SPECTACLE: A Model for Understanding New Planetariums
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Abstract

Predicting future attendance is critically important to organizations contemplating major new offerings or expensive renovations. The challenge is that most situations are unique and there are little data to inform decision makers. To satisfy the need for answers, I have developed a quantitative model that plots the patterns in attendance one might expect from an innovative new offering. Called SPECTACLE, this model can be used to illustrate the effects of the many factors at play during the early months and years of a new planetarium. It demonstrates, for example, the importance of audience base, marketing, innovation, and quality. Since SPECTACLE is quantitative, it can make financial predictions too.

INTRODUCTION

All museums and planetariums need to predict future attendance. This need is especially critical when contemplating major renovations or building new facilities. Generally institutions must project the impact on attendance of innovative new projects. They can then be better prepared to predict revenues as well as evaluate the impact of ongoing costs. Yet predicting the future can be a black art when there are no examples in the history of the institution or organization to draw from.

To address this need to make intelligent predictions and realizing that specific data are usually lacking, I have created a quantitative model called SPECTACLE. I've chosen the name because a planetarium is essentially an arresting visual experience – a spectacle. Even Sir Richard Steele's, 1713, report on the spectacle of Lord Orrery's new Copernican planetarium could be applied to the most advanced digital planetarium of today:

> It is like receiving a new Sense, to admit into one's Imagination all that this Invention presents to it with so much quickness and Ease. That which would have taken up to a Year of Study to come at a familiar Apprehension of it, is communicated in an Hour.

SPECTACLE, as a model, predicts attendance behavior similar to what marketing professionals call a Product Life Cycle, with its introduction, growth, maturity, and decline stages. SPECTACLE is, however, closer to a type of model scientists call a "toy" model. This type of quantitative model is relatively simple and features easy to adjust parameters or forces. A toy model is used to describe the behavior of a system based upon these forces. A toy model is usually not used to predict highly accurate outcomes for specific real situations. Nevertheless, it can show how different assumptions and forces play out in a well-understood, model world.

For the version of SPECTACLE used to model scenarios in this presentation, there are five basic adjustable parameters or forces:

1. <u>Innovativeness</u> – This parameter accounts for the degree to which the new planetarium program or innovation is perceived of as truly new and spectacular.

2. <u>Marketing</u> – When and how effective the marketing is in reaching the audiences are primary factors in the model. They correlate with dollars spent on marketing.

3. <u>Quality</u> – A parameter is included in the model to get a handle on how well the innovation is carried out. One could be very innovative and yet deliver a bad product. Quality is important to the next force at work.

4. <u>Word-of-Mouth</u> – Recommendations made by attendees to potential new attendees is modeled in SPECTACLE too. I assume that word-of-mouth marketing is important to building new attendance. This is an important force because it has a non-linear or multiplying effect. Negative word of mouth is not modeled in this version, however.

5. <u>New Markets</u> – A parameter is included into the model for new potential audiences. These are people beyond the usual group the pre-renovation planetarium attracted.

The version of SPECTACLE reported here makes an important assumption. It assumes most visitors, after they have seen the new innovative program, are unlikely to return soon. To get them back into the planetarium requires a new program that's significantly different or innovative once again. One may not need to totally renovate to get people back in the door, but one will need to do something significantly different than the initial offering to attract repeat visitors.

SEVEN SCENARIOS

I then ran SPECTACLE seven times to study the effect of varying these forces. To make the numbers concrete, I put in basic numbers for a medium sized planetarium that has a yearly attendance of 50,000 per year, averaging 4,170 visitors per month. Planetariums and museum typically have seasonal attendance patterns. The model runs described below assumed no seasonal variation. I initially thought that this might be an important factor for overall numbers, but it turned out to be not as significant as the other assumptions being made. So, to simplify interpretation of the model, I used monthly averages for the attendance figures preceding the introduction of the innovation.

The overall total for the pre-innovation year of 50,000 is totally arbitrary. It was used to simply give a reasonable number to the vertical axes on the plots. The numbers can be scaled to any total attendance. It's the relative changes that are the most important.

The major event, or innovative program (new planetarium, renovation, etc.), is introduced at month 12 in the plots shown below. Also note that the last six models all show model one for comparison in blue.

1. <u>Everything Done Perfectly</u> (see figure 1)

   The new, innovative planetarium opens at month 12. Before then I assume that it is getting the average monthly attendance to result in 50,000 attendees per year. Note that the bottom of the plot is not zero, but is at 4,170, the average monthly attendance before month 12. This model is an ideal case. In it all the parameters are at their optimum. Innovation is as good as it can be to be good for marketing. The marketing reaches those who are in the target audiences. The marketing is sustained for every month in this model past the starting of the new innovation. The quality of the program is high and results in optimal word of mouth reviews. In addition, I have assumed that the offering was able to attract a new market segment as large as the normal steady stage segment.

   The behavior of this model is typical of a product life cycle curve. There is a sharp rise as the marketing and positive responses attract audiences quickly, in a non-linear fashion. Then as the attendance numbers begins to saturate one simply starts running out of people who will wish to come but who haven't. The attendance then, by two years after the opening (month 36), returns very close to its initial monthly steady state. The overall attendance almost doubles in this model going from 50,000 per year to 94,000 in the first year of the innovative.

2. <u>Low Quality Program</u> (see figure 2)

   This model is identical to the previous in every way except one. The exception is that the quality of the program offered is perceived as ten percent as good as the previous program. In other words, the venue is fabulous, the marketing reaches and starts to attract people, even new audiences but, the product is poor.

   What one sees happening is that the numbers don't rise quickly. The curve is then flattened out as it tails off. This is because people may still be coming, but the word-of-mouth marketing never takes hold. The net result is 84,000 in the first year of innovation. It's curious that the overall attendance isn't that far in the innovation year as it was in the preceding case. This is because the innovation and marketing are sufficient to still drive the attendance strongly.

3. <u>Little Appeal to New Audiences</u> (see figure 3)

   This model is identical to the initial model. The innovation is perceived as high, marketing is effective and the quality of the program is good. What is different here is that the new planetarium has not appealed to a new market beyond those who normally would attend the planetarium in the first year of innovation. As a result, the behavior behaves like the first model, but just does not achieve as high

an amplitude. The attendance in the first year of innovation then runs just up to 60,000, or 20% above the attendance of the previous year.

4. Marketing Stopped after 3 Months (see figure 4)

This model demonstrates the effect of stopping marketing after month 15, or three months after the introduction of the new, innovative planetarium. Everything else is identical with the ideal case. What one sees is that the attendance still rises to its peak, but then quickly falls. The net result is a total innovation year attendance of 84,000. This is 10,000 less than the ideal case, but still a 68% increase over the attendance before the renovation.

5. Disaster (see figure 5)

It should not be too surprising that if the perceived innovation is low, marketing absent, and the quality of the program poor, that we should have an unappealing case like this one. If anything, maybe this model shows that the model will return virtually not change if the project is a bomb. I suppose matters could be worse because the effects of negative word of mouth are not included. If they were, then one might indeed have attendance which retreats from pre-innovation levels.

6. Realistic Successful Program (see figure 6)

Figure 6 shows another run that is similar to the ideal first case, but with a few modifications. Its innovation is considered to be excellent, though not perfect. Its marketing is maybe half as strong as in the first case, reflecting a more modest budget. And, it assumes that the quality of the program is high enough to stimulate very good word of mouth reports.

The overall attendance for this model is 92% higher than the base year. This would be considered a great success by most any planetarium undergoing a major renovation. I use this model to make the following financial calculations.

If we assume that the ticket price is $8, then in the first year of the innovation, this planetarium will realize an additional $290,000 in revenue. Based upon SPECTACLE alone, however, this additional revenue will drop to $72,000 by the second year out and then to only $25,000 in the third year. Clearly, this revenue drop could spell trouble if the innovation resulted in significant additional yearly operating costs.

7. Repeated Innovations (see figure 7)

The final model run of SPETACLE for this paper was one that took the previous model further. Knowing that sustained income would require repeated smaller-scale innovative programs, this planetarium introduced, on a slightly lower scale,

the same excitement it did with its initial new renovation. The net result is a series of peaks on a yearly basis as new programs continue opening.

This strategy is ultimately the most successful because it leads to an ongoing higher average attendance. In year one it's 88,000. The second year after the initial innovation, the attendance is 77,000. By the third year it's down to 73,000, still significantly higher than the pre-innovation attendance of 50,000 per year.

SPECTACLE easily computes the revenues expected in this case assuming $8 tickets. Although the first year of the innovation may have resulted in an additional $300,000, even by the fourth year out, the new venture is still netting an additional $130,000 per year.

Note that all these numbers can be easily scaled for different overall attendances or different ticket prices. These net attendance numbers and revenues scale linearly.

ASSESSING IMPORTANCE OF FORCES FROM PRECEEDING SCENARIOS

The motivation behind the use of this model and exercise is, of course, to enable decision makers to grasp the relative effects of changing the different forces at work when implementing a major planetarium renovation. Under the simplistic assumptions of this model, I found that being **innovative** is essential and maybe the most important driver to attracting significant new audiences. **Marketing** effectively was the second most important factor, but indeed it can be relaxed as one gets into the new year of innovation, provided the third factor, **quality,** is high. If the quality of the program is excellent, then it will drive the non-linear effects of word-of-mouth marketing. The final critical factor in driving attendance levels much higher is the need to attract **new audiences**. If one can't do the latter, then the attendance can never be significantly above what it was before the renovation no matter how innovative or excellent the offering.

CRITIQUES OF MODEL

SPECTACLE can be criticized on many levels. This is especially true if one wants to subject it to a fine-level of scrutiny or ask it to deliver accuracy beyond its ability. It is a simple model and in its current state, cannot account for even some secondary forces that most planetarians would agree are at work. A few weaknesses that come to mind are:

1. Audiences it models maybe respond too rapidly to marketing and word of mouth. There should be more of a delay. This would stretch out the curve and make it broader over time.

2. Negative word of mouth has not been included in the model. This makes these model runs somewhat optimistic. It's not obvious at first how to model this behavior. I will try in future versions. I heard from someone that negative word of mouth may be an even stronger effect than positive word of mouth. An anecdotal

story told to me once by a marketing professional was that if one sees a good program one tells four people. But, if one sees a poor program one tells, on average, thirteen people. I don't know the origin of these numbers, so I didn't want to use them. But, if the effect of bad news is truly three times worse than good news, then this could be an important effect to include. It would further underscore the importance of quality experiences and programs.

3. Realistic annual attendance cycles are not factored in to these models. I have done some test runs and not found significant (i.e., >5%) differences in overall yearly attendance. But, most know from experience that it's important to open new venues at times when word of mouth can help you out -- namely when seasonal attendance would normally peak.

4. These models are not compared to real data. This is ultimately what should be done to be able to calibrate parameters and to test the mechanics of the model. Maybe in the future this can be done. The only problem is that the factors involved might be quite different from one city to the next. And, since few planetariums have undergone more than one major renovation, it's unlikely there would be enough data to make meaningful conclusions. It's possible that these models will need to remain toy models or be used to test certain scenarios.

5. These models don't take into account the finite sizes of the planetariums. It's obvious that one cannot realize much higher attendances if one does not create a planetarium without enough seats or show times to absorb attendance spikes. Renovated planetariums that are projecting increased attendance must take into account how they will absorb projected new attendees, especially during peak attendance times.

6. This model does not include the negative effects of aggressive pricing. A future version should be able to attack the question of how to price the new venue. Clearly if the price is too high it will have a negative impact. But, if not priced sufficiently high, then one won't be able to take advantage of the new and attractive planetarium.

Experienced planetarians will spot other weaknesses of this model or factors that should be included. I welcome such comments and suggestions.

CONCLUSIONS AND RECOMMENDATIONS

The analysis of quantitative SPECTACLE models leads to a few recommendations for those contemplating new planetariums or making significant renovations to pre-existing theaters:

- If you're going to be innovative, then make sure your *really* innovate. You need to be perceived as being innovative to attract attention and to attract support. This

need is born out in all the models and gives strong support to upgrading facilities to the new, digital media.

- Don't neglect marketing. If you do, you won't get off the ground. You can slack off on it once word of mouth picks up, but you can't be perceived as an innovator if no one knows what you've done.

- Attend to quality. The quality of the program you deliver is very important because it will be a major factor in the word of mouth marketing. And, a poor program can be disastrous, maybe even worse than indicated by the model described in this paper. The overall quality of programs is a serious challenge to the new digital media because the costs of producing extraordinary programs can be very high. The planetarium community will need to find ways to meet this challenge in an affordable way to capitalize on the opportunities the new technologies offer.

- At the base of significant, long-standing attendance increases is the ability to attract new markets. If one can't make one's renovated planetarium appeal to more than would come before, then one may not be able to realize a sea change in attendance.

- The bottom line message to budgeting is to make sure the ongoing costs of operating and producing for the newly renovated planetarium are covered by income predictions like those made by this model. If not, then there will need to be another source of income.
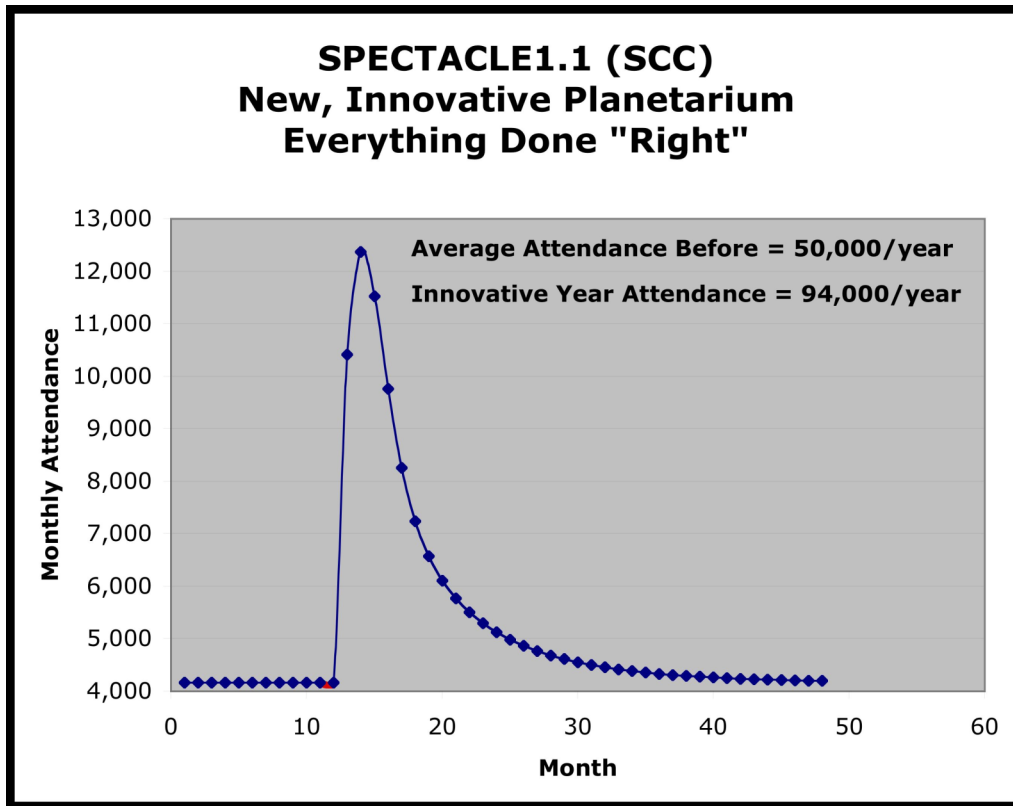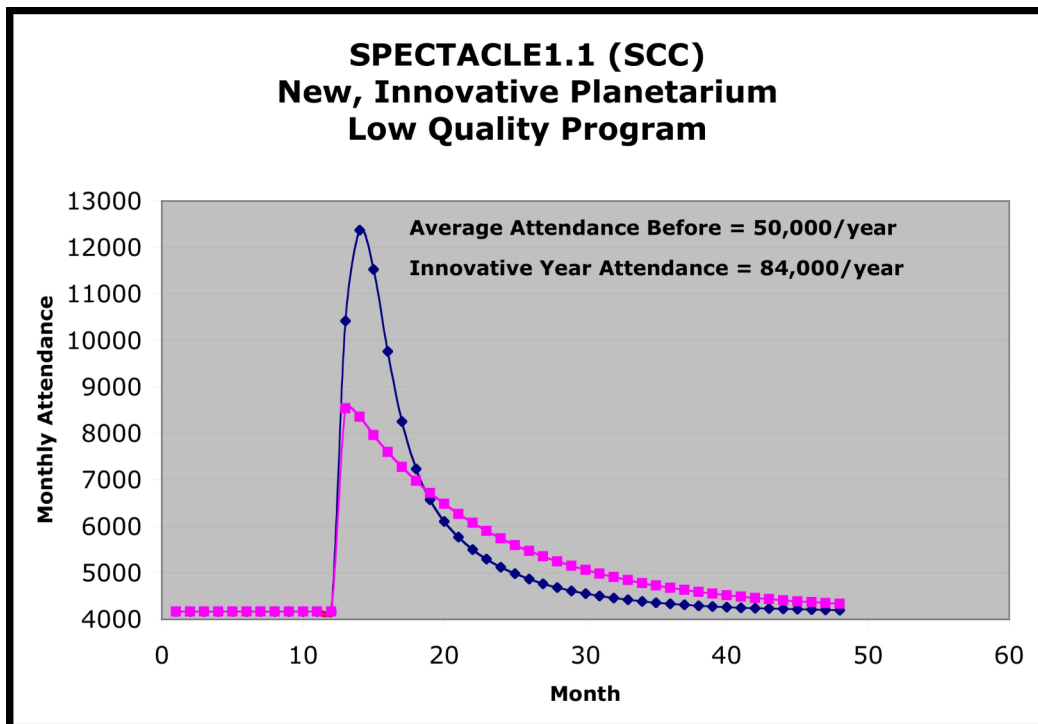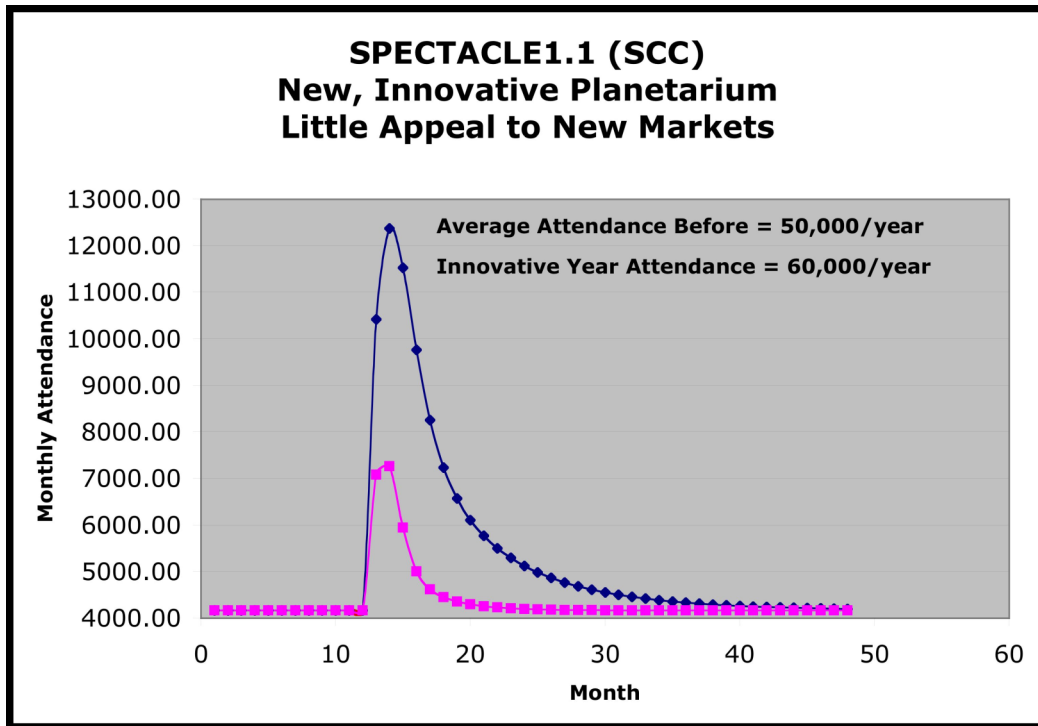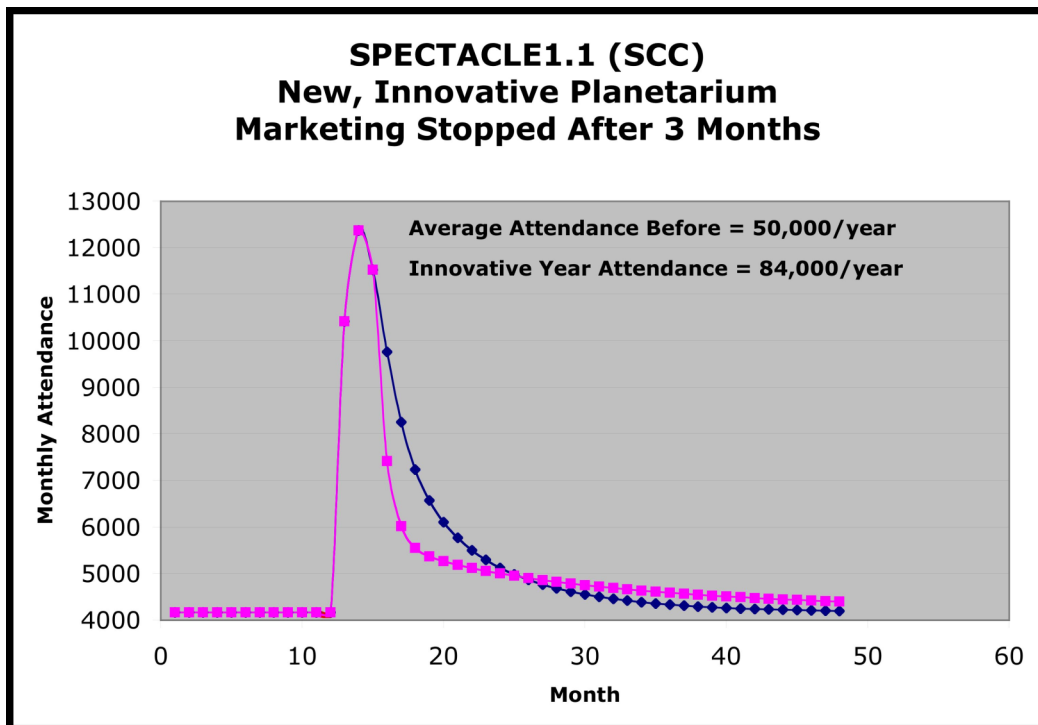
Figure 1

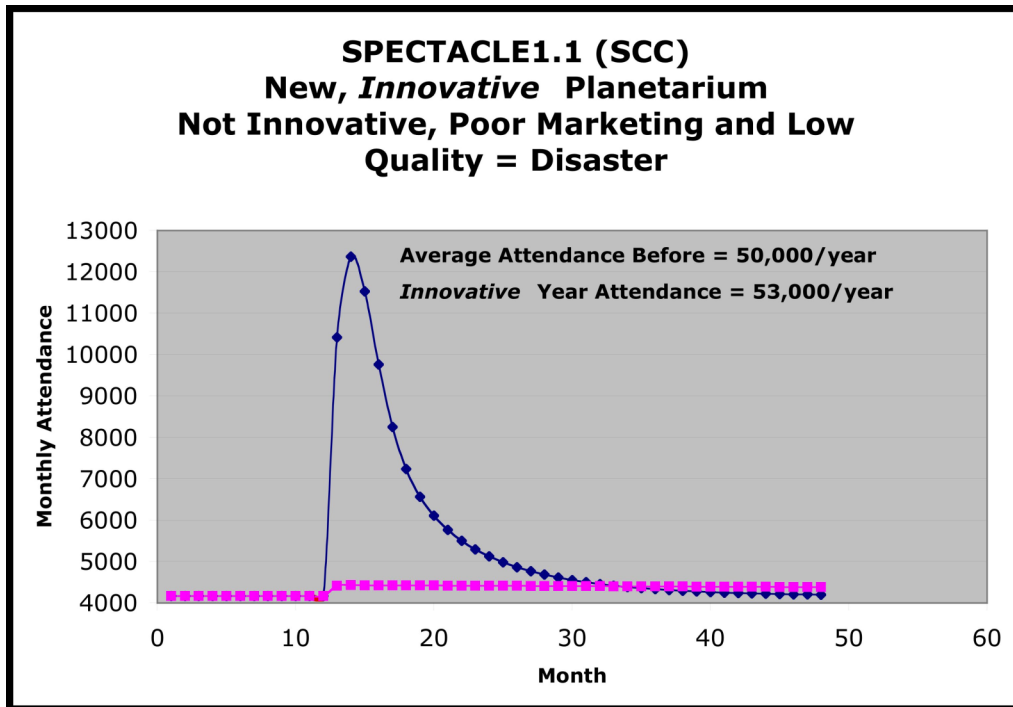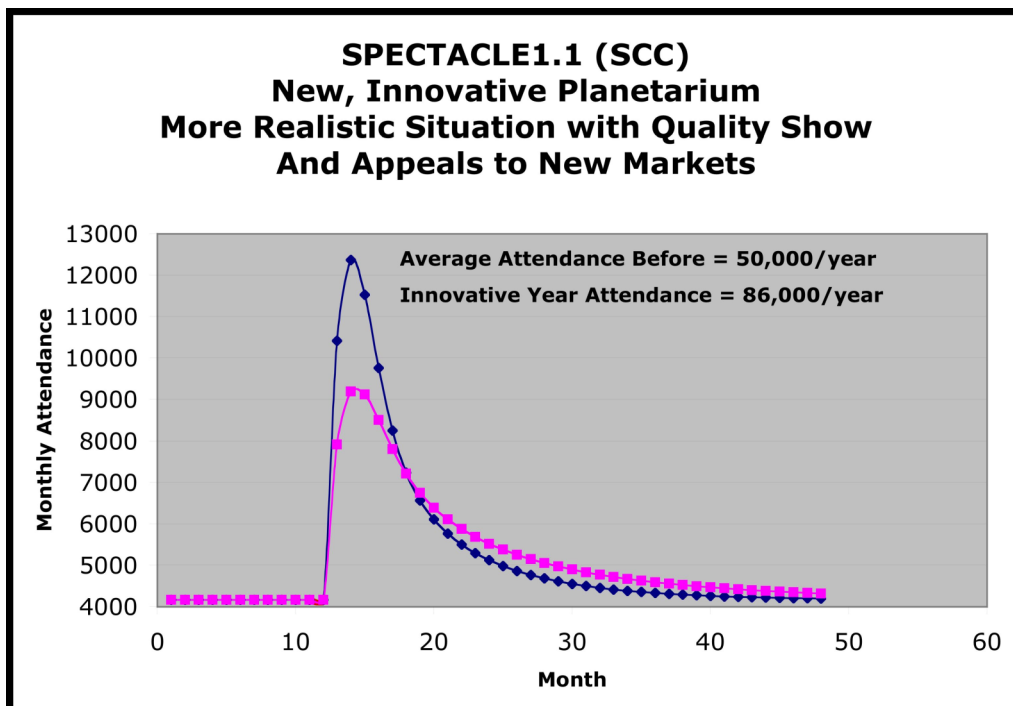
Figure 2

Figure 3.

Figure 4.

Figure 5.

Figure 6.

SPECTACLE1.1 (SCC)
New, Innovative Planetarium
More Realistic Situation with Quality Shows
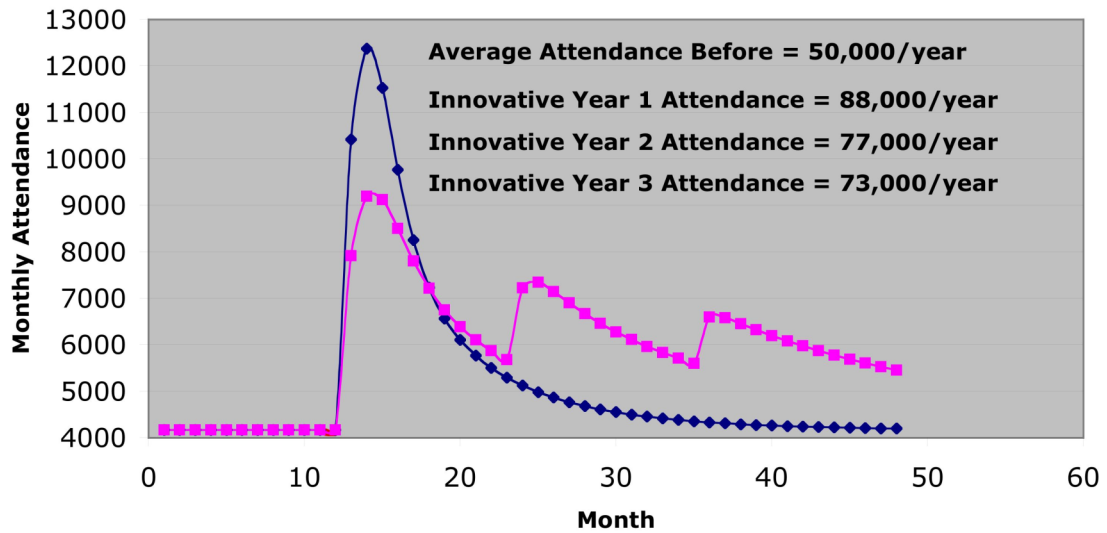**and Yearly Repeated Appeal to New Attendees**

Average Attendance Before = 50,000/year

Innovative Year 1 Attendance = 88,000/year

Innovative Year 2 Attendance = 77,000/year

Innovative Year 3 Attendance = 73,000/year

Figure 7.