Swim Team Scoreboard Project

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The Swim Team Scoreboard Project has identified six stages in the product lifecycle of the event and heat display board:

1. Design & Development
2. Introduction
3. Growth
4. Maturity
5. Decline
6. Death

For each of these stages, we will answer

Who are the customers or users?
What support will they need?
What needs, concerns, problems will they face?
What issues affect support costs?
How can product revenue be maximized?
What effect do design choices have on the PLC?

As a brief refresher, the event and heat display board will be attached to the existing scoreboard, and will rely on data coming from the timing computer in order to find the current event and heat numbers, and then display them continuously throughout the meet.

1. Design & Development

In the design and development stage, the event and heat scoreboard progressed from an idea, to a plan, to a functioning prototype, and from there to a useable product. There are no customers for this stage (besides the sponsor, who won’t be using the product during the design and development stage), but the users are none other than ourselves. When we test each part of the finished product we will be using it, as well as the testing of the finished product to ensure functionality.
Since we are the design and construction team, the support we need will come in the form of advice and suggestions from our sponsor’s and advisors. We also will utilize the manufacturer of the timing computer for information on the output of their system, so that we will be able to integrate our system with theirs appropriately.

As far as needs, concerns, and problems that we will encounter, they will all be design and manufacture related. Several big hurdles have presented themselves over the course of this project. The first was interpreting the data stream that emanates from the timing computer, finding out all the dirty little details about how it works, the format of the data, where the pertinent information was, etc. The next big hurdle was setting up a communications link between the outside world and our system, as well as the subparts of our system.

The support costs are entirely the cost of the equipment and supplies needed at this stage. Because we do not have a production-ready model, we have no incoming revenue, so it can’t be maximized at this stage. One of the requirements laid out by the customer was to minimize the overall cost of this system. We have worked this in to the design, by going with a microcontroller that offered a one-time high cost for licensing and software, but the actual microcontroller product is fairly cheap if bought in quantity. The rest of the products that we decided to use are easily obtainable to allow for future replacement of worn-out or broken parts. We have also endeavored to minimize the number of individual parts in our system to maximize the total lifetime of our product.

2. Introduction to Market

In the introduction to market phase, the primary customer will be our sponsor, the Inland Empire Swimming Committee. After an initial trial and exposure at a swim meet,
the customers will be any of the swimming teams within the Inland Empire Swimming division, as well as any other teams with representatives present to view the operation of our system. The customer base will slowly grow as word spreads from team to team, although this will never be a high volume product, it could conceivably be sold in the thousands, eventually.

The initial customers should not need a lot of support. Another design consideration was to make this product as user friendly as possible. The theory of operation is to be able to plug in the power and the data line coming from the existing scoreboard and it will handle itself from there. Sufficient testing will have been performed on the system in the design phase to ensure full functionality and error free operation. In the unlikely event that something does go wrong, there are only 2 support options. Either a part needs to be replaced, or the code needs to be tweaked.

As far as needs, concerns, or problems that the initial customers will face, the product will be used in a hostile environment, e.g. high humidity, lots of transportation, possible rough handling, possible immersion, etc. Any of these situations could present a problem for our customer. If the event and heat display does break as a result of one or more of the above conditions, the likely culprit will be physical hardware. The software will survive, which is where most of the development cost would normally go to in this type of product.

The support costs at this stage will likely come from the failure of any hardware that would need to be replaced. Although unlikely, it is possible that some small costs could be incurred by a need for further tweaking of the code, if the unit does not perform as expected, or if something slipped by in testing.
Product revenue can be maximized in the introduction to market phase by selling as many units as possible and putting out a good product in the first place. This should be one of the lower failure rate stages, although some failure is to be expected, the choices that we have made in hardware will minimize the total failure rate and thus maximize revenue and product life. These choices, as stated above, were to minimize the number of separate parts in the system and to use easily obtainable parts in the construction of our system.

3. Growth

In the growth stage, the customers will be any of the swimming teams. The volume of production will increase so that the cost of producing one unit of an event and heat scoreboard will decrease. Product updates will be needed in this stage. The problems and concerns in introduction to market stage should be solved and new functionality or technology will be added. The possible new technology is wireless distribution of results and notification of upcoming events and heats. This product updates will affect support costs.

As far as needs, concerns, or problems that the customers will face, as product are updating, new debugs will come out and the customers can be confused to operate new updated product. Product revenue can be maximized in this stage by that the customers become aware of our product and our product has been proven a success.

4. Maturity

In the maturity stage, the customers will be same as growth stage. The customers will not face needs, concerns, or problems. No feature and capability will be added to our product. No product frequent updates will be needed. The product will be not provided
any further patches and hot fixes, as these will have been issued at an earlier stage. The support costs will be reduced to a minimal level.

Since support costs will be the lowest of the stages, product revenue will be greater, accept that the number of units sold will likely be fewer than some of the previous stages. At this stage, the choices that we made in design will keep the product going strong and help to minimize our support costs.

When your project reaches the decline stage its life is not necessarily over. There are many things you can to slow down the decline of your product. Some of which are adding newer versions, upgrades, or lower pricing to beat competition. During this stage if the display system is not doing particularly well in the swimming world, it may be incorporated into other sports.

In the decline stage you still have services to provide your existing customers. Most of the customers you will have will be loyal customers who like your product and want to stay with your company. You need to keep good relations with these customers and give them good support so you don’t lose their business.

The support costs for the display system should be minimal. The products used for our design are relatively easy to find. Maxim Integrated Circuits and Rabbit Microcontroller are reliable companies and they have great support. The LED displays can be found from multiple manufacturers, therefore they are easy to find and relatively inexpensive.

During the decline stage your revenue can be maximized by limiting your support costs, having a strong initial design can minimize support costs. That way there are not
too many systems that need support or need to be replaced. You can also expand into
different markets so you get new customers as well as keeping the old customers.

Design choices correlate directly to the product life cycle for the display system.
Quality parts will be needed because of environmental effects. Most swimming are held
in indoor pools. This means that our product will be used in very damp and humid areas.
Also the Inland Empire Swimming Committee only has one of these display systems, so
it will be transporter to various places during its life. Therefore the system must be
rugged and be able to withstand abuse. Overall if you have a bad design you are going to
lose a lot of money in this stage because you will be wasting money on services to keep
customers.

Once the system has reached the death stage it is time to abandon the product to
minimize you losses. It is key to know for sure when the product has actually hit the
death stage. The way the market fluctuates it is sometimes hard to tell if your product is
obsolete. The best way to see if the death stage has hit is to extend the decline stage as
long as possible and have a short death. Then you can see the death approaching and get
out before you lose out.