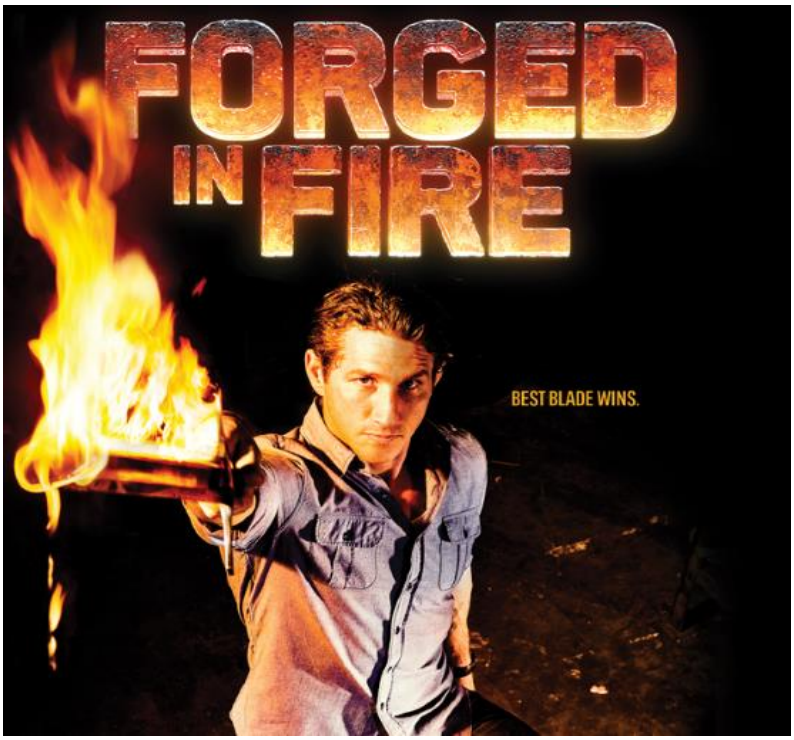
Forged in Fire
Risks Associated with a Reality Competition Show



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1. Introduction and Background

The first reality TV show is attributed to "An American Family" which aired on PBS in 1973. It featured the Loud family, a family of seven from Santa Barbara, California, as they dealt with the broad spectrum of changes in contemporary life at that time. By the late '90's reality television had grown to a major industry of its own, encompassing epics such as the well-known Survivor series (CBS), competitions such as The Amazing Race (CBS) and American Idol (FOX), and dating series such as the Bachelor (ABC). [1]

As the early days of the megahit reality shows passed, due in part to industry saturation, today's reality show production companies face many challenges. Excessive competition, rising operational costs, and strained profit margins are exasperated by overall uncertainty in the future of cable TV.[2]

Our project explores risks as seen through the eyes of Outpost Productions, who produces Forged in Fire for the History Channel. We explore the risks associated with the profitability and longevity of this show during a one-year production of 20 episodes and the impact to the objectives of the production company.

The objectives of Outpost Productions through their production of Forged in Fire are[3]:

- **Increase Outpost Productions' market presence** through signing contracts for new shows, expanding their global viewership, achieving their goal of targeting the 60/40 demographic split (shows that attract both men and women at a general 60/40 ratio), and generally grow their reputation in industry.
- **Deliver entertaining and groundbreaking reality series** which includes achieving show longevity through loyal viewership and promoting a passion for the reality show topical area, which for this series is blade smithing.
- **Be a reliable production company** by meeting deadlines in all aspects of production to deliver on contracts with their sponsors and maintain safe work environments to minimize production delays.
- **Be a profitable production company** by effectively managing expenses while concurrently increasing revenues via sales to produce new show series.

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[1] Hathaway C. "The surprising origins of reality TV". *The Washington Post*, www.washingtonpost.com/news/made-by-history/wp/2017/11/08/the-surprising-origins-of-reality-tv/. Accessed October 19, 2019.
[2] Schneider M. "Unscripted Producers Feel Squeeze of Growing Expenses, Reduced Pay". *Variety*, https://variety.com/2017/tv/features/unscripted-producers-survey-state-of-business-1201967584/. Accessed September 19, 2019.
[3] ITV America. "Outpost Entertainment". http://itv-america.com/partners/outpost-entertainment/. Accessed September 10, 2019.

2. Project Structure

We developed our risk analysis model using Expert Choice Riskion software. This section describes the major components of the project structure definition necessary to support the subsequent measurement and assessment functions. Our model name in the Riskion software is RM2019_KAS_SEB_Forged in Fire.

2.1. Identifying Risk Events

The first step in developing the model is to identify risk events. Events can be thought of as "the things you worry about" but are distinguishable from other key features of the model in that risk events must have an associated loss. Therefore, while the production company might worry that the sponsoring network could move the show to an undesirable timeslot, this would not be a risk event as it does not directly have an associated loss. Rather, the potential resulting loss in viewership would be the risk event and the change in timeslot would be captured in a different part of the model as a source (threat).

We identified risk events using the Visual Brainstorming feature of Riskion and through iteration. We learned that as we iteratively defined the different model components clarity emerged that enabled us to improve the definition of risk events. We eventually arrived at the risk events listed below in Figure 1.

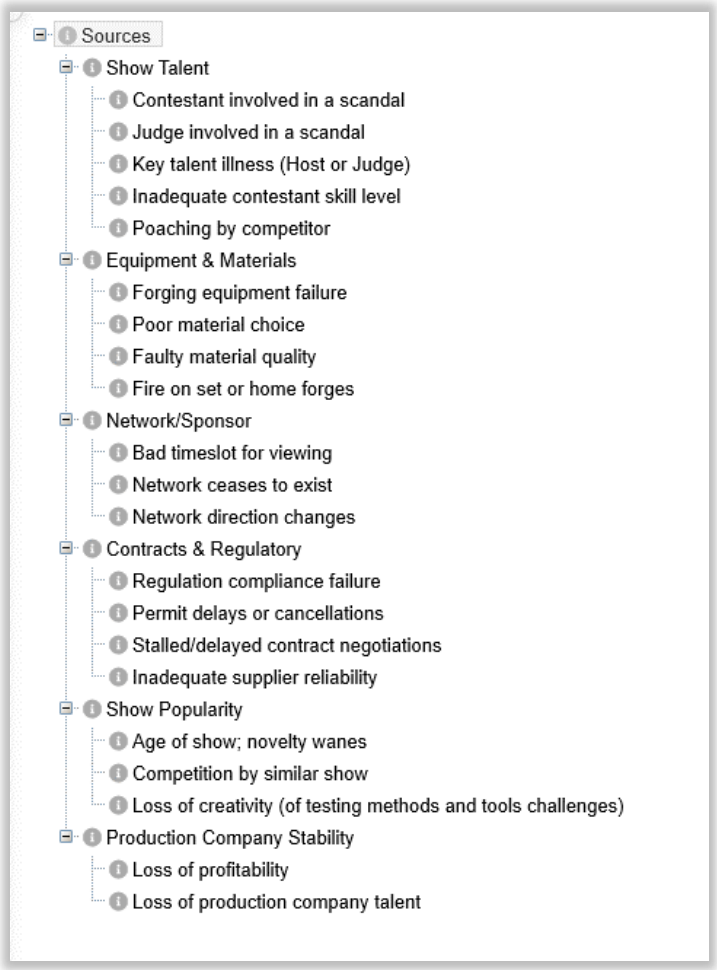
Figure 1: Risk Events

Events
Loss of advertising
Show cancellation
Declining viewership
Production stoppage
Injury
Excessive Weapon failure
Material supply disruption
Talent becomes unavailable
Loss of network sponsorship
Executive leadership turnover
Ineffective production staffing

2.2. Identifying Sources

Figure 2 depicts the sources, or threats, to the risk events. We identified these sources through the Visual Brainstorming feature of Riskion. Once the sources were identified we analyzed them to group them into common themes to support further analysis. These themes are captured below as the highest level of the hierarchy (i.e. Show Talent, Equipment, Materials, etc.) The sources within each category are specific sources/threats that may or may not occur which could result in the triggering of risk events.

Figure 2: Hierarchy of Sources

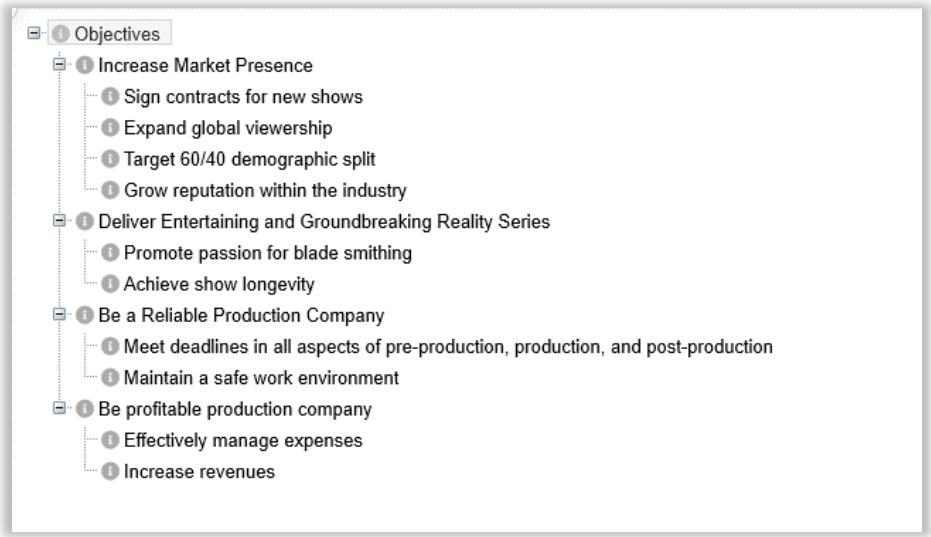


2.3. Identifying Objectives

Objectives were identified and refined through research on the reality television industry and through the website presence of Outpost Productions which provides insights into their company goals and market

niche. Through this analysis and sharpened by our previous events and source analysis, we arrived at the hierarchy of objectives provided below in Figure 3.

Figure 3: Hierarchy of Objectives



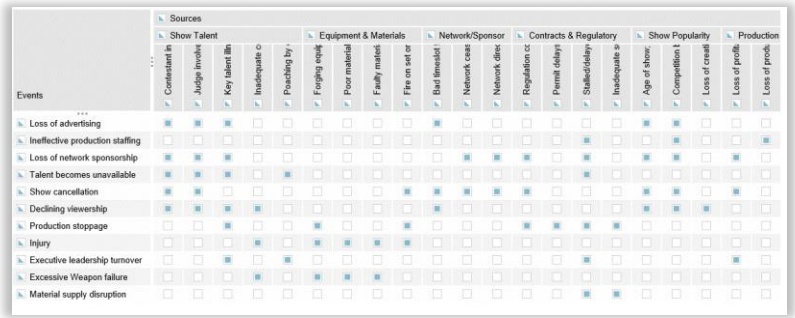
3. Events Mapping to Sources and Objectives

As mentioned in previous sections, the process of refining risk events, sources (threats), and objectives led to iterative improvements to the model. This was especially true in the next two steps where events are mapped to both sources and objectives

3.1. Likelihood of Events

Figure 4 below maps the likelihood of events based upon sources. Each event was linked to one or more sources that, if they occur, increase the likelihood of the event occurring. In most cases a source is linked to more than one risk event. During this step when we identified a source that did not increase the likelihood of our events, they were removed from the model as not being significant.

Figure 4: Vulnerabilities Grid



3.2. Impact of Events

In a similar way, events were related to the objectives as demonstrated in Figure 5 below. This stage of the model defines the direct relationship of risk events to the objectives. In section 2.1 above, a risk must have an associated loss. This grid captures the objectives against which that loss would occur. Note that there is often a many to many relationship between events and objectives in that an event can negatively impact the achievement of one or more objectives.

Figure 5: Impacts Grid

Events	Objectives									
	Increase Market Presence				Deliver Entertaining and Gro		Be a Reliable Production Co		Be profitable production con	
	Sign contracts for new shows	Expand global viewership	Target 60/40 demographic split	Grow reputation within the industry	Promote passion for blade smithing	Achieve show longevity	deadlines in all aspects of pre-production, production, and post-productior	Maintain a safe work environment	Effectively manage expenses	Increase revenues
Loss of advertising		■		■		■				■
Ineffective production staffing				■			■	■	■	
Loss of network sponsorship	■	■		■		■				■
Talent becomes unavailable			■				■		■	
Show cancellation	■	■		■	■	■				■
Declining viewership	■	■	■	■	■	■				■
Production stoppage				■			■		■	
Injury				■	■		■	■	■	
Executive leadership turnover	■		■	■			■			
Excessive Weapon failure					■	■		■	■	
Material supply disruption							■		■	

4. Participants and Roles

Several Outpost Productions executives and team members were identified for evaluation roles for this project. The participants identified are based upon our research of key roles in Production Company structures. One role is based upon an actual person. Jody Flynn is the senior executive for Outpost Productions and a key driver of the production company's success and direction. We were pleased to learn that she is a graduate of GW, however, as she was not available for assessment activities, we completed the evaluation assuming the perspectives she might offer. Similarly, assessments were performed assuming the perspectives that would be offered by the key roles of Casting Director, Director, Insurance Broker, and Risk Manager. Not all participants had the same role in evaluating sources and events as shown in Figure 7 below.

Figure 6: List of Participants for Evaluation

Email	Participant Name	Permission	Has Data
forman@gwu.edu	Professor Forman	Project Manager	
nstavrakakis@gwu....	Nicholas Stavrakakis	Project Manager	
kathy_steimer@gw...	Kathy Steimer	Project Manager	Yes
ebass@gwu.edu	Emily Bass	Project Manager	Yes
jflynn@email.com	Jodi Flynn, Producer	Evaluator	Yes
casting@email.com	Casting Director	Evaluator	Yes
director@emial.com	Director	Evaluator	Yes
broker@email.com	Insurance Broker	Evaluator	Yes
risk@email.org	Risk Manager	Evaluator	Yes

Figure 7: Example of Participant's Role for Evaluation of Events (Likelihood of Events)

Figure 8: Example of Participant's Role for Evaluation of Events (Impact of Events)

5. Measurement Methods

Using Expert Choice Riskion software, we determined the appropriate measurements to utilize for the project. Measurement is conducted on the following four dimensions:

- Likelihood of Sources
- Likelihood of Events given Sources
- Importance of Objectives
- Consequence of Events on Objectives

Riskion enables relative and absolute measurements for deriving priorities and produces ratio scale measurements, which means they are mathematically meaningful and provide the foundation for further risk and impact analysis.

We assessed the measurement alternatives available in Riskion to determine the best tools to apply to our model. We decided to leverage Pairwise Comparison and Rating Scale judgements. Pairwise Comparisons can be used to derive how much more likely or important one item is than another. The underlying eigenvector computations produce ratio measures from these judgements.

Rating Scales also produce ratio measures. They are useful when there are is many elements and it is too time consuming to make pairwise comparisons. The table below summarizes the measurement methods that were used for each of the necessary model measurements.

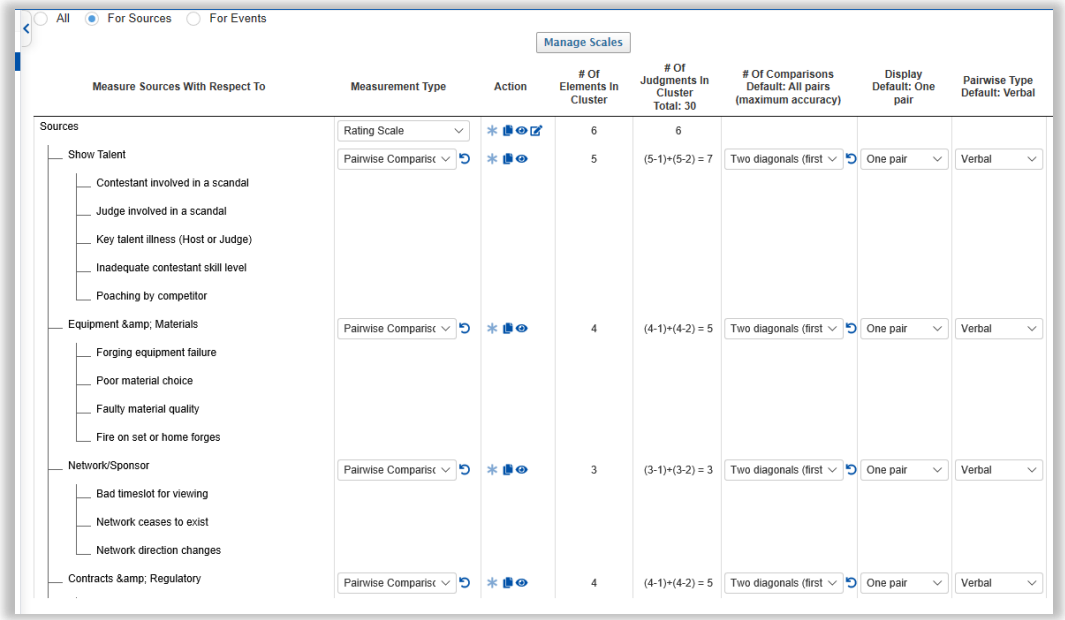
Model Measurement Dimension	Measurement Method Used
Likelihood of Sources	Pairwise Comparison
Likelihood of Events Given Sources	Rating Scale
Importance of Objectives	Pairwise Comparison
Consequence of Events on Objectives	Rating Scale

The sections below provide addition detail on the measurements used and the presentation of these measurement types to the participants

5.1. Likelihood of Sources

We chose Pairwise Comparison to measure the likelihood of sources. The importance of this data to the subsequent steps of the model justified the large number of comparisons that were required when we chose this method. To minimize the impact to our participants we were selective in the areas where we requested their participation. Figure 9 below provides an example of the definition screen for this dimension of measurement. Figure 10 provides an example of this comparison as presented to a participant.

Figure 9: Example of Measurement of Sources Rating Scale



All | For Sources | For Events

Manage Scales

Measure Sources With Respect To	Measurement Type	Action	# Of Elements In Cluster	# Of Judgments In Cluster Total: 30	# Of Comparisons Default: All pairs (maximum accuracy)	Display Default: One pair	Pairwise Type Default: Verbal
Sources	Rating Scale		6	6			
Show Talent	Pairwise Comparisc		5	(5-1)+(5-2) = 7	Two diagonals (first	One pair	Verbal
Contestant involved in a scandal							
Judge involved in a scandal							
Key talent illness (Host or Judge)							
Inadequate contestant skill level							
Poaching by competitor							
Equipment & Materials	Pairwise Comparisc		4	(4-1)+(4-2) = 5	Two diagonals (first	One pair	Verbal
Forging equipment failure							
Poor material choice							
Faulty material quality							
Fire on set or home forges							
Network/Sponsor	Pairwise Comparisc		3	(3-1)+(3-2) = 3	Two diagonals (first	One pair	Verbal
Bad timeslot for viewing							
Network ceases to exist							
Network direction changes							
Contracts & Regulatory	Pairwise Comparisc		4	(4-1)+(4-2) = 5	Two diagonals (first	One pair	Verbal

Figure 10: Sample of Pairwise Comparison

5.2. Likelihood of Events Given Sources

To measure Likelihood of Events given Sources we chose Rating Scale Measurement. We chose this measure in part to reduce participant fatigue due to the number of required judgements. But we also chose this method because we trusted the participant intuition in assessing the impact of an event should a source occur and felt it would provide similar results to a Pairwise Comparison exercise. Figure 11 provides an example of a screen to define this type of measurement. Figures 12 and 13 provide samples of the presentation of this type of measurement to a participant.

Figure 11 – Example of Measurement of Events Given Sources via Rating Scale

All | For Sources | For Events

Manage Scales

Measure Events With Respect To	Measurement Type Default: Rating Scale	Measurement Scale	Action	# Of Elements In Cluster	# Of Judgments In Cluster Total: 64
Sources					
Show Talent					
Contestant involved in a scandal	Rating Scale	Default Likelihood Sca		5	5
Judge involved in a scandal	Rating Scale	Default Likelihood Sca		5	5
Key talent illness (Host or Judge)	Rating Scale	Default Likelihood Sca		6	6
Inadequate contestant skill level	Rating Scale	Default Likelihood Sca		3	3
Poaching by competitor	Rating Scale	Default Likelihood Sca		2	2
Equipment & Materials					
Forging equipment failure	Rating Scale	Default Likelihood Sca		3	3
Poor material choice	Rating Scale	Default Likelihood Sca		2	2
Faulty material quality	Rating Scale	Default Likelihood Sca		2	2
Fire on set or home forges	Rating Scale	Default Likelihood Sca		3	3
Network/Sponsor					
Bad timeslot for viewing	Rating Scale	Default Likelihood Sca		3	3
Network ceases to exist	Rating Scale	Default Likelihood Sca		2	2
Network direction changes	Rating Scale	Default Likelihood Sca		2	2

Figure 12 – Sample of Rating Scale for Events Given Source

Given Show Talent > Judge involved in a scandal, rate the likelihood of the following Events

Edit

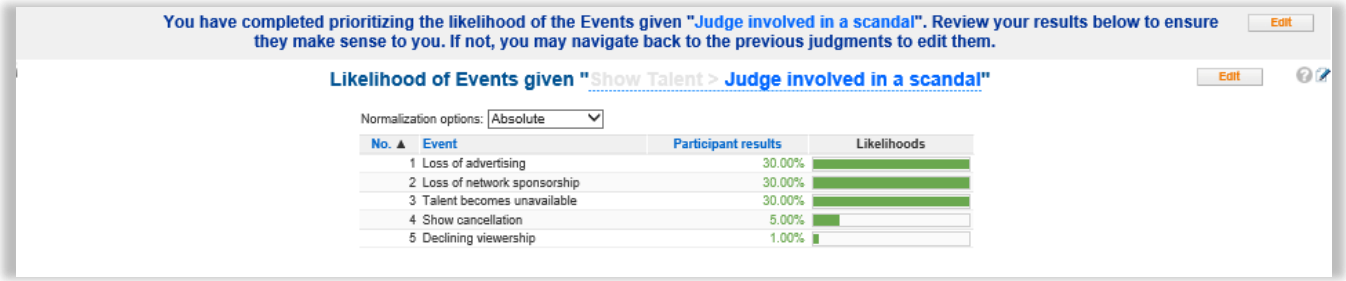
Loss of advertising	Judge involved in a scandal	Loss of advertising given Judge involved in...	Scale description
If advertising revenue decrease, the show could no longer be viable.			Default Ratings Scale for Sources and Vulnerabilities. Participants can enter likelihoods between given intensities

[01]. Loss of advertising	Not uncommon	30.00%
[11]. Loss of network sponsorship	Not uncommon	30.00%
[10]. Talent becomes unavailable	Not uncommon	30.00%
[02]. Show cancellation	Occasionally	5.00%
[03]. Declining viewership	Rarely	1.00%

Loss of advertising

Intensity Name	Likelihood
Not rated	
Certain	100.00%
Almost Certain	99.00%
Very likely	90.00%
Fairly likely	75.00%
50/50	50.00%
Not uncommon	30.00%
Occasionally	5.00%
Rarely	1.00%
Once a year	0.27%
Once a decade	0.03%
Almost never · One in ten thousand	0.01%
Once in a lifetime · One day in lifetime of days (90 years)	0.003%
Direct Value	

Figure 13 – Sample of Rating Scale Confirmation



5.3. Importance of Objectives

For the Importance of Objectives, we leveraged Pairwise Comparison. Figure 14 below provides a sample of the screen within Riskion where this measurement method was defined. Figure 15 provides a sample of the presentation of this measurement method to a participant.

Figure 14: Example of Measurement Methods for Objectives Rating Scale

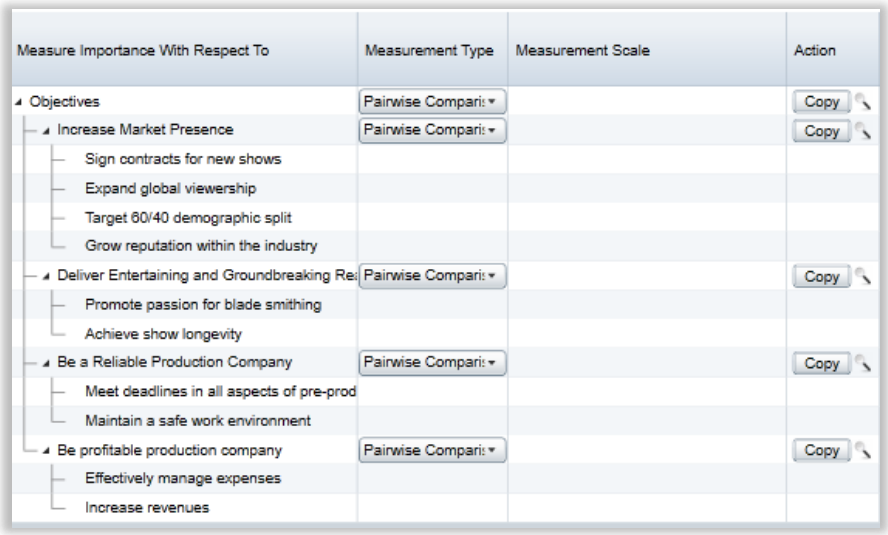
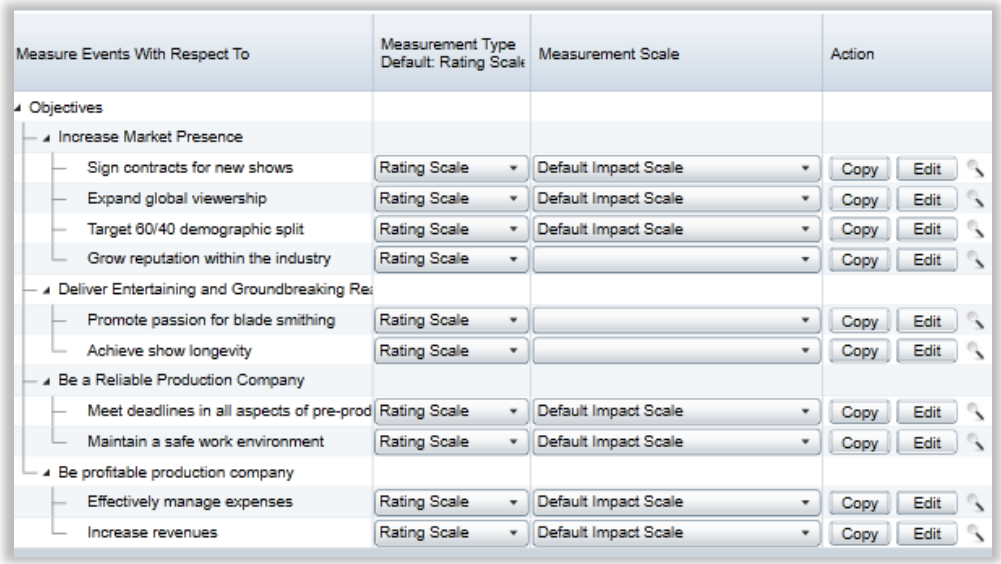


Figure 15: Example of Pairwise Comparison for Objectives

5.4. Consequence of Events on Objectives

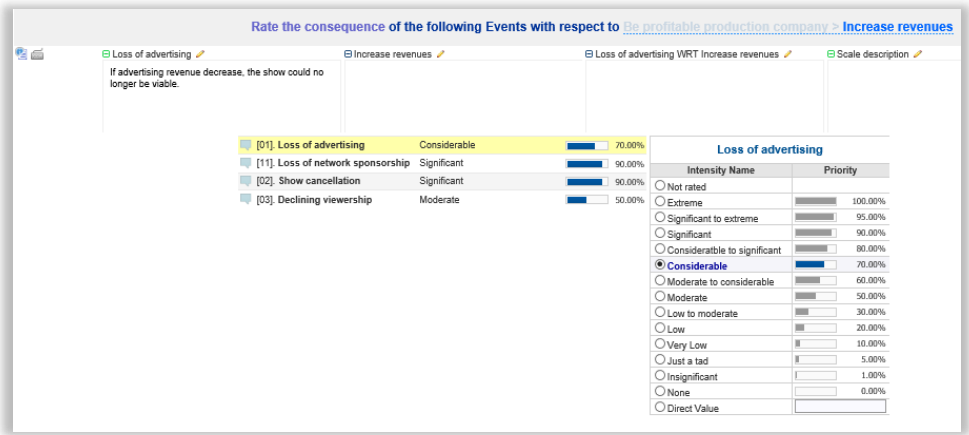
For the measurement of impact of Events on Objectives we leveraged Riskion's Rating Scale measurement. Figure 16 below is an example of the definition of that measurement type for this model dimension and Figure 17 provides an example of the presentation of this measurement type to participants.

Figure 16: Example of Measurement Methods Impact of Events to Objectives



Measure Events With Respect To	Measurement Type Default: Rating Scale	Measurement Scale	Action
Objectives			
Increase Market Presence			
Sign contracts for new shows	Rating Scale	Default Impact Scale	Copy Edit
Expand global viewership	Rating Scale	Default Impact Scale	Copy Edit
Target 60/40 demographic split	Rating Scale	Default Impact Scale	Copy Edit
Grow reputation within the industry	Rating Scale		Copy Edit
Deliver Entertaining and Groundbreaking Re			
Promote passion for blade smithing	Rating Scale		Copy Edit
Achieve show longevity	Rating Scale		Copy Edit
Be a Reliable Production Company			
Meet deadlines in all aspects of pre-prod	Rating Scale	Default Impact Scale	Copy Edit
Maintain a safe work environment	Rating Scale	Default Impact Scale	Copy Edit
Be profitable production company			
Effectively manage expenses	Rating Scale	Default Impact Scale	Copy Edit
Increase revenues	Rating Scale	Default Impact Scale	Copy Edit

Figure 17 – Sample of Rating Scale for impact of Events to Objectives



5.5. Evaluation Progress Monitoring

Expert Choice Riskion provides tools for monitoring the completion of participant measurement activities which are depicted in Figure 18 and 19. As we progressed through our model, there were several times when we identified a change to the model, such as identifying an event's impact on another objective previously missed, which required participants to return to the measurement

activities. Riskion provided an excellent interface where participants could quickly progress to any ratings not previously performed so that they could easily complete their follow-up measurement items.

Figure 18: Overall Evaluation Progress for Likelihood of Events

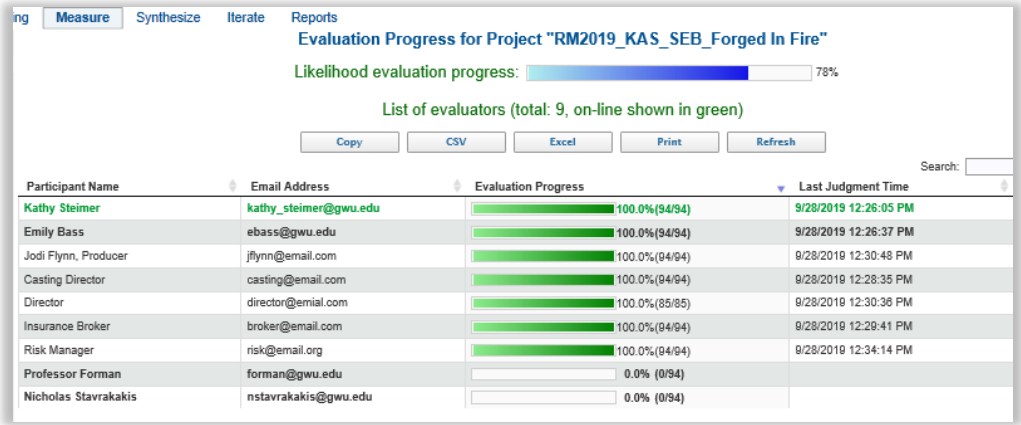
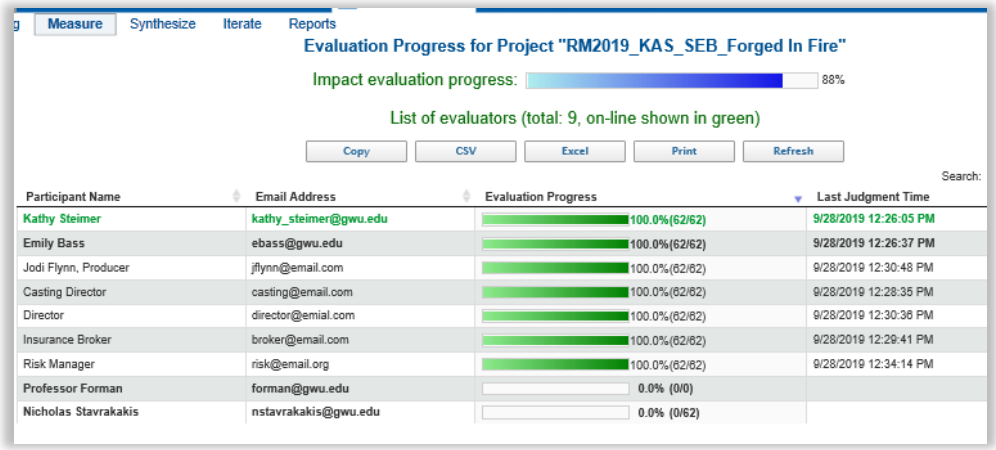


Figure 19: Overall Evaluation Progress for Impact of Events



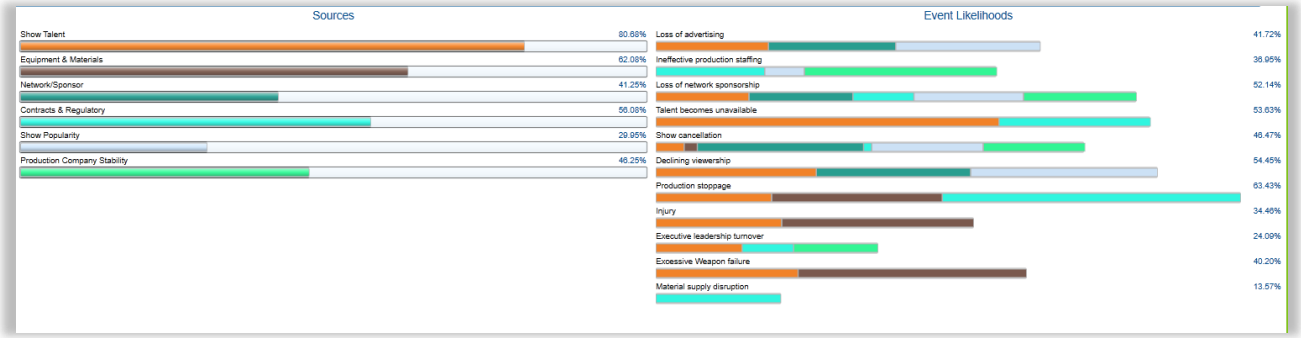
6. Synthesis/Sensitivity Analysis

The synthesis function in Riskion takes participants' measurements and computes the likelihood and impact of events. This allows us to assess our model by analyzing the likelihood of events given sources and the likelihood of events and objectives.

6.1. Synthesis: Likelihood of Events and Sources

Figure 20 shows that "production stoppage" is the event most likely to occur. The sources that most influence this event are: "contracts and regulatory", "equipment and materials", and "show talent". The event that is least likely to occur is material supply disruption, which is solely influenced by contracts and regulatory.

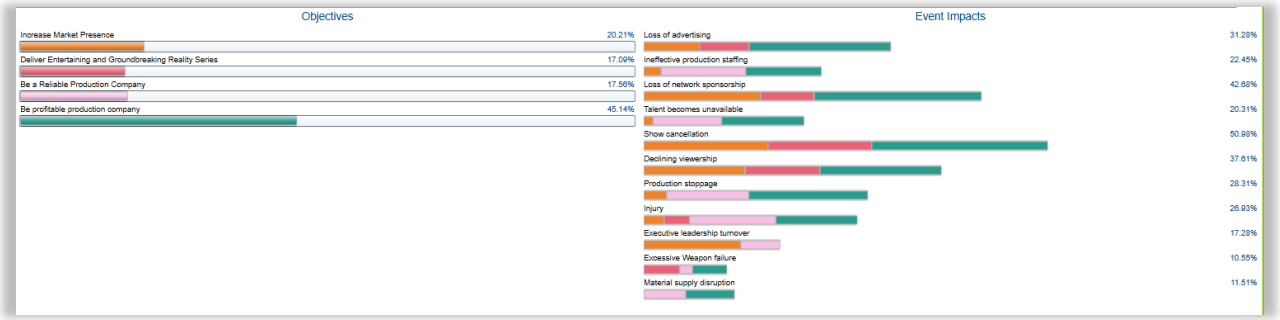
Figure 20: Dynamic Sensitivity - Event Likelihoods Given Sources



6.2. Synthesis: Likelihood of Events and Objectives

Figure 21 shows that among all objectives, “be a profitable production company” is seen as the most important object for the company. The event that most likely to have an impact on objectives is “show cancellation”, followed closely by “loss of network sponsorship” and “declining viewership”. Each of these events would have the strongest impact on “be a profitable production company”.

Figure 21: Dynamic Sensitivity – Event Likelihoods and Objectives



7. Risk Review

7.1. Overall Risk (without Controls)

Risk is defined as an uncertain event, that should it occur, will have a loss. Riskion takes the calculated likelihood and impact of events and computes which events have the highest risk associated with them. To help assess the events and their risks, monetary valued was applied to them. We did not have actual information on the value of events associated with reality television, so we used hypothetical figures. We valued our project at $10 million. The initial computed risk in Figure 22 is $13.5 million – more than the value of the project.

To account for double counting, we used the simulation function which reduced our overall risk to $6.4 million (Figure 23). “Show cancellation” has a risk of $1 million, followed closely by “loss of network sponsorship”, “declining viewership”, and “production stoppage”.

Figure 22 – Risk Matrix without Simulated Results

No.	Event	All Participants Likelihood Computed	Impact, $ Computed	Risk, $ Computed ▼
[02]	Show cancellation	46.47%	5,098,064	2,369,001
[11]	Loss of network sponsorship	52.14%	4,268,435	2,225,515
[03]	Declining viewership	54.45%	3,760,792	2,047,624
[04]	Production stoppage	63.43%	2,830,884	1,795,708
[01]	Loss of advertising	41.72%	3,128,023	1,304,964
[10]	Talent becomes unavailable	53.63%	2,030,947	1,089,237
[06]	Injury	34.46%	2,693,359	928,117
[13]	Ineffective production staffing	36.95%	2,244,897	829,543
[08]	Excessive Weapon failure	40.20%	1,054,684	423,947
[12]	Executive leadership turnover	24.09%	1,727,626	416,249
[09]	Material supply disruption	13.57%	1,150,675	156,187
			Total Risk	Computed $13,586,098

Figure 23 – Risk Matrix with Simulated Results

No.	Event	All Participants Likelihood Simulated	Impact, $ Simulated	Risk, $ Simulated ▼
[02]	Show cancellation	38.12%	2,628,218	1,001,999
[03]	Declining viewership	43.38%	2,225,951	965,611
[11]	Loss of network sponsorship	41.20%	2,228,544	918,226
[04]	Production stoppage	48.71%	1,725,946	840,743
[10]	Talent becomes unavailable	44.10%	1,263,758	557,329
[01]	Loss of advertising	34.99%	1,538,771	538,490
[06]	Injury	30.27%	1,773,846	536,906
[13]	Ineffective production staffing	33.40%	1,446,011	482,935
[08]	Excessive Weapon failure	35.12%	771,830	271,095
[12]	Executive leadership turnover	22.35%	933,342	208,571
[09]	Material supply disruption	13.42%	644,753	86,531
			Total Risk (Average Loss)	Simulated $6,408,441

7.1.1. Risk Map (without Controls)

A risk map can be used to identify and prioritize risks. The colored regions represent different levels of risk. The size of the circles on the map indicate the higher likelihood and impact of events. The risk map is a great tool to identify which specific events should be controlled. The four events completely in the red on the risk map (Figure 24) reflect the top four risks in the risk matrix (Figure 23). However, there are four additional events on the cusp of red that should also be included in the assessment for controls.

Figure 24: Risk Map Overall

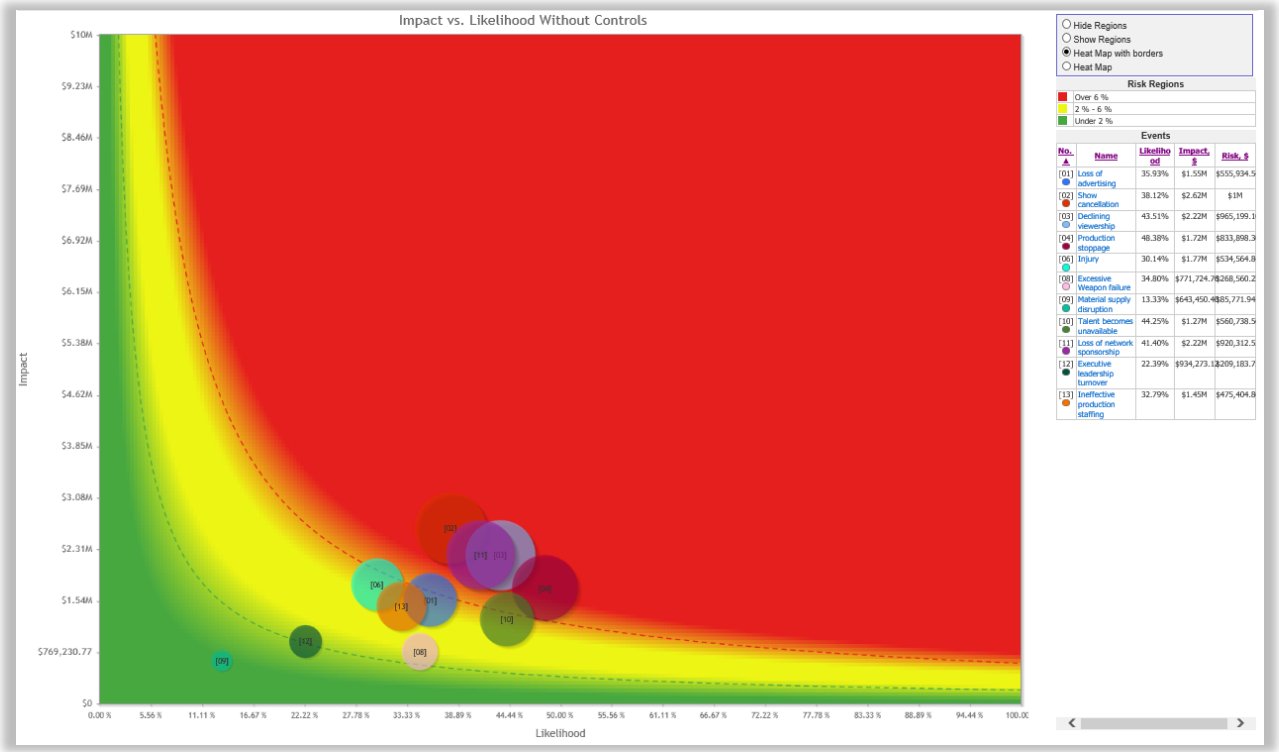
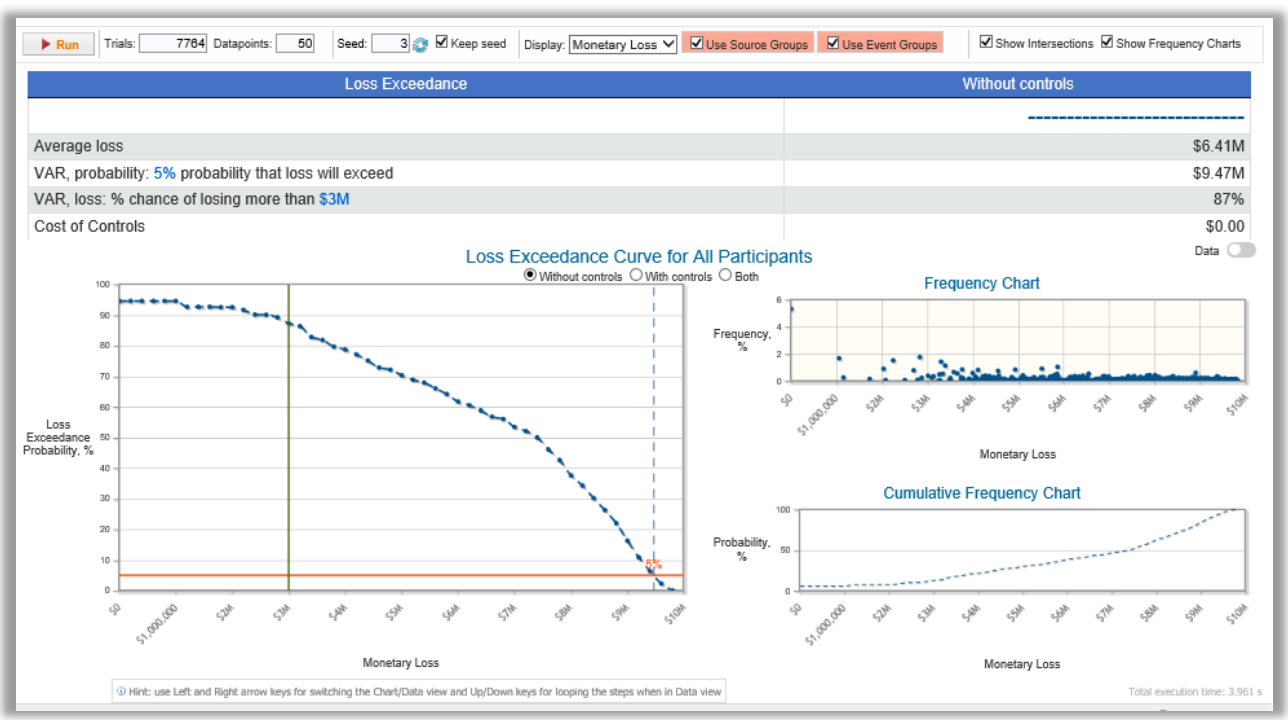


Figure 25: Loss Exceedance Curve



7.2. Identifying and Selecting Controls – Manual Iteration

Controls can be used to mitigate the likelihood of an event occurring and its impact. Controls can be used for events, sources, and objectives. We established 25 different controls that would cost approximately $4.5 million. We identified one control, insurance, as mandatory (Figure 26). Additionally, there were five controls with dependencies (Figure 27).

Figure 26: Mandatory Controls

Select Controls

Total Risk*: $6,410,115
Risk With Selected Controls*: $5,948,476 (Δ: $461,639)
Risk With All Controls: $718,556 (Δ: $5,691,559)

Selected controls: 1
Cost Of Selected Controls: $200,000 (unfunded: $4,374,600)
Total Cost Of All Controls: $4,574,600

Simulations Settings
Number of trials: 10000 Seed: 3 ☑ Keep Seed

☑ Show Monetary Values (Value of Enterprise: $10,000,000)

Index	Selected	Control Name	Control for	Selected	Cost	Applications	Categories	Must	Must Not
01	☐	Sign an integrity agreement	Source		1600	3		☐	☐
02	☐	Standard vetting and criteria for contestants	Source		100000	3		☐	☐
03	☐	Employment contracts with do not compete employment contracts	Source		5000	2		☐	☐
04	☐	Regular maintenance schedule	Source		5000	4		☐	☐
05	☐	On-call equipment handyman	Source		5000	4		☐	☐
06	☐	Fire extinguishers on all sets	Source		2000	3		☐	☐
07	☐	Fire suppression systems	Source		10000	3		☐	☐
08	☐	Onsite fire fighting professionals	Source		40000	3		☐	☐
09	☐	Network contract clause negotiation	Source		100000	2		☐	☐
10	☐	Permit and regulation compliance team	Source		500000	4		☐	☐
11	☐	Procurement expertise	Source		2000000	2		☐	☐
12	☐	Ongoing target market screening	Source		10000	3		☐	☐
13	☐	Consultant - weapon test specialist	Source		10000	3		☐	☐
14	☐	Copyright and trademark protection	Source		1000	1		☐	☐
15	☐	Excellent legal counsel	Source		250000	7		☐	☐
16	☐	Show security - negate show content leaks	Source		50000	1		☐	☐
17	☐	Have junior judges/understudies	Vulnerability		10000	5		☐	☐
18	☐	Backup distribution channel (i.e. streaming)	Vulnerability		100000	21		☐	☐
19	☐	Advertising contracts	Vulnerability		100000	5		☐	☐
20	☐	Emergency temp staffing contract	Vulnerability		50000	3		☐	☐
21	☐	Leadership succession plan	Vulnerability		10000	4		☐	☐
22	☐	Maintain material surplus	Vulnerability		15000	2		☐	☐
23	☑	Insurance	Consequence	Yes	200000	3		☑	☐
24	☐	Implement an effective industry PR campaign	Consequence		500000	16		☐	☐
25	☐	Production schedules include buffer (between Production wrap and contractual delivery)	Consequence		500000	14		☐	☐

Figure 27: Controls with Dependencies

NAME	1.Sign an integrity agreement	2.Have junior judges/unc	3.Standard vetting and criteria for contestant	4.Employm contracts with do not compete employme contracts	5.Regular maintenan schedule	6.On-call equipment handyman	7.Fire extinguish on all sets	8.Fire suppressic systems	9.Onsite fire fighting profession	10.Network contract clause negotiatio	11.Backup distributio channel (i.e. streaming)	12.Permit and regulation compliance team	13.Procure expertise	14.Ongoin target market screening	15.Consult - weapon test specialist	16.Copyrig and trademark protection	17.Insuran	18.Excelle legal counsel	19.Show security - negate show content leaks	20.Adverti contracts	21.Emerge temp staffing contract	22.Leaders successio plan	23.Maintai material surplus	24.Implem an effective industry PR campaign	25.Produc schedules include buffer (between Productio wrap a...
1.Sign an integrity agreement																		D (Can be concurrent)							
2.Have junior judges/understudies																									
3.Standard vetting and criteria for contestants																									
4.Employment contracts with do not compete employment contracts																		D (Can be concurrent)							
5.Regular maintenance schedule																									
6.On-call equipment handyman																									
7.Fire extinguishers on all sets																									
8.Fire suppression systems																									
9.Onsite fire fighting professionals																									
10.Network contract clause negotiation																		D (Can be concurrent)							
11.Backup distribution channel (i.e. streaming)																									
12.Permit and regulation compliance team																									
13.Procurement expertise																									
14.Ongoing target market screening																									
15.Consultant - weapon test specialist																									
16.Copyright and trademark protection																		D (Can be concurrent)							
17.Insurance																									
18.Excellent legal counsel																									
19.Show security - negate show content leaks																									
20.Advertising contracts																		D (Can be concurrent)							
21.Emergency temp staffing contract																									
22.Leadership succession plan																									

For our first iteration of controls, we manually selected the mandatory control of insurance, as well as all controls that had five or more applications. As shown in Figure 28, that resulted in the selection of seven controls at the cost of $1.6 million. By selecting these controls, we were able to reduce our risk by $4 million (Figure 29).

Figure 28: Manually Selected Controls – Iteration 1

Select Controls

Total Risk*: $6,408,441
Risk With Selected Controls*: $2,399,463 (Δ: $4,008,977)
Risk With All Controls: $714,511 (Δ: $5,693,930)

Selected controls: 7
Cost Of Selected Controls: $1,660,000 (unfunded: $2,914,600)
Total Cost Of All Controls: $4,574,600

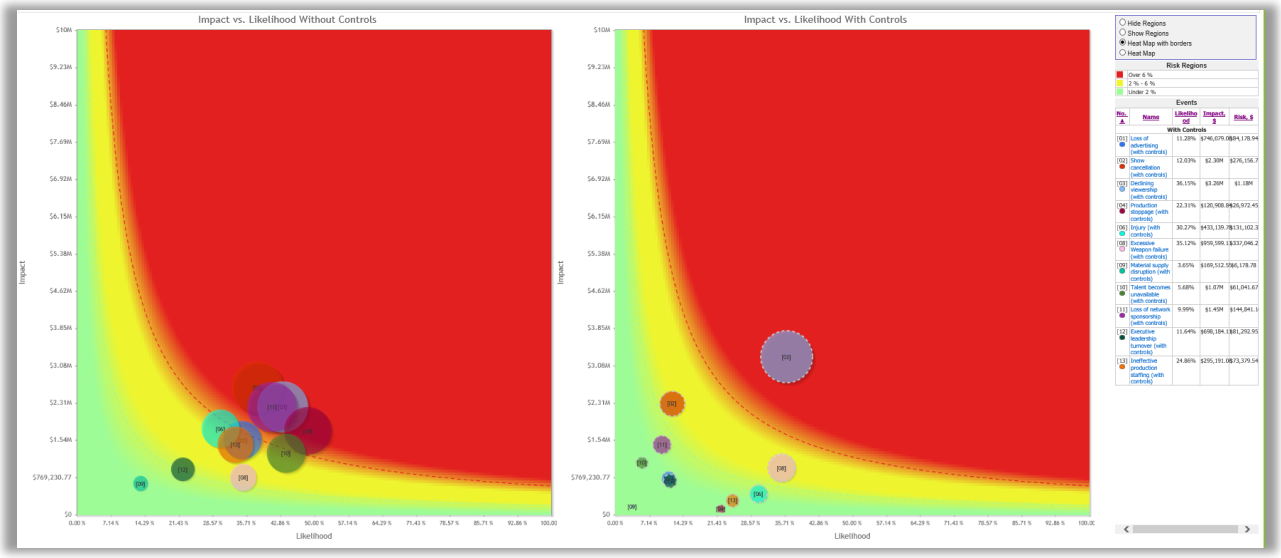
☑ Show Monetary Values (Value of Enterprise: $10,000,000)

Simulations Settings
Number of trials: 7764 Seed: 3 ☑ Keep Seed

Index	Selected	Control Name	Control for	Selected	Cost	Applications	Categories	Must	Must Not
01	☐	Sign an integrity agreement	Source		1600	3		☐	☐
02	☐	Standard vetting and criteria for contestants	Source		100000	3		☐	☐
03	☐	Employment contracts with do not compete employment contracts	Source		5000	2		☐	☐
04	☐	Regular maintenance schedule	Source		5000	4		☐	☐
05	☐	On-call equipment handyman	Source		5000	4		☐	☐
06	☐	Fire extinguishers on all sets	Source		2000	3		☐	☐
07	☐	Fire suppression systems	Source		10000	3		☐	☐
08	☐	Onsite fire fighting professionals	Source		40000	3		☐	☐
09	☐	Network contract clause negotiation	Source		100000	2		☐	☐
10	☐	Permit and regulation compliance team	Source		500000	4		☐	☐
11	☐	Procurement expertise	Source		2000000	2		☐	☐
12	☐	Ongoing target market screening	Source		10000	3		☐	☐
13	☐	Consultant - weapon test specialist	Source		10000	3		☐	☐
14	☐	Copyright and trademark protection	Source		1000	1		☐	☐
15	☑	Excellent legal counsel	Source	Yes	250000	7		☐	☐
16	☐	Show security - negate show content leaks	Source		50000	1		☐	☐
17	☑	Have junior judges/understudies	Vulnerability	Yes	10000	5		☐	☐
18	☑	Backup distribution channel (i.e. streaming)	Vulnerability	Yes	100000	21		☐	☐
19	☑	Advertising contracts	Vulnerability	Yes	100000	5		☐	☐
20	☐	Emergency temp staffing contract	Vulnerability		50000	3		☐	☐
21	☐	Leadership succession plan	Vulnerability		10000	4		☐	☐
22	☐	Maintain material surplus	Vulnerability		15000	2		☐	☐
23	☑	Insurance	Consequence	Yes	200000	3		☑	☐
24	☑	Implement an effective industry PR campaign	Consequence	Yes	500000	16		☐	☐
25	☑	Production schedules include buffer (between Production wrap and contractual delivery)	Consequence	Yes	500000	14		☐	☐

Figure 29: Exceedance Curve with Manually Selected Controls – Iteration 1

Figure 30: Risk Map with Manually Selected Controls – Iteration 1



When we compare the risk map before and after selecting controls (Figure 30), we see that we are left with only one event, “declining viewership”, in the high-risk section. In addition, all the events that were clustered on the cusp of the high-risk section are now distributed in the low-risk (green) section.

We were interested in identifying how we might further control for “declining viewership” and utilized the bow tie diagram for this. Two additional controls were selected, “sign an integrity agreement” and “standard vetting and criteria for contestants”.

By adding these two new controls, our control cost increased from $1.6 million to $1.76 million and reduced the risk by another $500,000 (Figure 31 and Figure 32).

The risk map shows that the additional controls were able to further reduce the risk associated with the event “declining viewership”, although it remained in the high-risk section (Figure 33).

Figure 30: Bow Tie Diagram for Declining Viewership

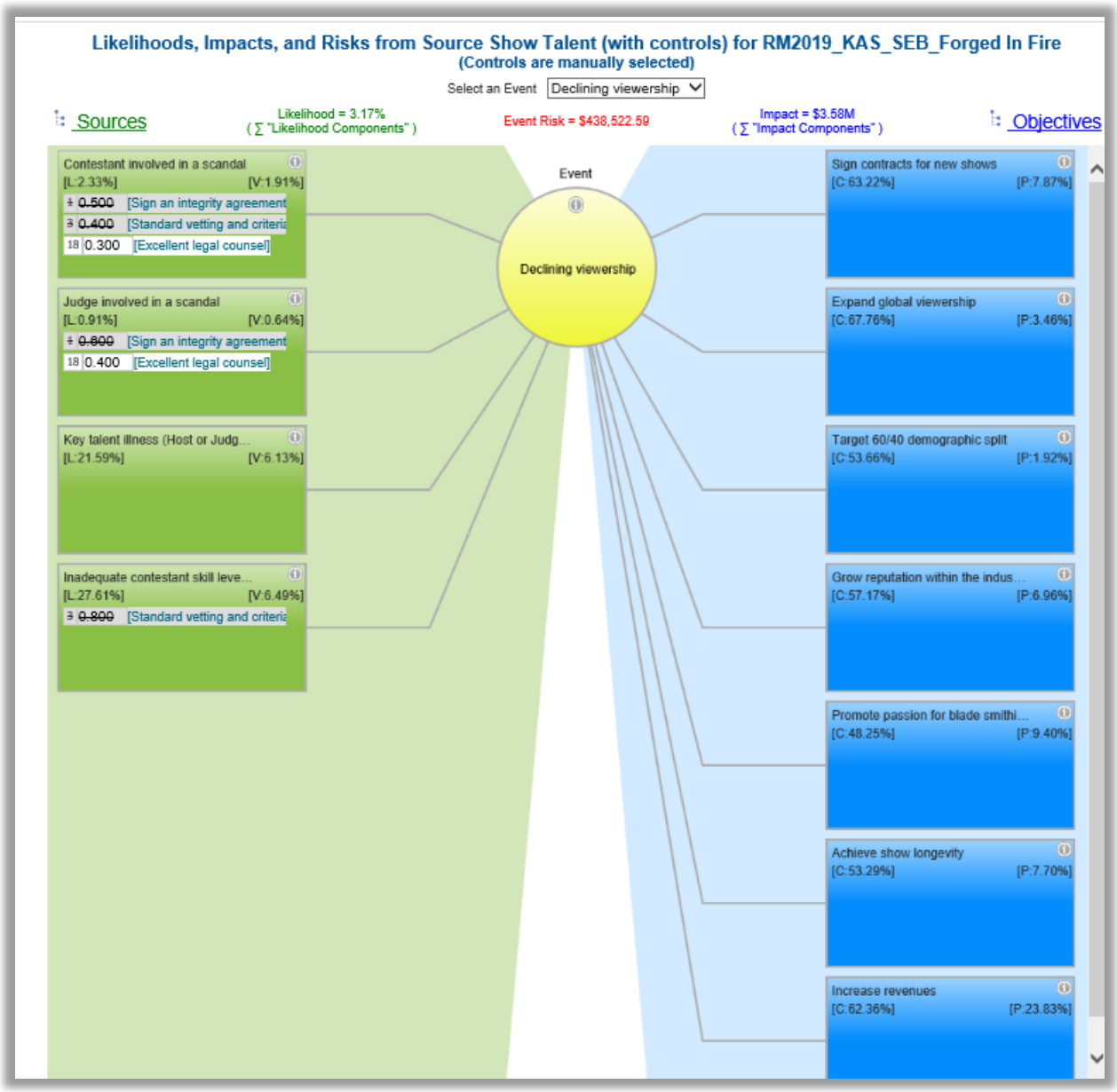
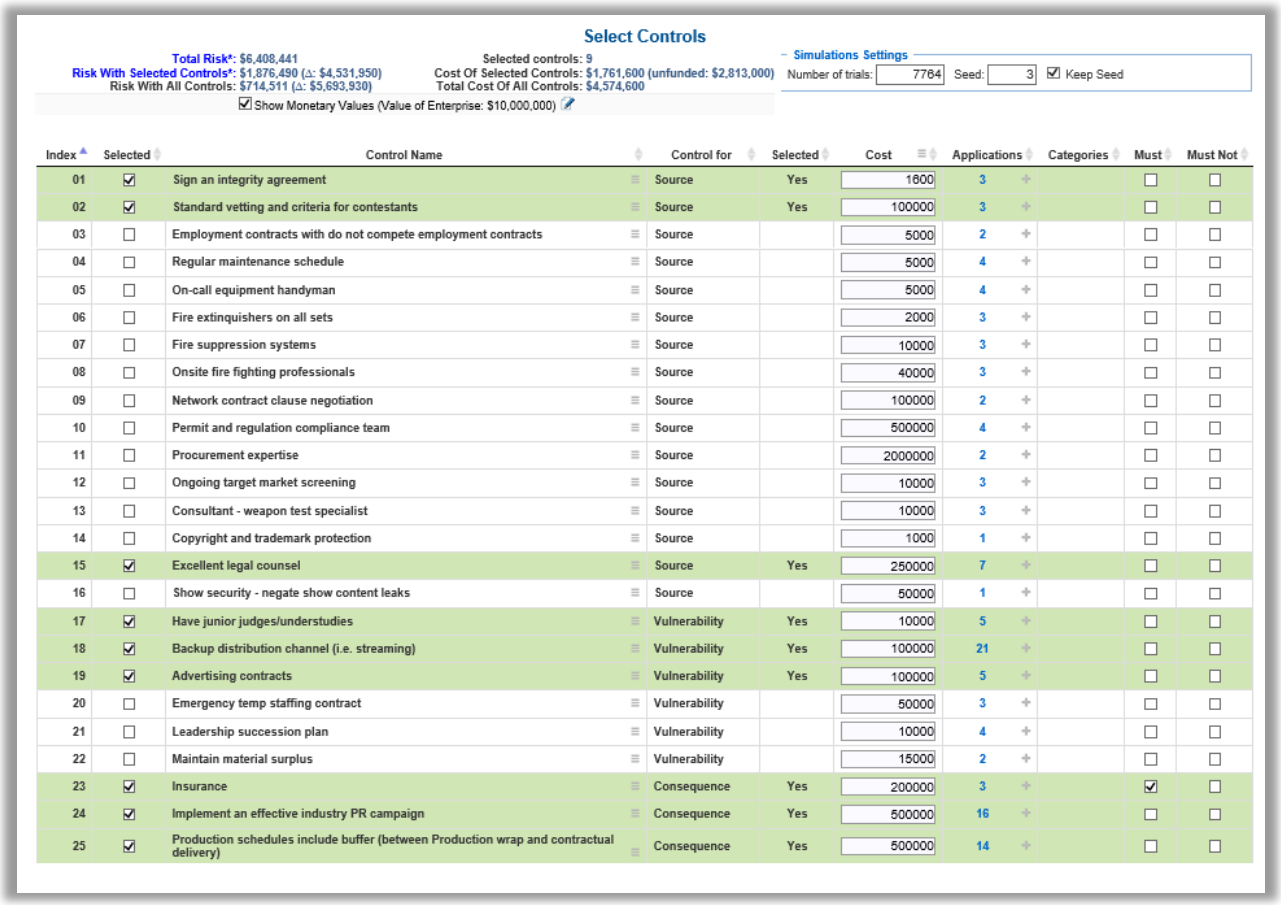


Figure 31: Manually Selected Controls – Iteration 2



Select Controls

Total Risk*: $6,408,441
Risk With Selected Controls*: $1,876,490 (Δ: $4,531,950)
Risk With All Controls: $714,511 (Δ: $5,693,930)

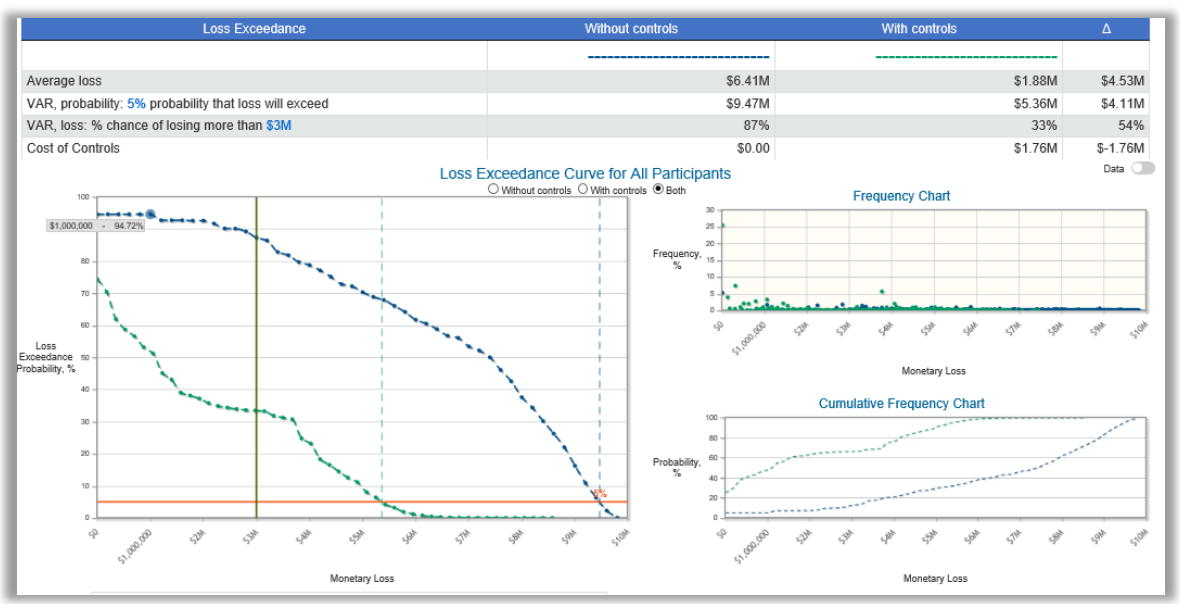
Selected controls: 9
Cost Of Selected Controls: $1,761,600 (unfunded: $2,813,000)
Total Cost Of All Controls: $4,574,600

Simulations Settings — Number of trials: 7764 Seed: 3 ☑ Keep Seed

☑ Show Monetary Values (Value of Enterprise: $10,000,000)

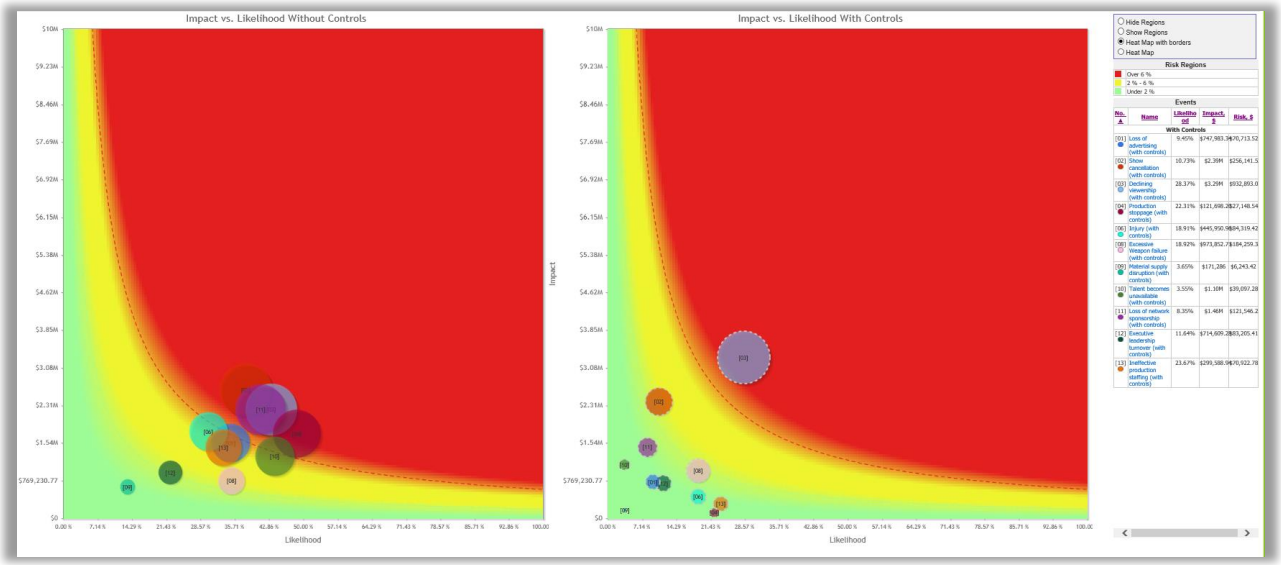
Index	Selected	Control Name	Control for	Selected	Cost	Applications	Categories	Must	Must Not
01	☑	Sign an integrity agreement	Source	Yes	1600	3		☐	☐
02	☑	Standard vetting and criteria for contestants	Source	Yes	100000	3		☐	☐
03	☐	Employment contracts with do not compete employment contracts	Source		5000	2		☐	☐
04	☐	Regular maintenance schedule	Source		5000	4		☐	☐
05	☐	On-call equipment handyman	Source		5000	4		☐	☐
06	☐	Fire extinguishers on all sets	Source		2000	3		☐	☐
07	☐	Fire suppression systems	Source		10000	3		☐	☐
08	☐	Onsite fire fighting professionals	Source		40000	3		☐	☐
09	☐	Network contract clause negotiation	Source		100000	2		☐	☐
10	☐	Permit and regulation compliance team	Source		500000	4		☐	☐
11	☐	Procurement expertise	Source		2000000	2		☐	☐
12	☐	Ongoing target market screening	Source		10000	3		☐	☐
13	☐	Consultant - weapon test specialist	Source		10000	3		☐	☐
14	☐	Copyright and trademark protection	Source		1000	1		☐	☐
15	☑	Excellent legal counsel	Source	Yes	250000	7		☐	☐
16	☐	Show security - negate show content leaks	Source		50000	1		☐	☐
17	☑	Have junior judges/understudies	Vulnerability	Yes	10000	5		☐	☐
18	☑	Backup distribution channel (i.e. streaming)	Vulnerability	Yes	100000	21		☐	☐
19	☑	Advertising contracts	Vulnerability	Yes	100000	5		☐	☐
20	☐	Emergency temp staffing contract	Vulnerability		50000	3		☐	☐
21	☐	Leadership succession plan	Vulnerability		10000	4		☐	☐
22	☐	Maintain material surplus	Vulnerability		15000	2		☐	☐
23	☑	Insurance	Consequence	Yes	200000	3		☑	☐
24	☑	Implement an effective industry PR campaign	Consequence	Yes	500000	16		☐	☐
25	☑	Production schedules include buffer (between Production wrap and contractual delivery)	Consequence	Yes	500000	14		☐	☐

Figure 32: Loss Exceedance Curve for Manually Selected Controls – Iteration 2



Loss Exceedance	Without controls	With controls	Δ
Average loss	$6.41M	$1.88M	$4.53M
VAR, probability: 5% probability that loss will exceed	$9.47M	$5.36M	$4.11M
VAR, loss: % chance of losing more than $3M	87%	33%	54%
Cost of Controls	$0.00	$1.76M	$-1.76M

Figure 33: Risk Map for Manually Selected Controls – Iteration 2

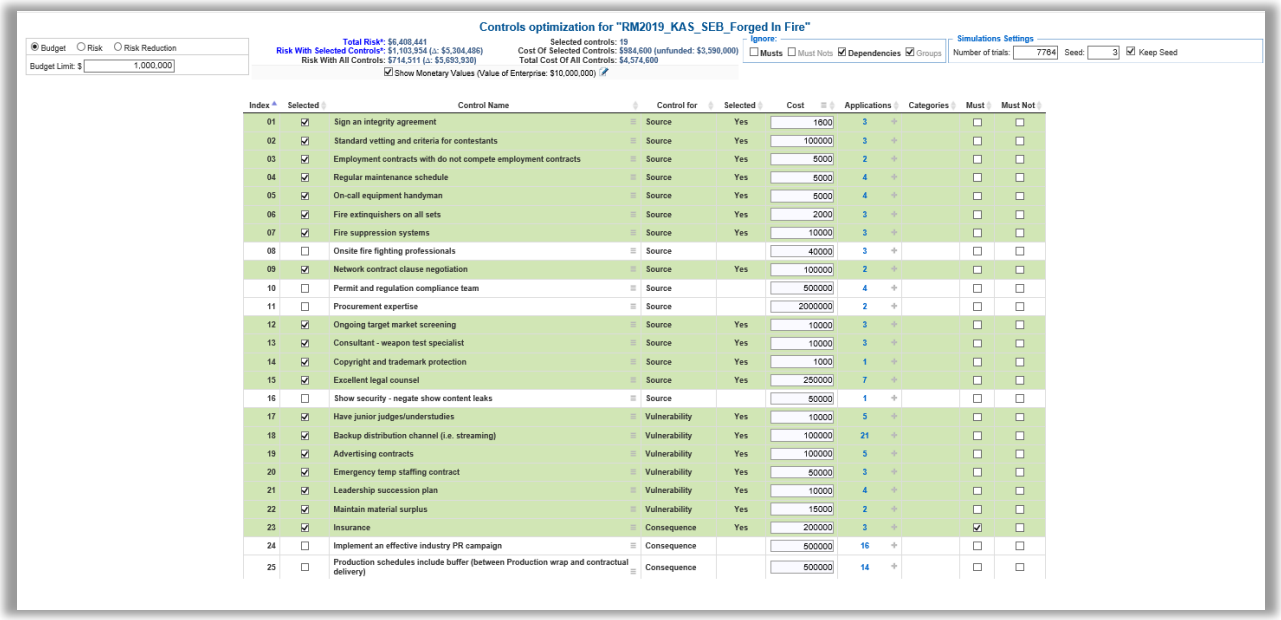


7.3. Optimizing Controls

After selecting controls manually twice, we decided to use the optimization tool in Riskion. This tool allows for setting an operating budget and the software selects the most cost-effective controls. We set a budget of $1 million. Optimization resulted in the selection of 19 controls at the cost of $984,600. This allows for 10 more controls than we manually selected and at almost half the cost. Our total risk is reduced from $6 million to 1 million (Figure 34 and Figure 35).

As seen in the risk map for this scenario (Figure 36), all but one event is now in the low-risk section. This clearly shows that best outcome can be found using the optimization tool, rather than manually selecting controls.

Figure 34: Optimized Controls



Controls optimization for "RM2019_KAS_SEB_Forged In Fire"

Budget / Risk / Risk Reduction — Budget Limit: $ 1,000,000

Total Risk*: $6,408,441
Risk With Selected Controls*: $1,103,954 (Δ: $5,304,486)
Risk With All Controls: $714,511 (Δ: $5,693,930)

Selected controls: 19
Cost Of Selected Controls: $984,600 (unfunded: $3,590,000)
Total Cost Of All Controls: $4,574,600

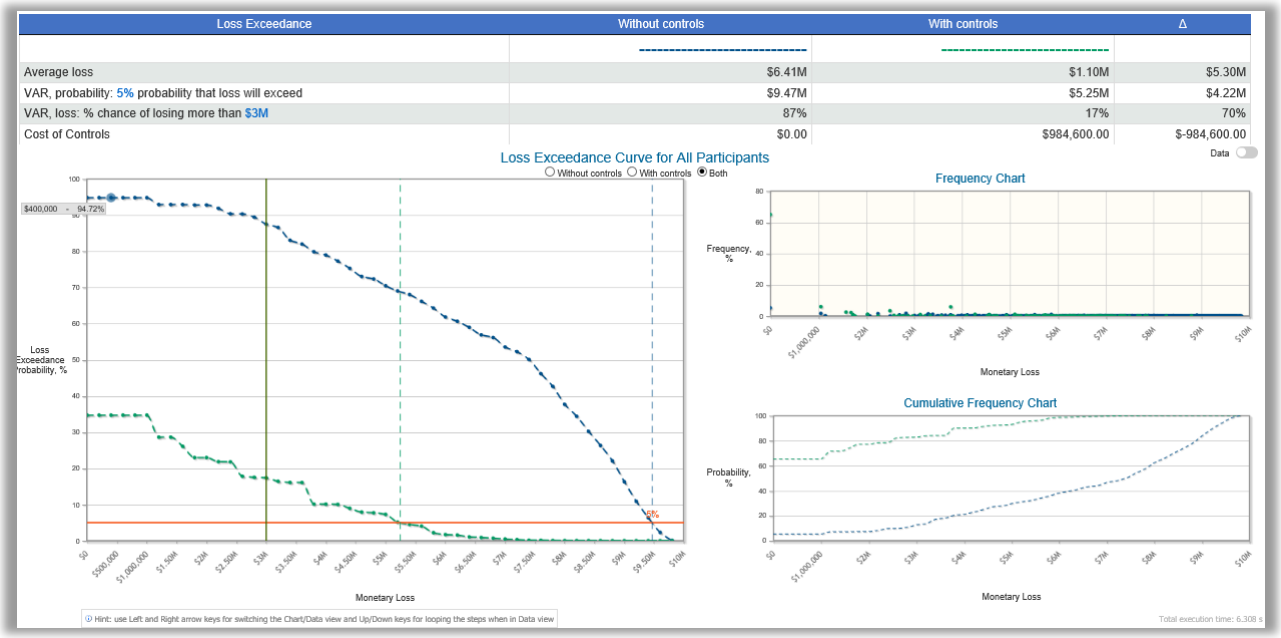
Show Monetary Values (Value of Enterprise: $10,000,000)

Ignore: Musts / Must Nots / Dependencies / Groups

Simulations Settings — Number of trials: 7764 Seed: 3 Keep Seed

Index	Selected	Control Name	Control for	Selected	Cost	Applications	Categories	Must	Must Not
01	☑	Sign an integrity agreement	Source	Yes	1600	3		☐	☐
02	☑	Standard vetting and criteria for contestants	Source	Yes	100000	3		☐	☐
03	☑	Employment contracts with do not compete employment contracts	Source	Yes	5000	2		☐	☐
04	☑	Regular maintenance schedule	Source	Yes	5000	4		☐	☐
05	☑	On-call equipment handyman	Source	Yes	5000	4		☐	☐
06	☑	Fire extinguishers on all sets	Source	Yes	2000	3		☐	☐
07	☑	Fire suppression systems	Source	Yes	10000	3		☐	☐
08	☐	Onsite fire fighting professionals	Source		40000	3		☐	☐
09	☑	Network contract clause negotiation	Source	Yes	100000	2		☐	☐
10	☐	Permit and regulation compliance team	Source		500000	4		☐	☐
11	☐	Procurement expertise	Source		2000000	2		☐	☐
12	☑	Ongoing target market screening	Source	Yes	10000	3		☐	☐
13	☑	Consultant - weapon test specialist	Source	Yes	10000	3		☐	☐
14	☑	Copyright and trademark protection	Source	Yes	1000	1		☐	☐
15	☑	Excellent legal counsel	Source	Yes	250000	7		☐	☐
16	☐	Show security - negate show content leaks	Source		50000	1		☐	☐
17	☑	Have junior judges/understudies	Vulnerability	Yes	10000	5		☐	☐
18	☑	Backup distribution channel (i.e. streaming)	Vulnerability	Yes	100000	21		☐	☐
19	☑	Advertising contracts	Vulnerability	Yes	100000	5		☐	☐
20	☑	Emergency temp staffing contract	Vulnerability	Yes	50000	3		☐	☐
21	☑	Leadership succession plan	Vulnerability	Yes	10000	4		☐	☐
22	☑	Maintain material surplus	Vulnerability	Yes	15000	2		☐	☐
23	☑	Insurance	Consequence	Yes	200000	3		☑	☐
24	☐	Implement an effective industry PR campaign	Consequence		500000	16		☐	☐
25	☐	Production schedules include buffer (between Production wrap and contractual delivery)	Consequence		500000	14		☐	☐

Figure 35: Loss Exceedance Curve for Optimized Controls



Loss Exceedance	Without controls	With controls	Δ
	---	---	
Average loss	$6.41M	$1.10M	$5.30M
VAR, probability: 5% probability that loss will exceed	$9.47M	$5.25M	$4.22M
VAR, loss: % chance of losing more than $3M	87%	17%	70%
Cost of Controls	$0.00	$984,600.00	$-984,600.00

Loss Exceedance Curve for All Participants — Without controls / With controls / Both

$400,000 - 94.72%

Loss Exceedance Probability, %

Monetary Loss

Frequency Chart

Frequency, %

Monetary Loss

Cumulative Frequency Chart

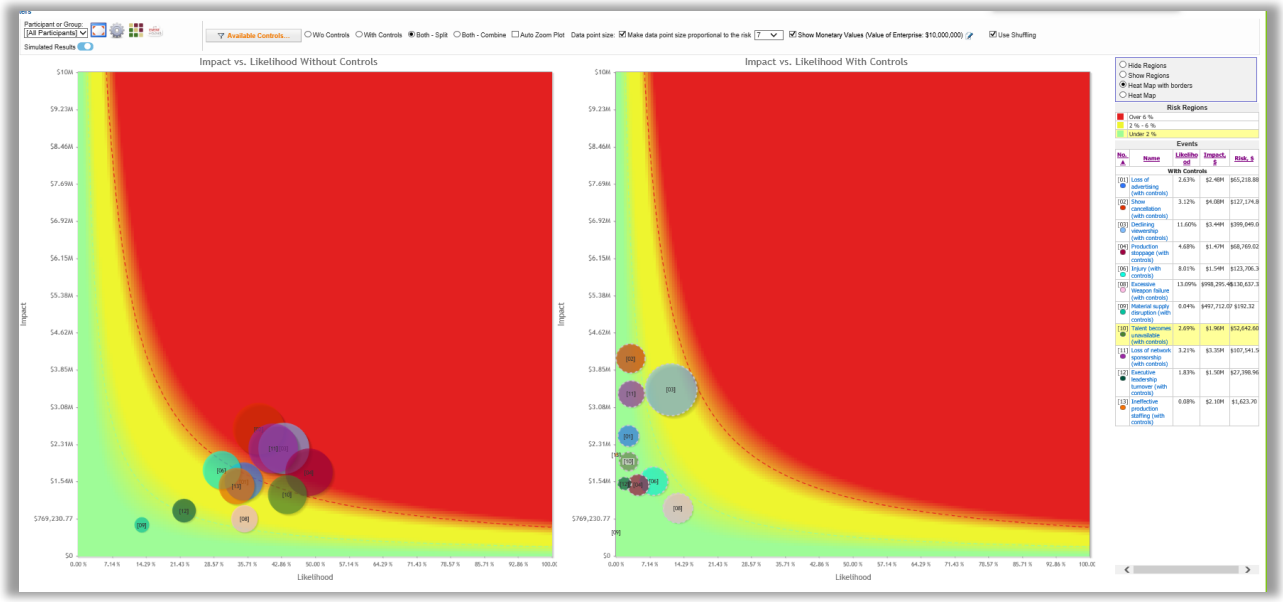
Probability, %

Monetary Loss

Hint: use Left and Right arrow keys for switching the Chart/Data view and Up/Down keys for looping the steps when in Data view

Total execution time: 6.308 s

Figure 36: Risk Map for Optimized Controls



8. Recommendations and Conclusion

The entertain business is volatile and generally carries much risk. As such, Outpost Entertainment knows that risk is part of their business and must be mitigated in order to achieve their objectives.

Based on our model, without controls the organization faces more than an 80% chance of losing more than $3M in a given year. However, with a modest investment in risk analysis and controls the risks and be greatly mitigated. A control budget of $1M reduces this chance to 18% or less, a significant risk reduction.

Figure 37 provides a visual version of the Efficient Frontier tool. This is an effective tool for leadership decision making. Leadership can use this chart to analysis their risk appetite and decide what their optimal control budget is. Different control options can be explored and online options within the tool can display the specific controls that would be implementation for each option.

With this tool Output Productions leadership can consider several options including the ones recommended below:

Option 1 – Minor Controls Investment: With an investment of $225K management can implement 7 controls which will reduce their risk by just under $2M.

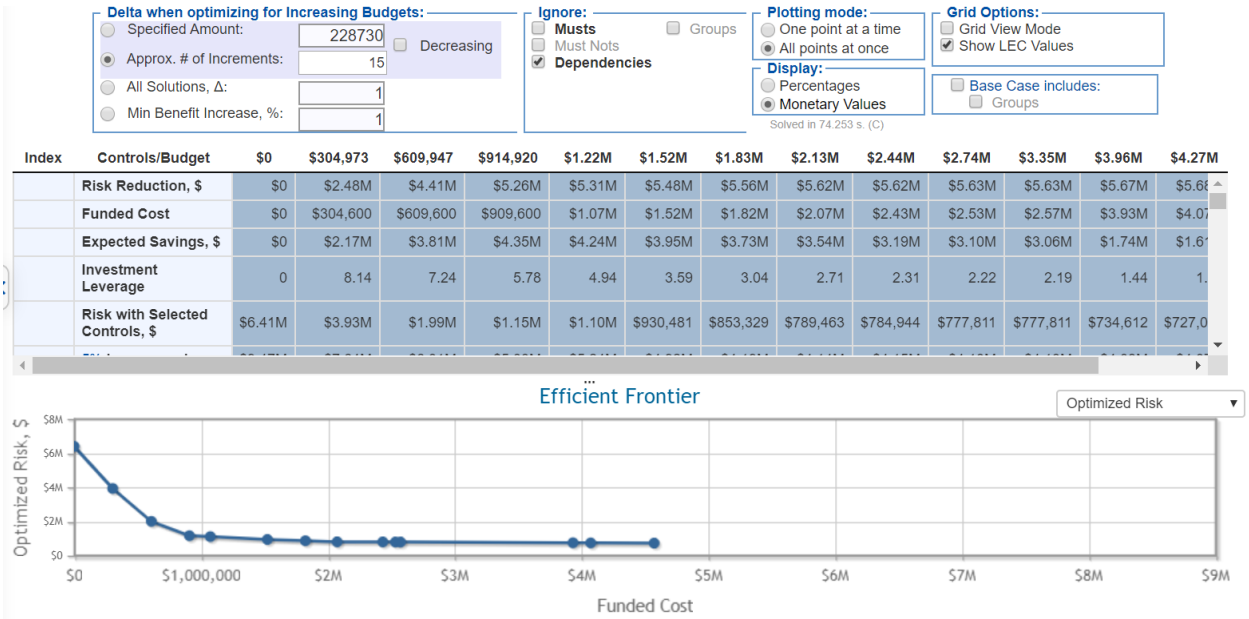
Option 2 – Modest Controls Investment: With an investment of just under $500K management can implement 12 controls which will reduce their risk by $3.8M.

Option 3 – Moderate Controls Investment: With an investment of $685K management can implement 11 controls which will reduce their risk by $4.5M

Option 4 – Notable Controls Investment: With an investment of 910K management can implement 16 controls which will reduce their risk by $5.2M

As the diagram indicates, return on investment related to controls plateaus after $1.2 million investment and options beyond that point are not worth further consideration.

Figure 37: Efficient Frontier



Index	Controls/Budget	$0	$304,973	$609,947	$914,920	$1.22M	$1.52M	$1.83M	$2.13M	$2.44M	$2.74M	$3.35M	$3.96M	$4.27M
	Risk Reduction, $	$0	$2.48M	$4.41M	$5.26M	$5.31M	$5.48M	$5.56M	$5.62M	$5.62M	$5.63M	$5.63M	$5.67M	$5.6
	Funded Cost	$0	$304,600	$609,600	$909,600	$1.07M	$1.52M	$1.82M	$2.07M	$2.43M	$2.53M	$2.57M	$3.93M	$4.07
	Expected Savings, $	$0	$2.17M	$3.81M	$4.35M	$4.24M	$3.95M	$3.73M	$3.54M	$3.19M	$3.10M	$3.06M	$1.74M	$1.6
	Investment Leverage	0	8.14	7.24	5.78	4.94	3.59	3.04	2.71	2.31	2.22	2.19	1.44	1.
	Risk with Selected Controls, $	$6.41M	$3.93M	$1.99M	$1.15M	$1.10M	$930,481	$853,329	$789,463	$784,944	$777,811	$777,811	$734,612	$727,0

9. References

1. Forman E, Forman H, Ludden E. Risks-We-Face and Risks-We-Take Enterprise Risk Management. Unpublished.
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