    C. forming, storming, norming, performing
    D. multidisciplinary teams, interpretation, circulation, evaluation
    E. resources, communication, organizational structure, disposition of the implementers

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Test answers:

1. A
2. D
3. B
4. D
5. C
6. B
7. D.
8. A
9. C
10. A
11. B
12. E
13. A
14. D
15. E

Test answers:
1. A
2. D
3. B
4. D
5. C
6. B
7. D.
8. A
9. C
10. A
11. C
12. E
13. A
14. D
15. E

Test answers:

1. A pg 4
2. D pg 3
3. B pg 4
4. D pg 9
5. C pg 5
6. B pg 8
7. D. pg 9
8. A pg 10
9. C pg 3
10. A pg 6
11. C pg 6
12. E pg 6-7
13. A pg 7
14. D pg 7
15. E pg 11