# Habitat$^{\text{TM}}$ Operations

*how to run it, once it's up*
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## Introduction

This document begins an evolutionary process to develop the guidelines and procedures for *Habitat* operations. It is an outline of the operational needs of the present and future system, a definition of the necessary support roles and a statement of our feelings about the division of operational responsibility.

## New Users

As new users sign up to play, they will need to have turves assigned to them. This in turn will require the generation of large number of residential regions. Obviously, we don't want to have to be designing a custom turf for each new user. Not only would this be expensive, but when 500+ new users sign up over a weekend we risk having consumption outstrip production. What we really want to do is automate the process, so that an arbitrary number of new turves can be generated on demand. Fortunately, this does not seem terribly difficult to accomplish.

The most straightforward implementation seems to be to generate apartment buildings. These have the advantage of being highly regular in structure, making automatic generation easy. We will generate them a floor or a whole building at a time, rather than turf-by-turf. Each floor of an apartment building is constructed according to a uniform, generic model. A floor consists of a hallway full of doors into adjoining apartment turves. To build the hallway, all the generator must do is copy a standard hallway model and add signs with the apartment numbers. The turf regions themselves are created by copying randomly from a collection of standard designs and then joining these with the hallway. The floors are connected to the rest of the world by a special TelePort designed to operate like an elevator.

One reasonably compact, utilitarian design we are considering packs 30 turves onto a floor. The ideal height for an apartment building seems to be 15 floors, so that each floor can be uniquely color coded. Such a building would therefor have space for up to 450 Avatars. By further clustering these buildings into standard model complexes, we can obtain another level of automated allocation before the intervention of a human designer is required. Ultimately, of course, some human attention *will* be needed to determine the placement of the apartment complexes within the overall framework of the world. However, this placement can be a part of the *Habitat* master geographic plan, so that the amount of human attention required at the operational level should be minimal.

We are faced with a choice of how and where to implement the apartment building generator. Certainly implementation will be much simpler and quicker on the Lucasfilm's Unix system, since all of the building blocks are presently there and a trivial "glue" program can be written in a day or so to automatically generate arbitrary quantities of apartment buildings at will. On the other hand, it will ultimately be more efficacious to situate the apartment generator at QuantumLink so that the process can be made completely automatic — obviously generating the turves at LFL requires some human intervention to run the program and transfer the data as needed.

In response to this choice, we propose the following compromise solution: since implementation of the apartment generator at Lucasfilm is so easy, we will do ahead and do so. This generator will be used to produce a batch of 10,000 to 20,000 turves worth of apartments, which can be uploaded to QuantumLink and stored for use as needed. This will give us a sufficient backlog that we can proceed with the more

difficult task of a Stratus-based apartment generator at a later date when we are not preoccupied with the press of getting the complete *Habitat* system operational. Lucasfilm will, in consultation with Quantum, lay out the apartment building floor plans, design the apartment turf interiors, and figure out where the buildings fit in the overall structure of the world. Once the data is generated, Quantum will be responsible for creating the software to install the new turves in the *Habitat* database and assign Avatars to them as new users sign on.

## Inactive Users

Inevitably, players will disappear from the system, for all of the reasons that users typically disappear from any system. We must take care to ensure that we are not left with hollow caverns where our cities and apartment complexes used to be — places where the "dead" population outnumbers the "live" population and the number of online players at any particular time is small enough relative to the size of the place that they just sort of rattle around in it.

The process of identifying the inactive users will be much like that presently used by the greater QuantumLink system. If a user's account lapses or is cancelled, his *Habitat* resources, such as his Avatar and Turf, need to be removed from the world and placed in a pool for reclamation, according to the same criteria that Quantum presently uses for reclaiming other resources devoted to lapsed or cancelled users.

There is, however, one complication. This is that people can be inactive *Habitat* players and still be active QuantumLink subscribers. In other words, we are not guaranteed the definite indicator of inactivity provided by an explicit account cancellation or failure to pay a bill that can be used in the system at large. While a dead QuantumLink account is a dead *Habitat* Avatar, the reverse is not necessarily true. This means that we must establish some criteria for deeming an Avatar to be well and truly dead.

We propose that a lapse of two months of inactivity mark a player's Avatar and Turf for the "grim reaper", though Quantum may wish to propose a longer or shorter period on the basis of their experience with QuantumLink. When an Avatar is declared inactive by such a lapse, we should give the player a second chance by sending him a message through the regular QuantumLink mail system informing him (politely, of course) that his Avatar is inactive and will be swept up by the Oracle if he does not log in to *Habitat* sometime during the next week. If the player fails to heed this warning, at the end of the week the system should send him a mail message informing him that his Avatar is deceased and then proceed with the "burial".

Once an Avatar has truly lapsed into inactivity, we want to reclaim its turf to be recycled and assigned to a new user. As with generation of new turves from scratch, this process can and should be automated. The object is to keep the residential areas as fully populated as possible. Quantum will need to created the software to detect the fact that an Avatar is inactive, to warn the player, and finally to "garbage collect" the resources.

## The Oracle

The Oracle is the personification of the system operators. It is also the major means by which we introduce information into the world and tinker with the players' sense of reality. What we have been calling "The Oracle", however, is actually several separate functions sharing a common operator's interface, each of which appears in the world under a different guise.

- *The Fountain*, found in most town squares, is primarily an information channel. Mostly what The Fountain does is answer questions. Sometimes it also says things spontaneously. Being a direct channel to the omnipresent being in charge of the world, The Fountain can be means of communicating requests and demands of all sorts, some of which may even be granted. However, The Fountain's main purpose is information distribution. It is the means by which clues are dispensed, advice is given, judgements are pronounced, and so on. The Fountain "prefers" that requests made to it be of a broad or public nature (such as "please make Populopolis a weapons-free zone") rather a specific or private nature (such as "please give me a million Tokens"). Its responses to questions are often quite cryptic, but The Fountain does not make an overt effort to twist the meaning of what players say to it. The Fountain does not answer all of the questions that are asked of it. Indeed, it answers relatively few of them. In the tradition of oracles throughout the ages, it is fickle and unpredictable.

- *The Genie* is a basic wish-granting genie in a magic lamp. Its purpose, obviously, is to grant wishes. Magic lamps are rare treasures found in obscure places. If an Avatar rubs on a lamp, a genie appears, and offers to grant a wish. The Avatar then has a short amount of time to make a wish, after which the genie (and the lamp) vanishes. Wishes are thus a you-only-get-one-chance sort of deal. The Genie should try to grant the wish to the extent that it is possible within the scope of the *Habitat* world. However, the Genie should try to twist and pervert the meaning of the wish (by such devices as taking the wisher overly literally) in direct proportion to greediness or foolishness of the wish. Thus simple, generous wishes should be granted directly, while complex, selfish wishes should result in all manner of havoc being visited on the wisher. Unlike The Fountain, The Genie is a "sure thing", in the sense that if a player makes a wish he is certain to get a response. However, Genies (or rather, the magic lamps that contain them) are very rare, and they disappear after they are used.

- *The Crystal Ball* is another information channel, but one oriented more towards divining details about the present and future, rather than with answering the sort of metaphysical questions that The Fountain tends to handle. Like the Genie, it is "reliable", in the sense that a player has a high probability of getting his question answered. However, Crystal Balls tend to be subtle and to misconstrue the meaning of questions in devious ways. In addition to being nearly as rare as magic lamps, Crystal Balls are also quite timid and shy. A Crystal ball will tend to only respond to the Avatar it considers to be its "owner" — the one who found it originally or who has been in possession of it for some while. Crystal Balls also tend to vanish forever if asked too many questions at once or if questioned too aggressively.

- *Bureaucrat-in-a-Box* is a mechanism for handling various sorts of mundane, non-magical, but necessary system-operator communications tasks. Each Bureaucrat-in-a-Box has an office in the *Habitat* with some associated purpose. Messages directed to a Bureaucrat relate to whatever business that Bureaucrat's office is concerned with. For example, the Bureaucrat in the Land Office is concerned with ownership of property, and it is here that Avatars come to request transfers of title to turves. Bureaucrats are very business-like, no-nonsense types, and deal only within their limited purviews. If a Bureaucrat is given a request that is not relevant to its particular sphere of influence, it simply ignores it.

The Oracular roles will be filled by one or more system operators. The way it works is as follows: ordinarily, things that Avatars say to Oracles go into a log file. The log file entries include a time stamp and identification of who the speaker was and exactly which Oracle he was speaking to, as well as what was said. The messages directed to a particular Oracle can be extracted from the log file automatically based on the log file entries themselves. The Operator goes through the log for a particular Oracle, and deals with the various entries. He can choose to ignore an entry (this, in fact, will be the usual case) or to respond. The response may simply require a message to the player or it may demand more extensive action. In any case, the operator does what needs to be done. Playing Oracle will require both imagination and patience.

In time, we will certainly develop a collection of stock responses to common questions ("Oh Great Oracle, what is the meaning of life?") and wishes ("Please give me a million more wishes!"), so that the operators' load can be reduced to handling the uncommon ones. The operators' interface needs to have a built-in mechanism for easily invoking these canned responses from a library.

Quantum will be responsible for creating the software to log messages to the Oracle in an appropriate format and to allow Oracular operators to extract the entries in a convenient way. Lucasfilm and Quantum will jointly specify and create the operators' tools necessary to allow the operators to respond with messages and changes to the system. We (LFL) have already drafted a first-pass specification for such a utility (which we named "Ghu"), that we provided to Quantum at the beginning of August. This must still be refined into a mutually agreeable design and then implemented. Since it is host software, Quantum will be responsible for implementation, though we will assist.

Quantum will be responsible for providing the operators. Whether these are Quantum employees or specially empowered volunteers from the user community must still be determined. If volunteers are used, someone at Quantum will need to be responsible for riding herd on them.

During the beta-test and the following few weeks of operation, Lucasfilm staff will perform the Oracle operator functions. This will enable us to determine precisely the sorts of things that an Oracle must

deal with on a day-to-day basis, as well as to develop a body of practice and experience from which to train the initial cadre of operators. On the basis of this experience, Lucasfilm will assemble a guidebook to the answering of questions and the granting of wishes, and begin collecting a library of pithy and provocative responses to common questions and wishes. Lucasfilm will also assist in the training of the first batch of Oracle operators and coach them during the first months of operation. The intent is that there will be a gradual transfer of responsibility for Oracular functions from Lucasfilm staff to Quantum operators over the first month or two of actual operations.

A future extension for the further automation of Oracular functions, particularly those of Bureaucrat-in-a-Box Oracles, is to create an Oracular automaton containing an English language parser. This automaton would attempt to interpret player utterances and deal with them directly, passing them on to human operators only those things which are too strange for it to handle itself. However, this is a complex, long-range undertaking and should be seriously considered only after the rest of the system is running smoothly. Furthermore, I would have to implement this one personally and I would insist that Quantum get a **C** compiler for their Stratus, since I refuse to even attempt such a thing in **PL/1**!

During the beta-test period, Lucasfilm will develop a full specification for the set of operations that need to be supported by Bureaucrat-in-a-Box Oracles and jointly with Quantum create the host software required to realize those operations.

## Exit Interviews

The ''exit interview'' is discussed in the user's manual. It is a ploy by which we can give the players a sense that the Oracle really exists as a Supreme Being with a minimal amount of effort on our part. Indeed, since the intent is that exit interviews are rare, we don't even have to have the feature operational right away. However, once we are set up we need to be very clever and very careful in the way we use it. Due to the sensitivity of the procedure, Lucasfilm will handle all exit interviews until such a time as we are confident that the procedure is so well understood that selected, regular Oracle operators may be entrusted with it. If necessary, we will retain responsibility for exit interviews indefinitely, though this may mean that they become very rare indeed.

## The Weekly Rant

The *Weekly Rant* is the *Habitat* newspaper. Somebody will have to be responsible for being its editor. The editor's job is to assemble the various bits of material that go into an issue, generating a piece of text to feed to a distribution program. This distribution program (to be provided by Quantum) will change all of the newspaper vending machines so that they contain the new issue instead of the old issue, allowing interested Avatars to stroll by and purchase a copy. We do not currently intend to offer a subscription plan, in the sense that Avatars would have copies of the *Rant* delivered directly to their turves, due to the proliferation of ''trash'' that this would generate.

The material that goes into the *Rant* is varied:

- Articles
- Paid advertisements
- Letters to the editor
- Classified ads
- Messages from the Oracle
- Editorials

Content can originate with the general public, who can submit articles and purchase advertising space, and with ourselves, for purposes of disseminating important system information as well as news about events that people might want to participate in, new developments in the world, clues to ongoing puzzles and mysteries, and so on.

Initially we ought to plan on publishing the *Rant* on a weekly basis. Depending on the volume of material being generated for it and amount of labor available to edit it, we may wish to alter the publication frequency upward or downward.

For the first few weeks of operation, Lucasfilm will edit the *Rant*. However, Quantum will provide an official editor, who we will bring up to speed during this period so that we can hand the job off to him once we have the operation down to a science. As with the Oracles, the editor may be either a Quantum employee or a trusted volunteer. The editor will require a means of extracting the text from submissions and compiling it into the publishable edition. If special software is required to do this, it will be Quantum's responsibility. Both Quantum and Lucasfilm will be responsible for providing material for the *Rant* to the extent that such material is needed in support of the world.

## Conduct of Adventures and Quests

In the context of *Habitat*, the word *Adventure*, to me, means the type of quest-for-treasure-and-magical-artifacts involving travel through exotic places and struggles against mysterious, magical enemies, both real and imagined, that characterizes the traditional fantasy role playing game genre. I don't think that adventuring will be the most significant nor the most common type of *Habitat* activity, but I think it will be very important. In particular, I think that it will be especially important in the early stages of the system's evolution, since I suspect that a large segment of the player base will originate in the FRP community and thus both want and expect such games.

While a large variety of adventures is both possible and desirable within *Habitat*, it is not practical for Lucasfilm nor Quantum to be the sole source of such material. What we wish to do is use the players themselves for leverage, establishing a community of adventure generators — interested and involved users who will lend their efforts to the creation of material simply because they enjoy that aspect of interaction. Our own participation would range widely in effort and involvement. Ideally, the bulk of material should come from the users themselves, with relatively little effort on our behalf being required to support them. Our support activities should emphasize making resources and information available, rather than giving individualized attention to each specific project. Naturally, we will want to leaven the mix with special projects for which we do provide special support, and, of course, some which are entirely our own undertaking.

Different adventures will require varying degrees of setup and oversight. Setup can range from the placement of a few important artifacts and clues to the wholesale creation of entire new realms. Oversight can range from non-existent — start it and forget about it — to massive — a virtual hand-holding guided tour. Adventures should be made available to the players through a variety of channels: advertisements in the *Rant*, pronouncements from the Oracle, *Habitat*-resident businesses catering to adventurers, and word of mouth.

The less specialized intervention in the world (requiring correspondingly specialized powers and privileges) needed to create a given adventure, the less support and attention the creator of that adventure will require from us. We should, therefor, provide the maximum degree of flexibility and power to adventure creators that we possibly can without compromising the security of the system and the integrity of the experience that the broader player community is having.

What we must do is establish a special level of player, somewhat more powerful and privileged than regular players but not as powerful as a regular operations person. The exact scope of these powers is, as yet, uncertain, as is the means by which these powers would be made available. However, this group of users would fill a role that we might call the "Adventure Masters' Guild". These people would be carefully screened, and then each would be given reign over a particular chunk of the world, within which they could conduct whatever adventures and so on that they feel like. Of course, they would be sworn to uphold a code of conduct designed to protect the less privileged players. Violation of the code of conduct would be grounds for loss of their privileged status, as would lack of activity, substandard quality output, or other undesirable behavior or non-behavior. Naturally, somebody in the permanent operations staff would have to be responsible for keeping an eye on these people and for handling complaints about them, as is now the case with the existing corps of QGuides and QHelpers.

Quantum and Lucasfilm must jointly consider the creation of this cadre of "Adventure Masters". We must develop a specification for the powers we will grant them and implement the mechanisms to achieve this. This specification and implementation will also be a joint effort, with Lucasfilm taking the lead. Lucasfilm will be responsible for the creation of documentation and instructional materials to guide and assist adventure creators. Quantum will be responsible for oversight of these volunteers on a day-to-day basis,

though Lucasfilm will retain final authority over their conduct.

Lucasfilm will contribute adventures of its own creation from time to time. We must arrive at an agreement as soon as possible as to the quantity and nature of the adventure material that Lucasfilm will generate, and the arrangement under which this material will be provided. We encourage Quantum to also contribute adventure materials to the world, with Lucasfilm retaining the same final authority over its use that it does with material provided by outsiders.

## World Expansion

The *Habitat* world is intended to be a constantly growing and changing place. However, it isn't like a plant or even a real city that grows and changes all by itself. Somebody is going to have to be responsible for generating the world. As with adventures, we would intend to gain maximum leverage from a community of interested and dedicated volunteers, rather than having to fabricate the entire thing ourselves. World expansion requires somewhat more control and supervision than adventure generation, however, since the effects are more lasting and the resource load induced is larger. We would like the growth to follow at least the skeleton of a plan, rather than proceeding in an uncontrolled and haphazard fashion.

We will start with a broad plan for the world as a whole. This plan will outline the skeleton of the *Habitat* geography, providing roads and other pathways but leaving the interstices relatively unfilled. The master plan will include the locations of cities and the positions and priorities for the installation of new housing and basic services. With the basic infrastructure installed, we can then proceed to start generating the more interesting parts of the world, the spots where the real action will be.

As with adventures, we would like to empower a special class of privileged users who can design and create realms. Unlike adventuring, where we simply grant some authority and set the Adventure Masters loose in the world, we will want to be more controlled. I see the realm creation operation working somewhat like a publishing house: people submit realms for consideration; the ones we like, we install; the ones we don't like, we send back with a thanks-but-no-thanks letter; the ones that show promise but aren't quite right, we send back with specific critiques and our best wishes. Eventually we develop a stable of reliable world builders from whom we solicit realms. Of course, there will be the "slush pile" of unsolicited realms, most of which are crap but which occasionally contains a real gem. As in a publishing house, the low person on the totem pole in the operation will inevitably be the one who gets assigned to plow through this stuff when he or she is not too busy with other things. To manage this process, Lucasfilm proposes that another trusted system operator be appointed as "editor of user generated realms". Like the editor of the *Weekly Rant*, this person would be a special and devoted sysop who would work closely with Quantum and Lucasfilm. As with the *Rant* editor, Quantum will be responsible for locating and recruiting this person, while Lucasfilm will train him.

Of course, having a large, external community of realm generators requires that we provide some means for them to specify their designs. This has been previously discussed in the document **Gateway Development**.

We will also want to create special realms of our own, to maintain balance and to keep a generally high quality level in the world. Special realms will support the various special activities which we devise for the players, such as the numerous sub-games that have previously been suggested in other documents. We will also want to generate realms of our own in order to influence by example the direction of the broader world-building community.

Of course, Lucasfilm will generate the overall geographic plan and the specific designs for such "core" areas as business districts and so on. Quantum will consult in the development of this plan.

## Antisocial Behavior

As is currently the case with People Connection, and is inevitably the case in any sort of interactive system where the users are given the means to communicate with each other, there will be individuals who insist on engaging the most obnoxious sorts of antisocial behavior. The "real" world has institutions designed to deal with such undesirables, such as schools, police, courts, and so on, as well as general standards of politeness and civilized conduct. Part of the appeal of online systems to the more obnoxious elements, I think, is in fact the very lack of any such institutional structure. There are no parents or teachers or

police to be afraid of, and the ultimate censure is only loss of access to the system (which, while perhaps undesirable, is less traumatic and thus less daunting than the threat of having to stay after school or of getting a sharp *wack!* upside the head).

Unlike other online systems, *Habitat* attempts to portray a complete world. It is therefor at least plausible that certain forms of antisocial behavior may be at least partially self-correcting, in the sense that the *Habitat* society itself may develop the necessary institutions. It is important, however, for us to distinguish between the forms of "antisocial" behavior that are legitimate elements of game play in the world and those which are offenses against the users themselves. For example, if someone chooses to arm themselves and become a bandit, robbing whoever they can, that is game play and we should not attempt to intervene. On the other hand, if someone chooses to stand in the town square and utter obscenities to everyone who passes by, we will need to act against them. It may be that with time, *Habitat* may evolve its own internal checks and balances (say, people form a government that provides a police force) that acts to control the latter elements as well as the former. However, we cannot simply rely on this happening spontaneously.

The question which confronts us is this: To what degree do we let *Habitat* function as a social laboratory and allow it to evolve its own institutions and to what degree to we attempt to manage it directly, imposing structures and institutions ourselves? To what degree do we attempt to maintain order and civilization within the world and to what degree do we just allow whatever happens to happen?

My intuition is to compromise, establishing a compartmented environment similar to what happens in People Connection with public and private rooms. At the core of the world is civilization. The residential zones that new users start out in are included in this area, as are the businesses that provide the basic, essential services and the play areas that are home to a number of the more organized and controlled activities that players can participate in. We maintain a reasonably high degree of order within these areas, and the rules are made clear to everyone from the beginning. At the edges of civilization are the frontier areas. Within the frontier areas the rules are different. Communities are free to establish their own standards of behavior and their own institutions for enforcing those standards. We will provide certain types of limited assistance in doing this (perhaps, for example, allowing a community to establish a weapons-free zone and then having the host enforce this). Beyond the frontier areas is wilderness. In the wilderness, anything goes. There is absolutely no law except survival of the fittest. Wilderness gradually turns into frontier and then civilization as it is settled and communities develop. We make the boundaries between these areas explicit, and make sure that people understand what it means to cross these boundaries. Naturally, there will be a limit to just how wild-and-wooly the wilderness can get. This limit will no doubt be prescribed for us by our lawyers.

The policy Lucasfilm would like to pursue is the above. Quantum will have to approve, of course, and contribute the specifics as to where we draw the line as far as behavior is concerned. Given the above policy, we will be jointly responsible for seeing that it is followed. This includes not only enforcing the rules of good behavior but also, for example, seeing to it that signs are posted in the appropriate regions warning about the boundaries between the different levels of control and guiding the orderly progression of settled areas into the fold of civilization.

## Habitat Economics

The *Habitat* economy will have to be controlled somewhat carefully, at least until it starts to develop some momentum of its own. By this, I mean that we will have to pay close attention to the prices we establish for various goods and devices, to the supply of these goods and devices, and to the amount of money that is actually circulating at any given time. Initially we will simply have to set up a pricing structure based on our own intuitions about the value of different items. For example, my perception is that the escape device will be quite valuable, since it is so useful. However, what we establish as the price and supply of this device will probably have profound effects on game play. A world in which this particular device is cheap and commonplace will have a different flavor from one in which it is rare and expensive.

We must establish some meaning for our monetary unit and set prices for the various items accordingly (we must establish prices in order to program the vendo machines). We may also want to establish limits on the supply of certain items. Therefor, in addition to a geographic plan the *Habitat* world must have an economic plan. This plan does not need to be elaborate but it does need to be solid and self-

consistent. Unlike real economies, we are not setting out to control production nor to fulfill some social agenda about distribution of wealth. Instead, we are striving to keep the world interesting and entertaining. Indeed, I favor following a free-market model to the greatest extent that this is possible. We therefor have a reasonable hope of avoiding many of the pitfalls that real planned economies tend to fall prey to.

As part of the beta-test setup, Lucasfilm will establish the initial pricing and monetary standards. Both parties will have to be responsible for monitoring these standards to see if they need to be changed on the basis of actual experience.

## Rewards and Punishments

Various activities in the world will carry with them rewards and punishments of various sorts. For example, there may be prizes awarded for solving particular puzzles, accomplishing particular quests, or winning the capture the flag tournament. There are a couple of issues to be decided here: first, what sorts of rewards and punishments are appropriate (given, among other things, our economic plan) and second, who will be responsible for doling them out, and for underwriting them, in the case where they have real-world value, however nominal (e.g., the chocolate aardvark awarded for the most clever slogan for the *Weekly Rant*).

Lucasfilm proposes that there be a number of contests run regularly for which we distribute nominal but enjoyable prizes (e.g., the proverbial chocolate floppy disk). These contests should match in frequency, challenge and reward those currently conducted by Quantum in other parts of the system. The contests themselves would tie in with the various activities that are being developed for the players to participate in, such as region rallies, treasure hunts, and so on (the list of activities currently under development is given in a companion document). As with present contests, Quantum will be responsible for providing and distributing the prizes. Lucasfilm will assist in the organization and conduct of the first several such contests, until the sysops get the hang of it.

## Record Keeping

The *Habitat* design, not to mention the user's manual, calls for a "Hall of Records" or "Book of Records". The purpose of this is to provide feedback to the players in order to motivate those who are driven by the urge to be the best or do the most or have the most or in some other way aspire to possess a superlative. Maintaining these records can be largely automated, once we establish what the records we want to keep actually are. Several have been suggested elsewhere, and this is not the place to go into that sort of detail. However, it is necessary to point out that we do have to decide on what records will be kept. Also, somebody will have to be responsible for installing software "instruments" in the appropriate parts of the system to collect this information and to see to it that this information is periodically collected, sorted, and output in a form suitable for inclusion in a player readable document.

Lucasfilm will be responsible for developing the list of records to be kept. Quantum will advise as to the practicality of collecting the various pieces of data. Quantum and Lucasfilm will be jointly responsible for implementing the software to collect the records, each being concerned with modifications to its own code. Quantum will be responsible for implementing the software to summarize the data and generate the record book output. Lucasfilm will specify the format of this output.