

Planetarium Support Areas

by Karl von Ahnen
Minolta Planetarium, De Anza College

All the magic in a planetarium doesn't happen without some outside help. Situated around the planetarium chamber are a number of areas that are needed to create, maintain and deliver the magic to the audience. These are the planetarium support areas. They may include:

- Offices,
- Storage space,
- Workshops,
- Production areas,
- Electronics room,
- Lobby, display/exhibit areas,
- Gift Shop
- Employee lounge,
- Meeting rooms,
- Library,
- Lecture hall

Some of these can be separate areas, and some can be combined or eliminated depending on the planned use of the facility. The combinations and arrangements of support areas are nearly limitless. Available space and facilities of the mother institution (museum, science center, school, ...), can help to determine what support areas will be needed in the planetarium building or area. The size of the dome is not necessarily the most decisive factor either. Some small planetaria have large staffs and do a lot of outreach and production work. Some larger facilities do only live shows, purchase all their shows, or do production in an outside facility. Some planetaria serve a singular purpose such as teaching celestial navigation, while others serve as multi-disciplinary immersive theaters. There is a wide variety of needs, but it's good to plan for future expansion.

Storage:

Storage is essential for any planetarium and is an often-overlooked and under allocated need. Even a portable needs a place to live. Portables, in fact, need an extra support area: space in a vehicle for transport. Without a plan, things often get stored anywhere near where they were last used, such as behind the dome, in the corners of the projection booths or galleries, or maybe under your desk or workbench. Sound familiar? Wouldn't it be nice to plan for storage space from the beginning?

When planning for storage, keep in mind that as years go by there will be more and more 'precious' materials that are not needed at the moment, but may be useful later. These could be special effects projectors, which may be called on to perform in another show, or be cannibalized for a new effect, or lobby displays to be used again for, perhaps, the next dinosaur show. Then there are telescopes for use after the evening public shows; broken projectors that will be repaired when you find the time (right...). Don't forget the archives. Many objects stored here will become mysterious, ancient artifacts to the next generation of planetarians. You wouldn't want to deprive them!

Storage areas should have ample shelving of various sizes, and cabinets to store fragile or valuable items, or items that need to be kept clean. You need space to keep spare parts, special tools, building materials, hardware, paint and office supplies. File cabinets are good for storing old fliers, brochures newspaper articles and other paper archive items.

You may want to include a lockable storage room for telescopes and expensive equipment, perhaps room for a portable planetarium to be used for outreach.

Plenty of floor space is also important. A hand truck will come in handy quite often.

A storage area is also needed to store boxes of brochures and fliers before distribution. It can serve as the gift shop stock room. The storage area is the 'catch-all'- a place where things go when you don't have room elsewhere. You might want to include a large open area here to use as temporary space for many other uses. This may also serve as a shipping and receiving area. Don't scrimp on storage space!

Office(s):

When planning office space keep in mind the size of the staff needed for your operation and that staff may increase. Office functions may include: correspondences; publicity; book keeping; ticket sales; gift shop sales and operations; scheduling; E-mail, phone and fax communications; production management; interviews and meetings. A barebones office will almost certainly require a desk a few chairs a telephone, a computer, file cabinet, book shelves (this will probably be your library area). In a smaller school setting this may also be the astronomy instructor's office. In a large museum this may require a number of separate office and meeting rooms.

Some things you may want to plan office room for are:

- * Storage for catalogues, attendance records, correspondence, tickets
- * A place to count out tickets and all the money!
- * Plenty of telephone and network jacks
- * Space for a fax machine and a printer
- * A copy machine
- * A safe

- * Speaker monitors to keep track of what's going on in the planetarium chamber

- * A bulletin board

- * Bookshelves for reference materials

A number of separate office rooms will be needed if you have a larger staff. A meeting room is important if you have a staff larger than a few, or expect to hold interviews, production meetings, etc. An employee lounge area for coffee machine, refrigerator, microwave oven, sink etc. may be needed. There have been times when a comfortable couch to kick back and take a two-minute nap would be very welcome. It has been suggested that a sauna or hot tub would be appreciated, but there are certainly other ways to keep your employees happy.

Work Shop(s):

Even if you're not planning to build things, something is bound to break!

There are a wide variety of projects that will need workshop space and tools. They can be pretty much broken down into the three categories of: Woodwork, Metal work and Electrical. (Possibility a fourth, Optical, could be added to the list.) This doesn't mean that you will need three shops, but it is nice to have at least separate areas in the shop for working on different sized things and things of different delicacy. It's a good idea to keep sawdust out of the slide projectors and metal filings out of your electronics projects. Plenty of electric outlets should be planned for in all areas. To help you plan these areas, here are some of the tools you'll need:

Wood:

Basics:

Work bench with wood vise, saw horses, toolbox for tools to acquire as you need them. Start with: hand saw, hammer, rasp, sand paper, punch, square, clamps, screwdrivers, pliers, painting supplies, goggles and/or face mask, dust masks.

Power tools: screw gun, hot-melt glue gun, electric drill, palm sander, saber (reciprocating) saw, shop vacuum.

Better equipped:

Add larger or multiple workbenches (different heights are nice for different size projects), small table saw, drill press, hand circular saw, belt sander, router, and an air compressor (good for removing dust and running air tools).

Well equipped:

Include large table saw with capacity for full sheets of plywood (high quality carbide tipped blades are highly recommended), chop saw, band saw, stationary belt/disk sander, jig saw, jointer, lathe, sawdust extraction system.

Metal:

Basics:

Bench with heavy metal vise, toolbox with starter tools of: hack saw, files, punch, screwdrivers, pliers, wrenches, clamps.

Power tools: Electric drill, saber saw, (these could be the same as for Woodworking, but with bits and blades for metal work) bench grinder.

Better equipped:

Tin snips, pop riveter, peening hammers, cold chisel, and calipers.

Power tools: Drill press (including good quality high-speed metal drill Bits), cutoff saw, bench grinder, metal cutting band saw. (Some band saws work for both metal and wood. They have a special gear reduction system for the slower speeds required for metal cutting.)

Well equipped:

MIG welder, acetylene torch, free standing grinder, metal lathe, large concrete floor for layout and construction. Ventilation system.

Electrical:

Basics:

Work bench (carpeted and a bit higher than standard is nice). Tool box with starters of: screwdrivers, regular and needle nosed pliers, diagonal wire cutters, wire strippers, end wrenches, socket wrenches, allen (hex) wrenches, Torx (star) screwdrivers, multi-meter, soldering iron.

Better equipped:

Oscilloscope, regulated power supply, signal generator, a place to store wire, cables and a parts storage rack for connectors, cable ties, wire nuts, etc.

A utility sink should be planed for somewhere in the shop area.

There will, no doubt, be a lot of tools I have missed or special tools that you may need for specialized uses. Try to maintain an open fund for tool procurement as needed. Don't scrimp on quality, especially on tools you know you'll use a lot.

Production Areas:

Imaging:

Before we start on the imaging area, I think a short discussion of new trends in planetarium imaging technology is in order. This can be summed up as:

Slides vs. Video:

As of this writing it seems that there is a transition in progress in the planetarium world. When planetaria were new, just reproducing a reasonable facsimile of the night sky was all the magic that was needed. Sky shows were live. Soon special effects like meteors, comets, and auroras were added to help

demonstrate celestial happenings and add excitement to presentations. Slide projectors were a natural addition to show close ups of planets, comets, and galaxies. They could cross fade and overlay images to add action. Multiple projector images and wide-angle images brought even more dramatic effects to the star theater. Panoramas and all-skies were born. A movie projector brought another dimension still. These were later replaced by video projectors that allowed multiple inputs: VHS, laser disc, computer, DVD and other, even more sophisticated devices. Automation systems became important to coordinate all these devices with a pre-recorded program tape. Now we can have multiple projector video images can fill the entire dome. This can eliminate the need for slide and special effects projectors and even replace the historic heart of the star theater: the planetarium star projector itself! After all, if you can place any image - moving or still - anywhere on the dome, you really don't need any other projectors.

The detail and color of a 35mm slide is hard to match, but the advantages of all-video theater already have convinced many that this technology has arrived. It's likely that the all-video star theater will be standard for new 'modern' installations. This of course has a big influence on planning production areas in a new 'state-of-the-art' facility. Even if there are no current plans to work with video or digital image production, the areas should be planned with this upgrade in mind for the future. This means planning room for computer workstations in the production area. (Actually, this will probably save room in the long run). It's a good idea to plan for lots of electric outlets and network connections.

An electronics room (discussed later) will need plenty of space to accommodate the extra equipment required for this technology.

But let's not get ahead of ourselves. Let's look at today's technology with a plan to easily adapt for the future.

Imaging Room(s):

Slides:

Slides seem to be a dying medium in most of the world, but they may remain the best solution for certain types of images in the planetarium for some time to come. An area should be allocated for working with slides. The following are all useful in the slide area:

- A slide library may be kept and organized in slide boxes or in slide protector sheets organized in boxes or even file folders.
- A light table dedicated to viewing slides for choosing images for a program will be needed. A separate large, table or backlit rack for laying out the slides in sequence is very handy; the bigger the better. A third light table for working on individual slides, helps to keep the others free of loose mounts, obaquing fluid and tape, etc.

A slide duplicator can be a very useful tool, especially one that can hold filters to adjust color balance, and can zoom in to change image size.

A copy stand can be used to take pictures (slides) of prints, artwork or pages out of books and magazines (of course, be aware of copyright rules).

Most of this can fit into a fairly small room or area.

Digital:

With the digital age upon us, some additional imaging capabilities will also be needed in this part of the production area. You will want a way to turn slides into digital images and a way to make digital images into slides; a way to create digital images from photos or illustrations from books, and perhaps a way to print color images from digital files. Basically, you'll want to be able to change back and forth from slide, print, and digital. Even if you don't have a video projector to project digital images, converting images to digital to work on them with image processing software can be a great advantage. It might even eliminate the need for a later part of this section—the dark room.

Being able to make digital images from your slides to project through video projectors can be very useful. Images can then be used for Power Point presentations or similar uses. They could also be manipulated to change or move, adding a dynamic aspect to your images. Likewise being able to make slides from digital images can often be the best approach. Each requires a computer and some peripherals.

To make digital images from slides a slide scanner is used. Some flat bed scanners can do this, but check the capabilities of the scanner to see that it will suit your needs. Generally a scanner made for slides and negatives is the most desirable, and the price is usually a good indication of quality. Research what's available, and what features are desirable before buying. Sometimes the software that comes with the scanner is not the best or easiest to use. Set aside some money to purchase better software; ask around. A query to the planetarium list server 'Dome-L', will probably bring information on the latest and greatest.

To make slides from your digital images, you can e-mail them into a processing service, buy a film recorder (very expensive), or print your images and use a copy stand to shoot them using slide film. This last way may sound primitive, but it works quite well, and is quick and easy. You will need a good color printer, good quality paper, and proper lighting for your copy stand; polarizing filters are a good idea. Good quality color printers have become very inexpensive, making this alternative very attractive.

A digital camera mounted on your copy stand will take care of converting any prints or illustrations into digital images, or you could use a flat bed scanner.

A computer and these peripherals don't require a very large amount of space, but you may wish to have multiple workstations depending on your production plans.

Art Studio:

If you are planning to produce any custom artwork for your productions a dedicated area would be helpful. Plan room for large layout table(s), drafting table(s), shelves and cabinets for supplies and for storing finished artwork. Good lighting will be very important in this area. Lots of windows for natural light is best.

Dark Room:

The “digital” dark room is gradually replacing the “chemical” dark room, but there are still a few simple uses for a standard darkroom that can be helpful. Specifically, the creation of slide masks is simple, takes little room, and is probably worth planning for. You will need a room that you can make completely dark, running water (not necessarily in the dark room, but near by), a place to put your developing trays, a safe light, a light source (a small, cheap enlarger on a timer works fine for this), and a dry area to cut negatives etc. This can all be done in a small area. Remember you don’t need to be dealing with big enlargers and large chemical print trays. Small plastic bowls or ashtrays will work fine. One and a half meters of counter space is probably all you’ll need.

Sound room:

An area where one can copy audio from one kind of medium to another is very helpful. This can usually be accomplished in the star theater, but having a separate sound room allows audio work to be done while the theater is in use.

You may only wish to be able to duplicate your audio track to another medium, make back-up copies, or add time code for you automation system. Perhaps you will want to cut out or add small pieces to the narration to update a program.

Some basic pieces of equipment you may want to install in a small sound studio are:

- Cassette player/recorder
- CD player
- A multi-track recorder (digital or analogue)
- A time code generator
- A small mixing board
- A microphone
- Monitor speakers

If you plan to produce shows for sale, a full sound recording studio will be necessary. This will include a recording room separated from the recording studio, usually by a window. A full array of recording equipment including a large mixing board, equalizers, amplifiers, patch bay, effects, and monitors will be needed. The newest theaters often use 5.1 (six channel) surround sound systems, so you may want to have this recording capability.

This will take up a fair amount of room, so plan for plenty of room and rack space. Some planetariums just plan to have audio production done by an outside studio.

As in the visual effects world, sound production and editing is ever increasingly being accomplished through digital sound editing. If you have digital visual workstations, it makes sense to have the sound editing and production software needed with those computers.

Electronics Clean Room:

Depending on the size of your planetarium and the sophistication of your audio, visual, and control needs, a separate room may be needed for electrical and electronic equipment. The size of your console area will probably determine whether you need to place electronics in a separate area. It would probably be wise to allow space for a separate electronics room even if you don't feel you need one now. As planetariums turn more and more into multi-media theaters, the need for digital audio and visual storage and computers to store databases and run simulations and system controls will become more of a necessity to keep the facility up to date.

The electronics room should be arranged near the theater so that control cabling won't have to run too far. There is often a maximum distance that signal cables can run before the signal needs boosting. A large conduit or trough will be needed to run from the electronics room to the console area. By large I mean you should have room for many cables and sufficient room to easily snake in large plugs and terminals. For safety and to keep signals clean, a separate conduit should be used for any power lines. Humidity, temperature, and dust control are considerations that need to be addressed for your electronics room. Many pieces of electronic equipment are heavy heat producers, and will need a lot of power and cooling. You may need a sub-panel in this area. Check the specs on the equipment to see what is required

So, how big does the room need to be? The electronics room will need to have space for standard electronics racks. Most electronic equipment comes either rack mountable or can be made so by using optional mounting brackets. Here are some of the things you may want to mount remotely in your electronics room.

Audio:

Tape decks, CD players, Hard drive audio players, MP3 players, and CD burners

Video:

VCRs, Laser Disc players, DVD players, hard drive based video servers, DVD burners

Control equipment:

Some planetarium star projectors require external control electronics. Automation control electronics, lighting dimmer packs, switchers and controls

Other:

Lasers if fed into theater by fiber optics might be kept in the electronics room.

Video graphics computers and other equipment for real-time video simulations need plenty of rack space. Check with manufacturers for specifics.

A separate electronics room helps keep your console area less cluttered and allows you to organize the controls in a more intuitive configuration. It puts

the electronics in a better-protected and controlled environment. It can also double as a work area for certain show production functions. For example, if you run shows mostly from hard drives but use other media as source material, the electronics room can be a place where source media material can be transferred to hard drive in show production. A show producer with headphones can be doing show production while a planetarium show is running in the main theater.

Lobby/Display Area

This is an area that is so variable that it is hard to address. One thing that can be said is plan for the future, and plan for changes. Have plenty of electrical outlets and lighting options built in from the start. Computer network connections should be placed regularly for Internet hook-up or centrally controlled video.

If you aren't planning a display gallery, you will still have to consider an area for people to gather and line up before entering the theater. Groups may arrive early while the theater is in use or being readied. This is also a consideration when setting up portables.

Library and Lecture Hall

Most institutions will not be able to afford a separate room to use as a library. Keep in mind though, that you will probably serve as the local authority on astronomy, space science, and unusual celestial events, for both the public and the press. A comprehensive reference library will be very important. Plan to make your reference materials easily accessible for quick reference.

Many planetarians like to begin their program in a class room/lecture hall setting to prepare their visitors for the show. Schools will find a separate classroom a great benefit. Even though the planetarium is a unique and unequalled learning tool for many aspects of astronomy, it does not make a very good conventional classroom. If you plan to hold science camps for young kids you'll want room for tables and desks to do activities.

Gift Shop

The size of the gift shop will depend a lot on what goods you plan to carry. If you expect to sell only to small children coming for school field trips you will not need as much room as if you want to sell telescopes and high-end items. Well-lighted display cases are important. Posters can be great 'double usage' gift shop items. You can place samples all around the gift shop area, lobby and entryway. This adds ambiance while displaying your gift shop sale items.

Careful planning of your planetarium support areas can make an enormous difference in the day-to-day operations of your facility. Many of these areas are overlooked because the focus is, of course, on the star theater chamber. A lot of square footage can be taken up with the peripheral areas talked about in this chapter. You must decide what is needed, what can be eliminated or shared in your particular situation.

But, keep in mind that the facility will probably outlive your connection with it. In so many ways, a planetarium is a growing, living thing that will continue

to change as years go by. We can only guess at what a “modern” planetarium will be like 10 or 20 or 30 years from now. Plan the support areas with flexibility and the next generation in mind so the magic can live on!

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