Risk/Return Analysis
of the

Enterprise Media Management System

For
The Exploration Network, Inc.

This is an example deliverable based on an actual AIE project. The company name and some project data have been changed and detailed spreadsheets have been excluded to protect confidential client information.

The Exploration Network, Inc. – July, 2000

Hubbard Decision Research
The Applied Information Economics Company

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Executive Summary

This report summarizes the results of the risk/return analysis of the proposed investment in the Enterprise Media Management System. This method comes from the "Applied Information Economics" approach developed by Doug Hubbard.

Project Benefits

The Enterprise Media Management System (EMMS) is an investment that will integrate several existing Digital Media Management Systems (DMMS) and build some DMMS's where none currently exist. The goal of EMMS is to create an integrated and collaborative management of media assets and asset information. See Section 1 for more details.

Required Investment

The costs will be about 50% hardware, 14% software licenses and 36% labor from ISS and user departments. Some costs will probably be the purchase of software and hardware. The estimated investment is about **$3.1 million.**

Key Risks

- It is possible that utilization would be constrained by both technical and acceptance factors - if utilization is too low the system may not be able to pay for itself.
- Cancellation prior to completion is not likely but could occur from several possible causes.

Results of Analysis

The risks are shown to be acceptable given the expected return. See Section 4 for details.

Recommendations

1. Proceed with the EMMS investment. - A plan should be developed between ISS and the business units to find a realistic level of technology investment and ISS labor so that a realisitic way can be found to maximize utilization. Run another Risk/Return analysis after such a plan is developed to assure that the investment is still valid.
2. Follow the specific "scope control" criteria shown in Section 5.
3. Continue to gather data on promotion time available for various programs so that the relationship between promotion time and ratings can be measured further. This information may have an effect on investment priority and roll-out schedules.
4. See Section 5 for other detailed recommendations.

Value of This Information

Applied Information Economics can be used to compute the value of this information with standard, proven methods. This analysis not only significantly reduced uncertainty but also identified several proactive steps to improve the value of this investment over what was originally proposed. These effects are computed to have a very conservative information value of at least $2,100,000. A conservatively high estimate of the cost of this pilot is $68,000. This puts the cost of analysis at less than 2.2% of the total investment size with a 31:1 payback.

1. DESCRIBE and CLASSIFY

The proposed investment is the Enterprise Media Management System (EMMS). EMMS will create an integrated and collaboratorive environment for the management of media assets and asset information.

1.1 Objectives

The objectives of this first step of the assessment are to:
- Provide a brief description of the investment decision
- Perform the classification
- List the benefit elements
- List the cost elements and
- Identify the risk factors

1.2 Approach

This initial step takes the form of a workgroup comprising the project sponsor, the estimators, the auditor, the assessment coordinators and the AIE facilitators.

The intention is to arrive at a consensus concerning the scope of the project. At this stage, the different cost, benefit and risk elements can be expressed in fairly vague terms.

1.3 Description

The Enterprise Media Management System (EMMS) is an investment that will integrate several existing Digital Media Management Systems (DMMS) and build some DMMS's where none currently exist. The goal of EMMS is to create an integrated and collaborative management of media assets and asset information.

By "management" we mean to include the acquisition, internal distribution, fulfillment, tracking and storage of media.

DMMS's that must be built for the EMMS investment are:
- In-production archiving
- Digital Rough cuts
- Archive access system

DMMS's that currently exist or will soon be built (by other projects) that must be integrated into EMMS are:
- Virtual Library
- Rights Management
- PMD/Document Management
- .com media management
- other distribution sites

EMMS could stand for any combination of media quality, media type and data storage objectives. The specific EMMS investment that we will conduct the RRA for is defined in the following table. In each cell, an "X" means that at least some of that media will be stored in that method. An "X" in production, for example, means that at least some of that media will be stored in production quality (offline copies will still exist). If there is an "X" in the Offline Only column that means that some of the media is available only offline (no digital copies have been loaded into any DMMS).

Scope of the proposed EMMS Project

	Old Archives			New media		
	Production	Draft	Offline Only	Production	Draft	Offline Only
Video		X	X		X	X
Stills	X	X	X	X	X	X
Audio	X		X	X		X
html	X			X		
Gfx		X	X		X	X
docs	X		X	X		X

For text files like html and documents the distinction between "production" and "draft" quality is not relevant.

If this investment has a favorable risk/return position then it may be possible within the scope of this analysis to optimize the investment for the following:

- Is there an "optimal percentage distribution" of video to be stored in production quality, draft quality and offline only? If so, what is it?
- Is there an "optimal percentage distribution" of other media to be stored in production quality, draft quality and offline only? If so, what is it?

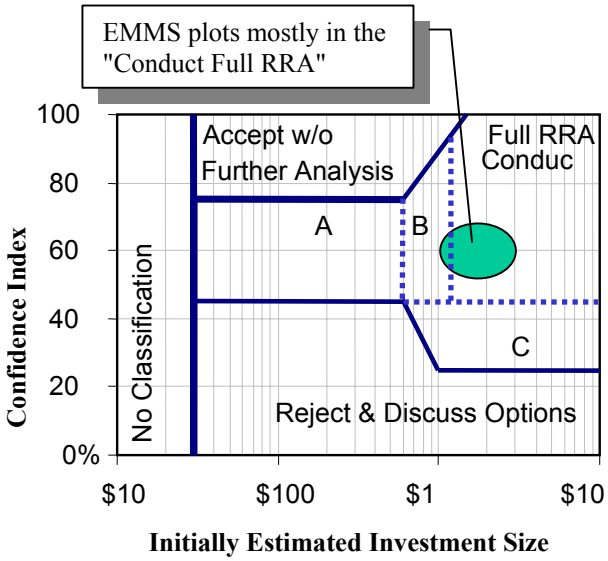
- What state of technology would be necessary to store more production quality media cost-effectively?
- Is there an "optimal priority" for converting media to digital formats and, if so, what is it?

Not all optimization questions can be answered within the scope of this analysis. But if the EMMS investment shows a favorable risk/return position, we will conduct some optimization as time and resources allow.

1.4 Classification

The classification model is based on a version developed during the AIE Implementation project in 1999. The rules of this classification model are not yet official but it is shown here as an example.

Classification Chart



Classification indicates that a full Risk/Return Analysis is required.

1.5 Expected Benefits

Several categories of benefits were identified as unique to the EMMS investment:

1. Reduced time to market
2. Labor efficiencies in searching for media
3. Improved quality of product
4. Greater volume/output
5. Increased marketing capability
6. Improved exploitation of existing assets
7. Improved collaboration
8. Reduced IT management costs for multiple and separate systems
9. Reduced cost of data entry into multiple systems
10. Producer cost reduction
11. Improved control, reporting and management

These benefits will be clarified further in the clarification workshops

1.6 Expected Cost Elements

The categories of expected costs that would be realized with the EMMS investment are as follows:

1. Hardware:
    a. Storage capacity
    b. Communications
    c. Workstation upgrades
    d. Servers
2. Licensing of DMMS software
3. Labor
    a. Integration effort (by ISS)
    b. Training
    c. Data conversion – Media & Metadata
    d. Additional project planning, analysis and management
    e. Maintenance and support

These costs are those that are unique to the EMMS investment and are not part of any other project. If EMMS does not go forward these costs would not be realized.

1.7 Risk Factors

Key risks about an investment in EMMS include:

1. Not having a clear understanding of the deliverable & scope
2. Vendors may not be able to support the system, may get bought out, etc.
3. Mangement expectations may be unrealistic
4. Technology may change during the project
5. Internal resource turnover

1.8 Conclusion & Next Steps

A full RRA is required. The additional required workshops were scheduled.

2. CLARIFY

The clarification process successfully converted all intangible benefits into three measurable categories: productivity improvements, improved time to market and improved ratings. Most risks turned out to be uncertainties about benefits. See the Clarification Worksheet in Appendix 1 and the spreadsheet in Appendix 3 for details.

2.1 Objectives

This step involves converting the intangible costs and benefits into tangibles, and constructing the cost/benefits model.

2.2 Approach

During the Clarify step, we conducted a series of workshops that focused on translating the "intangibles" identified in the Describe & Classify step into well-defined measurable variables. The methods for doing this are based on the use of proven AIE methods in a "Clarification Workshop". These methods coach the people who originally identified the intangibles so that they can articulate the benefits in more precise terms.

Once ambiguity is removed and more precisely defined variables are identified, then a spreadsheet is constructed to insert these new variables into a cost/benefit analysis.

2.3 Resolving Intangibles

The following were the expected benefits of Producers' Services Home Page divided into 4 major categories developed as a result of identifying the benefits and clarifying the intangibles. These 3 categories are:

- Productivity improvements
- Improved time to market
- Increased Ratings

Each of these categories contains several specific variables that are well enough defined such that measurements are possible. The productivity and time to market improvements were broken down into the follow types of projects:

- Base program production
- International versioning
- New media production
- Ancillary broadcast productions
- Consumer products

Likewise, the risks were converted into tangible quantities. Risks were modeled in the CBA in the following major ways:

1. Broad ranges on other known variables will represent our uncertainty about benefits and costs (for example, the actual productivity improvements are uncertain).
2. Some risks actually implied additional adjustments that had to be considered in the benefits (for example, utilization may be lower than expected and all benefits would be adjusted accordingly).
3. The chance of cancellation represents the risks of possible changes in ISS priorities.

2.4 Cost/Benefits Model

The investment will be analyzed by IRR over 4 years after implementation (5 years total).

Ratings were considered only very conservatively and it was important to the participants to argue the value of EMMS both with and without ratings improvements. Both models were created so that the effect of ratings impact could be considered separately.

2.5 Conclusion & Next Step

The decision model is sufficiently well defined to proceed to the Measurement step.

3. CONDUCT MEASUREMENTS & VIA

Calibrated estimates were made for 71 variables. A value of information analysis (VIA) indicated that additional measurements were needed for labor costs and ratings improvements.

3.1 Objective

The objective of this quantification step is to provide a numerical estimate of the probable values for each parameter in the cost/benefits model. Specifically, this estimate will be expressed as a "Probability Distribution" that represents the uncertainty of each variable.

3.2 Approach

Since the variables in the cost-benefit model are clearly identified and organized and the formula to calculate the contribution of the variables has been indicated, the variables can now be measured.
To conduct the measurements, a two-stage approach was used. The initial stage provided conservatively wide and rapidly developed ranges for the entire spreadsheet model. The majority of these initial measurements come from Standard Metrics and Calibrated Probability Assessments.

Standard Metrics are simply quantities that are provided as "givens" in order to standardize Cost/benefit analysis. Examples are loaded cost of labor, cost of capital, etc.

Calibrated Probability Assessments are subjective - yet scientifically based - probability assessments of individuals. A series of training exercises (calibration) is conducted to make the estimators aware of the optimistic nature of their estimates. These exercises then develop the estimators' skills in representing uncertainty concerning quantities, or in determining a correction coefficient for their estimates.

The estimates are represented by a confidence interval and a probability distribution for this interval. The calibrated estimator has a 90% confidence level that the estimate he gives is within that range. The probability distribution demonstrates the shape of the curve of the range. Once the measurements received from the now calibrated internal resources are put into the spreadsheet then VIA analysis is conducted.

The VIA or value of information analysis is then used to identify those variables for which it is economically justified to reduce uncertainty by searching for additional information.

3.3 Initial Measurements

As expected, most of the initial quantities came from Calibrated Probability Assessments. The other source of data was Standard Metrics.

Initial Measurement Source Summary	
Source of Measurement	Number of variables
Calibrated Probability Assessments - probability distributions gathered from Estimators who have been through calibration workshops	**71**
Standard Metrics - these are exact quantities set as a financial analysis standard (e.g. cost of capital, marginal tax rates, standard labor costs, etc.)	**4**
Total	**75**

The calibration training showed that most of the estimators were able to adequately represent their uncertainties with probability distributions. Most of their ranges were conservatively wide.

NOTE: Actual revenue for High-Cost programs was never validated. This affects the business value of ratings improvements. Therefore, two models were built - one with ratings effects and one without. The model with a ratings effect assumed a range of $60-$120 million per year of High Cost revenue. (This did not affect the final recommendation to invest since there are sufficient benefits in other areas to justify the investment)

3.4 First VIA

The results of the first Value of Information Analysis (VIA) indicated that additional measurements were justified in the following areas:

Summary Results of First Value of Information Analysis (VIA) without Ratings Increase			
Variable Name	Expected Value of Perfect Information (EVPI)	Justified measurement effort	Measurement Approach
Chance of cancellation	**$63,000**	**0 days**	The chance of successful completion is 97% - this is approaching the maximum realistic certainty of completion for any IT investment. Therefore, no additional measurements were made.
Production labor costs - number of FTE's, project duration, etc.	**$14,000**	**1-2 days**	Several specific projects could be sampled in this amount of time and the findings would provide significant uncertainty reduction
All media management activity information - current time spent in media management, expected reduction, etc.	**$47,000**	**3-6 days**	Previous pilot results were reviewed more closely to see if any additional uncertainty could be removed
Expected utilization of EMMS by programs	**$7,000**	**Under 1 day**	A more aggressive utilization strategy was developed
All EMMS costs	**$3,000**	**Under 1 day**	Some adjustments were made given the more aggressive utilization strategy
All other variables	**Under $1,000**	**0**	No further measurement was necessary

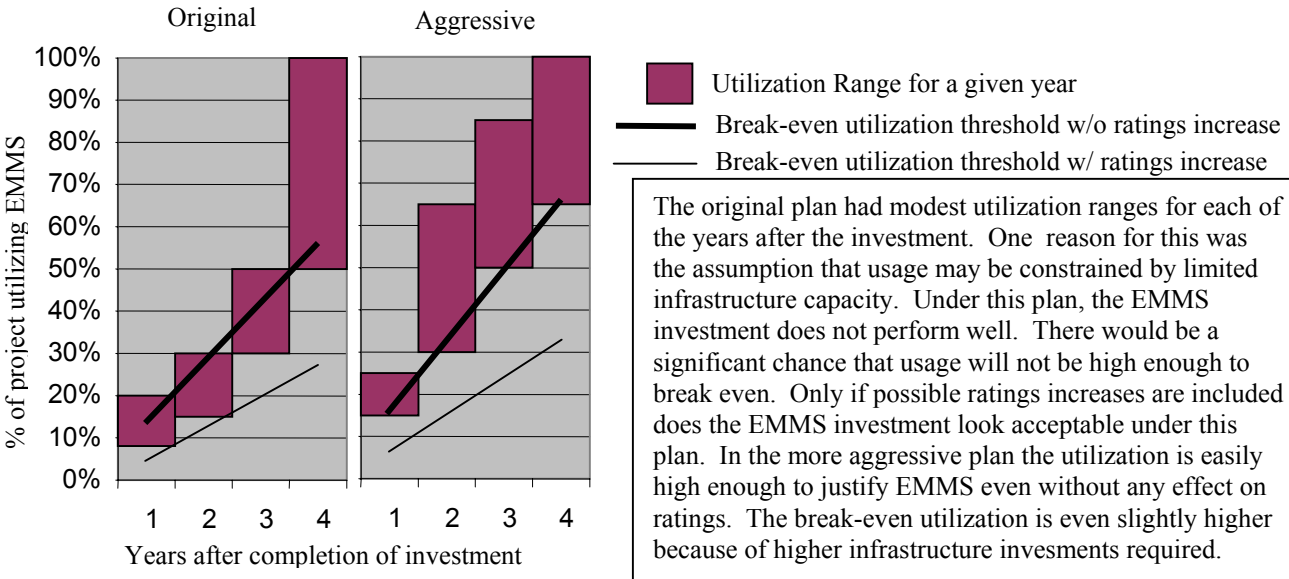
Expected Value of Perfect Information (EVPI) shows the maximum value of additional information even if that information were perfect. This gives us a good idea of an extreme upper bound for effort required for additional measurements. As a rule of thumb, 2% to 20% of the VIA of each variable could be spent in further measurements. In addition to the EVPI, the cost and feasibility of additional information gathering are considered when identifying measurement priorities.

Two sets of VIA's were run: one without any ratings increase (shown in the table above) and one with a model with a ratings increase. With the ratings increase the only relavant uncertainties that was worth measuring was the effect additional promotion time has on ratings.

3.5 Second Measurement: w/o Ratings

1. Labor costs - The initial ranges for FTE's assigned to a project and the duration of a project were large. A survey of several recent projects allowed for a significant reduction in these ranges. The new measurement was slightly more in favor of the proposed EMMS investment.
2. Reduction in media management activities - ranges were changes just slightly as a result of reviewing the results of past pilots in greater detail
3. Utilization and Costs - a more aggressive utilization plan (with increased costs) was clearly justifiable. This was not a measurement but a change in implementation methods that allowed a reduction of uncertainty about both costs and utilization. This also resulted in a much better argument for EMMS. The sources of uncertainty for utilization were two-fold: acceptance and infrastructure capacity. (See following graphic).

Break-even for Original Utilization Plan vs. Aggressive Plan



The original plan had modest utilization ranges for each of the years after the investment. One reason for this was the assumption that usage may be constrained by limited infrastructure capacity. Under this plan, the EMMS investment does not perform well. There would be a significant chance that usage will not be high enough to break even. Only if possible ratings increases are included does the EMMS investment look acceptable under this plan. In the more aggressive plan the utilization is easily high enough to justify EMMS even without any effect on ratings. The break-even utilization is even slightly higher because of higher infrastructure invesments required.

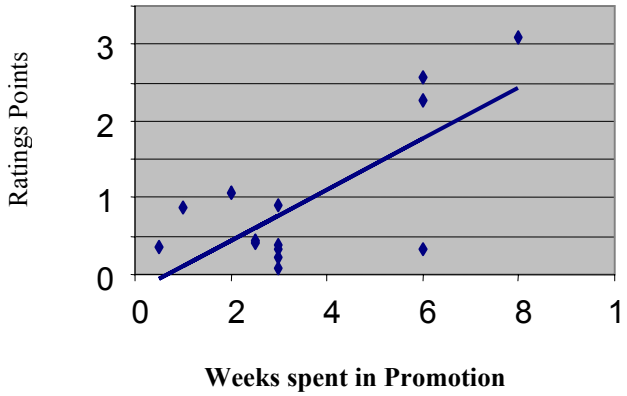
3.6 Second Measurement: w/Ratings

In the model where ratings were considered, only the relationship between ratings and additional promotion time justified any further measurement. One proposed benefit of EMMS was that since project duration should decrease (due partly to increased productivity) more time would be available for promotion. Additional time spent in promotion should have some effect on ratings but this quantity was very uncertain.

To reduce uncertainty on this critical measurement, a survey was conducted that gathered data on several recent programs. Of these programs, 16 had data on both promotion time available and ratings. Initially, no correlation was found between additional promotion time and ratings. But the data was skewed, in part, because 2 of the 16 programs were recent "superstars". These programs both had ratings over 7.0 ratings points.

When the superstars were removed, a more obvious pattern emerged. While it may always be difficult to predict the ratings of superstar programs, most average-performing programs had a correlation between promotion time and ratings. While the sample size of 14 average-performing programs was small for a statistical regression, it appears that at least some of the variance in ratings was due to promotion time available.

Promotion Time vs. Ratings Correlation



3.7 Second VIA

After the second iteration of measurements the only variables that still have a significant EVPI are those related to chance of cancellation. Again, even though cancellation is a significant risk, the chance of cancellation is as small as it is reasonable for any IT investment to be. At this point, no further measurement is justified.

3.7 Conclusion & Next Step

No further measurements are economically justified and feasible. Proceed to risk/return analysis.

4. RISK/RETURN ANALYSIS

The ENI Investment Services Home Page meets the risk/return criteria for ENI. However, it will be difficult to prioritize this investment against others until AIE is fully implemented and RRA is consistently done for all large investments.

4.1 Objective

The objective is to identify whether the ratio of expected return to the risk of loss is compatible with the company's investment criteria.

4.2 Approach

This approach is inspired from applied financial portfolio management methods. The tools used in this step are the Excel spreadsheet and an Excel macro for generating the "Monte Carlo" simulation.

ENI compares the "Expected IRR" (the probability-weighted average of all possible outcomes) against the probability that the IRR will be negative.

Then determine the probabilities of the different values of the IRR for the project, and in particular the probability of a negative return.

Finally, the above results are used to plot the position the project on ENI 's risk/return profile.

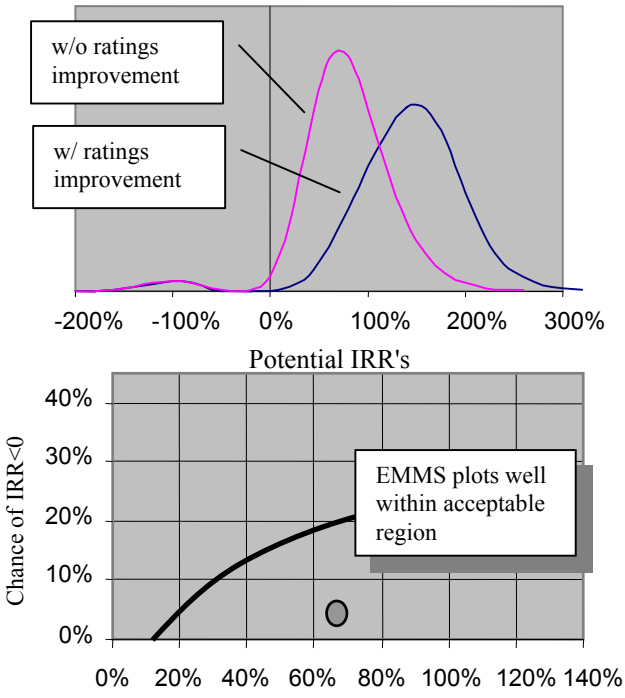
4.3 Risk/Return Position

The Monte Carlo model ran 10,000 simulations to generate the following distribution of possible IRR's. Some of the simulations showed a good IRR and some showed a negative IRR.

The following "IRR Distribution" chart summarizes the results of the 50,000 scenarios. The horizontal axis shows the possible range of IRR's generated in the simulations. The vertical axis of the following chart shows the frequency of that IRR among the 50,000 scenarios. The smaller bump to the left in the distribution reflects the outcomes where investment was cancelled after spending some amount of money. Cancellation could be due to any number of causes but there is always some unrecoverable amount of investment.

The IRR Distribution is used to plot the position of the investment in the "Risk/Return Plot" chart. In the Risk/Return Plot, the bold curve represents the required risk/return boundary for an investment the size of the Enterprise Media Management System. The dot represents where this particular investment plots relative to the risk boundary without ratings improvements considered. Including ratings improvements would plot the investment off the chart to the right and well withing the region of acceptable investments.

IRR Distribution for 50,000 Scenarios



4.4 Conclusion & Next Step

The risk/return position of the ENI Production Services Home Page shows that it is a desirable investment. The next section (recommendations) will point out how to proceed.

5. ISSUE RECOMMENDATIONS

The EMMS project should proceed. Determine the plan that is feasible given ISS resources yet increases utilization as much as possible. Ongoing measurements for the promotion time/ratings correlation will be useful.

5.1 Objectives

Summarize the results of the AIE assessment and issue clear recommendations to support the decision-making process.

5.2 Approach

The recommendations will be based on the results obtained during the previous steps. Careful attention is paid to the "residual VIA's" (high-impact uncertainty that could not feasibly be reduced prior to proposing the investment decision)

5.3 Recommendation

Proceed with the EMMS investment. The critical manageable risk is removing constraints to utilization.

5.4 Risk Mitigation & Improvements

The following points should make the ENI Production Services Homepage a more desirable investment.

1. "Buy" utilization if at all feasible

A 1% point increase in utilization (averaged over all years) is easily worth a $100,000 increase in the investment size. If possible ratings improvements are included it could be worth $200,000 or more. One way to buy utilization is to try to remove possible hardware infrastructure constraints to utilization. This includes making sure that data storage, workstation performance, and the network are all at sufficient levels to support EMMS. This is feasible up to a point depending on availability of ISS resources. For this reason, ISS should negotiate with the EMMS sponsors to identify feasible steps investments of ISS resources to improve utilization. Because the tradeoff between utilization and investment is highly in favor of increasing the investment, even higher-cost outsourcing of some ISS support would be justified.
Whatever investment/utilization plan is ultimately chosen, be sure to run a Monte Carlo simulation to see if that plan produces an acceptable risk/return position. This can be done quickly and easily by merely chaning the number is the current model and running another Monte Carlo. This will ensure that the chosen plan meets minimum risk and return requirements.

3. Scope control

The true cost of additional features is much more than the increase in initial development costs alone. The majority of the cost is deferred benefits plus subsequent maintenance. Adjusted for risk, an increase in the duration of the EMMS project by one month reduces the value of the investment by over $400,000 based on productivity and time-to-market alone. It reduces the value of the investment by over $800,000 if ratings impacts are considered. Therefore, any added features should have total benefits over all years (discounted) that exceed these amounts. With this in mind, additional proposed features must be carefully considered before they are added to the scope of the project. The following table shows two rules-of-thumb that may be applied to assess the value of adding a new feature.

Scope Control: Minimum required business impact for a specific function that increases project duration by one month (one of the following examples)	
Increase in average utilization over all years	4%
Overall productivity improvement	5%

Features that fail to meet these criteria are not necessarily excluded. Instead they may be simply deferred and considered for future versions of the EMMS project.

3. Continue to gather Promo/Ratings data

The relationship between promotion time and ratings can be reduced further simply by gathering data on new programs as they are produced. While this new information should have no effect on the initial decision to invest, it does effect the criteria mentioned in the previous two recommendation points above. If the correlation between promotion time and ratings is, for example, found to be even stronger than the first measures indicated, then the value of increasing utilization is higher and higher initial investments might be justified. Also, the value-added bar is raised for additional features since delaying the release of EMMS would have an even greater cost than shown in point 2 above. On the other hand, if the correlation is lower, then less aggressive utilization is acceptable and the required minimum value for new features is less (making it easier to increase scope if necessary).

Non-ISS Reality Check:
The expected investment size equates to roughly 7 new people over the same time frame (4 years). Would simply adding more FTE's allow the same improvement in time-to-market and increase promotion time available?

APPENDIX 1: CLARIFY benefits

INTANGIBLE BENEFIT	*UNIT OF MEASURE*
1. Reduced time to market	Conservatively modeled only as effect of additional promotion time on ratings and revenue from earlier release
2. Labor efficiencies in searching for media	Improved productivity
3. Improved quality of product	Not modeled - will be added if results are indecisive
4. Greater volume/output	Improved productivity assumed to be the net effect
5. Increased marketing capability	Included as part of additional promotion time effect on ratings
6. Improved exploitation of existing assets	productivity
7. Improved collaboration	Improved productivity, TTM, additional promotion time
8. Reduced IT management costs for multiple and separate systems	Reconsidered and thought to be negligable
9. Reduced cost of data entry into multiple systems	Improved productivity
10. Producer cost reduction	Improved productivity regarding external costs
11. Improved control, reporting and management	Improved producitivity
12. Competitive advantage	Conservatively included only as improved ratings and TTM
13. Attracting superior talent - internal and external	Not modeled - will be added if results are indecisive
14. Producer relationship	Not modeled - will be added if results are indecisive
15. Support for changing production technology	Not modeled - will be added if results are indecisive

Appendix 2: Auditor's Note

The Auditor finds that proper procedure used and that the recommendation should be followed as given in Section 5. Some minor points about procedure are discussed below.

App. 5.1 Objectives

The Auditor's Note section is an objective review of the RRA analysis of this investment. It is written by an objective observer who is qualified in AIE methods and it is meant to identify possible conflicts of interest in the analysis and to QA the results.

App. 5.2 Approach

The auditor is an objective observer of the RRA procedure who reports to the decision-makers of the investment. The auditor's role is to QA the analysis and to identify any possible lack of objectivity in the process (conflicts of interest, etc.). The ultimate tool of this Auditor - as with any auditor - is disclosure. In the event that any shortcomings in the procedure were noted, it will be up to the Judge to interpret the effect on the desirability of the investment.

App. 5.3 Findings

1) Classification, of course, was abbreviated. As a pilot project it was simply assumed that this investment would require full RRA analysis. The size and nature of the investment, however, made this a safe assumption.
2) The RRA method itself was correctly applied during this analysis. After multiple audits, the auditor has determined that no errors exist.
3) There were some possible technical errors in the identification of roles. Specifically, a key estimator for the benefits is also the sponsor. However, this auditor feels the estimates were still conservatively broad and not obviously skewed in favor of an optimistic appraisal of the investment.
4) Not all estimators demonstrated a wholly adequate level of calibration prior to providing estimates. Since the estimators who were not quite calibrated happened to be estimating relatively insignificant numbers the auditor feels this should not significantly impact the analysis.
5) An outside consultant was used for some key calibrated estimates and it was felt that there was some possible conflict of interest (the consultant may benefit personally if this investment were approved). However, the other calibrated estimators on the team felt that the consultant's ranges were realistic.

App. 5.4 Impact of Audit

Finally, in the auditor's opinion, the RRA analysis contained no procedural errors that have and effect on the recommendations and the results of the RRA analysis are reasonable. The recommendation should be followed as stated in Section 5.

Summary of Assigned Roles	
Role	**Name, Company**
Judge(s)	Daniel Johnson, ENI Amy Smith, ENI
Auditor(s)	Doug Hubbard, Hubbard Decision Research
Sponsor	Peter McHenry, ENI
Estimator(s)	Peter McHenry, ENI Pam Kalas, ENI Mary Huling, ENI Dan McGuire, ENI Brad Hammond, ENI Pam Wayne, ENI
Facilitator(s)	Doug Hubbard, Hubbard Decision Research
Analyst(s)	Doug Hubbard, Hubbard Decision Research

	A	B	C	D	E	F
1	**Module Type**	**Lower**	**Formulas &**	**Upper**	**Dist.**	**Source**
2	**Variable Name**	**Bound**	**Best Estimate**	**Bound**	**Type***	**References**
3						
4	**General Financial Assumptions**					
5	Planning horizon (yrs)		4			
6	First year		2001			
7	Cost of capital		6.5%			
8	Marginal Tax Rate		0%			
9	Average cost per internal FTE per week		$ 1,731			CFO's office standard
10						
11	**Program Production Productivity and TTM**					
12	Average weeks duration per project	6	14.0	24	1	CE 6/3 John Smith
13	Average internal FTE's per production	2	6.00	10	3	=C13*C14+C15*C16
14	Average internal costs per FTE per production		$ 145,385			=C9*C12*C13
15						Tom Finn and John Smith will look at budget book
16	Average producer FTE's per production	8	16.00	24	1	CE 6/3 John Smith
17	Average cost per producer FTE per week	800	1,200	1,600	1	From PMD estimate
18	ENI share of production budget	60%	71%	82%	1	From PMD estimate
19	Average producer costs per production		$ 190,848			=C16*C17*C18*C12
20						
21	Average labor cost per production		$ 336,233			=C19+C14
22						
23	Share of time spent in MM by producers	10%	23%	35%	3	CE workshop June 28
24	Share of time spent in MM by ENI	3%	5%	7%	1	CE workshop June 28
25	Productivity Improvement realization factor	20%	40%	60%	3	CE workshop June 29
26	Expected reduction in media management tasks	25%	45%	65%	3	
27	Total productivity savings per production		$ 9,038			=(C23*C19+C24*C14)*C25*C26
28						
29	Percentage of productivity improvement as work force reduction	10%	20%	30%	3	CE workshop June 28
30	Percentage of productivity improvement as TTM decrease		80%			=1-C29
31	Percentage of media management on critical path	85%	90%	95%	3	CE workshop June 28
32	Percent reduction in TTM		10.8%			=(C23*C19/C21+C24*C14/C21)*C30*C31
33	Additional weeks available		1.5053			=C32*C12
34						
35	Increased profit per production sub-total		$ 9,038			=C27
36						
37	**International versioning productivity and TTM**					
38	Average weeks duration per post-production project	6	10	14	1	CE workshop June 28
39	Average internal FTE's per production	4	8	12	3	CE workshop June 28
40	Average external FTE's per production	2	5.0	15	2	CE workshop June 28
41	Average costs per production		$ 198,462			=C38*C39*C$9

*1=Normal, 2=Lognormal, 3=Uniform, 4=Beta, 5=Binary

	A	B	C	D	E	F
1	Module Type	Lower	Formulas &	Upper	Dist.	Source
2	Variable Name	Bound	Best Estimate	Bound	Type*	References
42						
43	Percentage of highly customized programs	8%	14%	20%	3	CE workshop June 28
44	Share of time spent in MM in high customized programs	10%	20%	30%	3	CE workshop June 28
45	Share of time spent in MM in language versioning	8%	14%	20%	3	CE workshop June 28
46	Total productivity savings per production		$ 5,301			=C42*C$25*C$26*C40
47						
48	Percentage of productivity improvement as work force reduction	10%	20%	30%	3	CE workshop June 28
49	Percentage of productivity improvement as TTM decrease		80%			=1-C45
50	Percentage of media management on critical path	50%	70%	90%	3	CE workshop June 28
51	Percent reduction in TTM		7.8%			=C42*C46*C47
52	Percent completion of Program production started before DMMS	75%	88%	100%	3	CE workshop June 28
53	Percent completion of Program production started after DMMS	30%	48%	75%	3	CE workshop June 28
54	Additional weeks available		1.7			=C48*C38+C$33*(1-C49+C50)
55						
56	Revenue per extra week of availability		$ -			Tom Finnindicates that additional revenue here is counted below
57	Percentage of revenue lost due to unavailability		20%			
58	Percentage of revenue deferred		80%			=1-C54
59	Time value of deferred revenue		$ -			=((1+C$7)^(C51/52)-1)*C53*C55
60	Revenue saved		$ -			=C53*C51
61	Profit margin		20%			
62						
63	Increased profit per production sub-total		$ 5,301			=C58*C57+C43
64						
65	New Media Production productivity and TTM					
66	Average weeks duration per post-production project	1	4.0	22	2	CE workshop June 28
67	Average internal FTE's per production	1	3	10	2	CE workshop June 28
68	Average external FTE's per production	1	3	10	2	CE workshop June 28
69	Average costs per production		$ 35,169			=C63*C64*C$9
70						
71	Share of time spent in media management	15%	45%	75%	3	CE workshop June 28
72	Total productivity savings per production		$ 2,849			=C67*C$25*C$26*C65
73						
74	Percentage of productivity improvement as work force reduction	10%	20%	0.3	3	CE workshop June 28

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	A	B	C	D	E	F
1	**Module Type**	**Lower**	**Formulas &**	**Upper**	**Dist.**	**Source**
2	**Variable Name**	**Bound**	**Best Estimate**	**Bound**	**Type***	**References**
75	**Percentage of productivity improvement as TTM decrease**		**80%**			**=1-C70**
76	**Percentage of media management on critical path**	**10%**	**43%**	**0.75**	**3**	**CE workshop June 28**
77	**Percent reduction in TTM**		**15.3%**			**=C67*C71*C72**
78	**Percent completion of Program production started before DMMS**	**50%**	**75%**	**100%**	**3**	**CE workshop June 28**
79	**Percent completion of Program production started after DMMS**	**30%**	**48%**	**75%**	**3**	**CE workshop June 28**
80	**Additional weeks available**		**1.7**			**=C73*C63+C$33*(1-C74+C75)**
81						
82	**Revenue per extra week of availability**	**$ 1,000**	**$ 3,000**	**$ 5,000**	**3**	**CE Tom Finn 6/28**
83	**Percentage of revenue lost due to unavailability**	**0%**	**50%**	**1**	**3**	**=((1+C$7)^(C80/52)-1)*C82*C84**
84	**Percentage of revenue deferred**		**50%**			**=1-C79**
85	**Time value of deferred revenue**		**$ 3**			**=((1+C$7)^(C76/52)-1)*C78*C80**
86	**Revenue saved**		**$ 5,110**			**=C78*C76**
87	**Profit margin**	**50%**	**75%**	**1**	**3**	**Check w/ Tom**
88						
89	**Increased profit per production sub-total**		**$ 6,681**			**=C83*C82+C68**
90						
91	**Ancillary broadcast productivity and TTM**					
92	**Average weeks duration per post-production project**	**4**	**10.0**	**16**	**3**	**CE workshop June 28**
93	**Average internal FTE's per production**	**2**	**3**	**4**	**3**	**CE workshop June 28**
94	**Average external FTE's per production**	**3**	**5**	**12**	**2**	**CE workshop June 28**
95	**Average costs per production**		**$ 111,923**			**=C88*C89*C$9**
96						
97	**Share of time spent in media management**	**5%**	**18%**	**30%**	**3**	**CE workshop June 28**
98	**Total productivity savings per production**		**$ 3,526**			**=C92*C$25*C$26*C90**
99						
100	**Percentage of productivity improvement as work force reduction**		**20%**			**=(C96*(1-C97)+C96*C97*C98)*C26**
101	**Percentage of productivity improvement as TTM decrease**		**80%**			**=1-C95**
102	**Percentage of media management on critical path**	**85%**	**90%**	**0.95**	**3**	**CE workshop June 28**
103	**Percent reduction in TTM**		**12.6%**			**=C92*C96*C97**
104	**Percent completion of Program production started before DMMS**	**90%**	**95%**	**1**	**3**	**CE workshop June 28**
105	**Percent completion of Program production started after DMMS**	**30%**	**48%**	**0.75**	**3**	**CE workshop June 28**
106	**Additional weeks available**		**2.1**			**=C98*C88+C$33*(1-C99+C100)**
107						
108	**Revenue per extra week of availability**	**$ 3,000**	**$ 6,000**	**$ 9,000**	**3**	**CE Tom Finn 6/28**

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	A	B	C	D	E	F
1	Module Type	Lower	Formulas &	Upper	Dist.	Source
2	Variable Name	Bound	Best Estimate	Bound	Type*	References
109	Percentage of revenue lost due to unavailability		20%			
110	Percentage of revenue deferred		80%			=1-C104
111	Time value of deferred revenue		$ 12			=((1+C$7)^(C101/52)-1)*C103*C105
112	Revenue saved		$ 12,302			=C103*C101
113	Profit margin	20%	35%	50%	3	CE workshop June 28
114						
115	Increased profit per production sub-total		$ 7,831			=C108*C107+C93
116						
117	Consumer products					
118	Average weeks duration per post-production project	1	6.5	12	3	CE workshop June 28
119	Average internal FTE's per production	0	2	4	3	CE workshop June 28
120	Average external FTE's per production	3	6	12	2	CE workshop June 28
121	Average costs per production		$ 69,300			=C113*C114*C$9
122						
123	Share of time spent in media management	30%	50%	0.7	3	CE workshop June 28
124	Total productivity savings per production		$ 6,237			=C117*C$25*C$26*C115
125						
126	Percentage of productivity improvement as work force reduction		20%			=(C124*(1-C125)+C124*C125*C126)*C54
127	Percentage of productivity improvement as TTM decrease		80%			=1-C120
128	Percentage of media management on critical path	85%	90%	0.95	3	CE workshop June 28
129	Percent reduction in TTM		36.0%			=C117*C121*C122
130	Percent completion of Program production started before DMMS	75%	88%	100%		
131	Percent completion of Program production started after DMMS	30%	48%	75%		
132	Additional weeks available		3.2			=C123*C113+C$33*(1-C124+C125)
133						
134	Revenue per extra week of availability	$ 500	$ 1,414	$ 4,000	2	CE Tom Finn 6/28
135	Percentage of revenue lost due to unavailability	50%	70%	90%	3	CE workshop June 28
136	Percentage of revenue deferred		30%			=1-C129
137	Time value of deferred revenue		$ 2			=((1+C$7)^(C126/52)-1)*C128*C130
138	Revenue saved		$ 4,586			=C128*C126
139	Profit margin	0%	10%	20%	3	CE workshop June 28
140						=((1+C$7)^(C136/52)-1)*C138*C140
141	Increased profit per production sub-total		$ 6,696			=C133*C132+C118
142						
143	Growth model					
144						
145	Total increased profit per production		$ 22,171			=C35+C60+C67+C94+C110

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	A	B	C	D	E	F
1	**Module Type**	**Lower**	**Formulas &**	**Upper**	**Dist.**	**Source**
2	**Variable Name**	**Bound**	**Best Estimate**	**Bound**	**Type***	**References**
146						
147	**Inflation of production costs**	**2%**	**3.7%**	**12%**	**2**	**CE workshop June 28**
148	**Growth rate in productions per year**					
149	**2002**	**1%**	**10%**	**20%**	**3**	**CE workshop June 28**
150	**2003**	**1%**	**10%**	**20%**	**3**	**CE workshop June 28**
151	**2004**	**1%**	**10%**	**20%**	**3**	**CE workshop June 28**
152	**2005**	**1%**	**10%**	**20%**	**3**	**CE workshop June 28**
153						
154	**Current number of productions per year**	**100**	**125**	**150**	**1**	**John Smith**
155	**Projected annual number of productions**					
156	**2002**		**138**			**=C148*(1+C143)**
157	**2003**		**151**			**=C150*(1+C144)**
158	**2004**		**166**			**=C151*(1+C145)**
159	**2005**		**183**			**=C152*(1+C146)**
160						
161	**Total projected benefits from productivity and TTM improvement**					
162	**2002**		**$ 3,161,263**			**=C$139*C150*(1+C$141)^1**
163	**2003**		**$ 3,477,389**			**=C$139*C151*(1+C$141)^1**
164	**2004**		**$ 3,825,128**			**=C$139*C152*(1+C$141)^1**
165	**2005**		**$ 4,207,640**			**=C$139*C153*(1+C$141)^1**
166						
167	**Ratings increase due to program quality**					**CE Tom Finn 6/28, review w/ John Smith**
168	**Percent ratings increase due to improved quality**	**0.000%**	**1.00%**	**5%**	**4**	**CE workshop June 28**
169	**Total Domestic Annual Revenue for High Cost programs**	**$ 1,100,000**	**$ 1,550,000**	**$ 2,000,000**	**1**	**Tom deduced from budget data**
170	**Total projected benefits from ratings increase**					
171	**2002**		**$ 2,131,250**			**=C$165*C$164*C150**
172	**2003**		**$ 2,344,375**			**=C$165*C$164*C151**
173	**2004**		**$ 2,578,813**			**=C$165*C$164*C152**
174	**2005**		**$ 2,836,694**			**=C$165*C$164*C153**
175						
176						
177	**Ratings point increase due to improved quality**	**0.000%**	**1.00%**	**5%**		**CE workshop June 28**
178	**Total International Annual Revenue for High Cost**	**$ 250,000**	**$ 375,000**	**$ 500,000**	**1**	**Tom deduced from budget data**
179	**Total projected benefits from ratings increase**					
180	**2002**					
181	**2003**		**$ 515,625**			**=C$175*C$174*C150**
182	**2004**		**$ 567,188**			**=C$175*C$174*C151**
183	**2005**		**$ 623,906**			**=C$175*C$174*C152**
184			**$ 686,297**			**=C$175*C$174*C153**
185	**Utilization & Implementation**					

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	A	B	C	D	E	F
1	**Module Type**	**Lower**	**Formulas &**	**Upper**	**Dist.**	**Source**
2	**Variable Name**	**Bound**	**Best Estimate**	**Bound**	**Type***	**References**
186						
187	**2002**	**8%**	**14%**	**20%**	**3**	**CE workshop June 28**
188	**2003**	**15%**	**23%**	**30%**	**3**	**CE workshop June 28**
189	**2004**	**30%**	**40%**	**50%**	**3**	**CE workshop June 28**
190	**2005**	**50%**	**75%**	**100%**	**3**	**CE workshop June 28**
191						
192	**Adjusted benefits without cancelation**					
193	**2002**		**$ 740,952**			**=(C176+C156)*C183**
194	**2003**		**$ 1,425,912**			**=(C177+C157)*C184**
195	**2004**		**$ 2,788,451**			**=(C178+C158)*C185**
196	**2005**		**$ 5,751,180**			**=(C179+C159)*C186**
197						
198	**Initial Investment**					
199	**1. Hardware:**					
200	**a. Storage capacity**	**$ 300,000**	**$ 550,000**	**$ 800,000**	**1**	**CE workshop June 28**
201	**b. Connectivity**	**$ 5,000**	**$ 202,500**	**$ 400,000**	**3**	**CE workshop June 28**
202	**c. Workstation upgrades**	**$ 20,000**	**$ 60,000**	**$ 100,000**	**3**	**CE workshop June 28**
203	**d. Servers**	**$ 100,000**	**$ 300,000**	**$ 500,000**	**3**	**CE workshop June 28**
204	**Total hardware**		**$ 1,112,500**			**=SUM(C196:C199)**
205						
206	**2. Licensing/api of DMMS software**	**$ 20,000**	**$ 260,000**	**$ 500,000**	**3**	**CE workshop June 28**
207						
208	**Customization/integration/initial migration**	**$ 300,000**	**$ 500,000**	**$ 700,000**	**3**	**CE workshop June 28**
209	**Training**	**$ 10,000**	**$ 22,360**	**$ 50,000**	**2**	**CE workshop June 28**
210	**Additional project planning, analysis and management**		**$ -**			
211	***Total Initial Investment***		**$ 1,894,860**			**=C200+C202+C204+C205+C206**
212						
213	**Recurring costs**					
214	**Percentage of hardware as recurring**	**10%**	**20%**	**30%**	**3**	**CE workshop June 28**
215	**Percentage of labor as recurring**	**15%**	**23%**	**30%**	**3**	**CE workshop June 28**
216	***Annual recurring costs***		**$ 335,000**			**=C213+C211+C214**
217						
218						
219	**Conditional Cancelation Risk**					
220	**Chance of Cancelation**		**3.0%**		**5**	**CE workshop June 28**
221	**Percentage of Cost Realized at Cancelation**	**80%**	**115%**	**150%**	**3**	**CE workshop June 28**
222	**Cost Realized at Cancelation**		**$ 2,179,089**			**=C220*C207**
223	**Expected Initial Investment**		**$ 1,903,387**			**=C219*C221+(1-C219)*C207**
224						
225	**Summary Cash Flow**					
226	**Expected Investment**		**$ (1,898,030)**			

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	A	B	C	D	E	F
1	**Module Type**	**Lower**	**Formulas &**	**Upper**	**Dist.**	**Source**
2	**Variable Name**	**Bound**	**Best Estimate**	**Bound**	**Type***	**References**
227	**2002**		**388,416**			**=-C219*(C221+C225)+(1-C219)*(C189-C225-C207-C$215)**
228	**2003**		**1,058,185**			**=(1-C$219)*(C190-C$215)**
229	**2004**		**2,379,848**			**=(1-C$219)*(C191-C$215)**
230	**2005**		**5,253,695**			**=(1-C$219)*(C192-C$215)**
231						
232	**Financial Results**					
233	**Net Present Value**		**$ 5,120,762**			**=NPV(C7,C225:C229)*(1-C8)**
234	**IRR Guess**		**378%**			**=-SUM(C225:C229)/C225**
235	**Return On Investment**		**64%**			**=IF(C233<-1,C233,IRR(C225:C229,C233))**
236	**Filtered IRR**		**64%**			**=IF(ISERR(C234),0,C234)**
237						
238						

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