# When Miners Go Missing

A presentation before the 3rd International Mine Rescue Conference

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Solvay Minerals, Inc.
Green River, Wyoming
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8:26 am

# Hour one: What We Knew

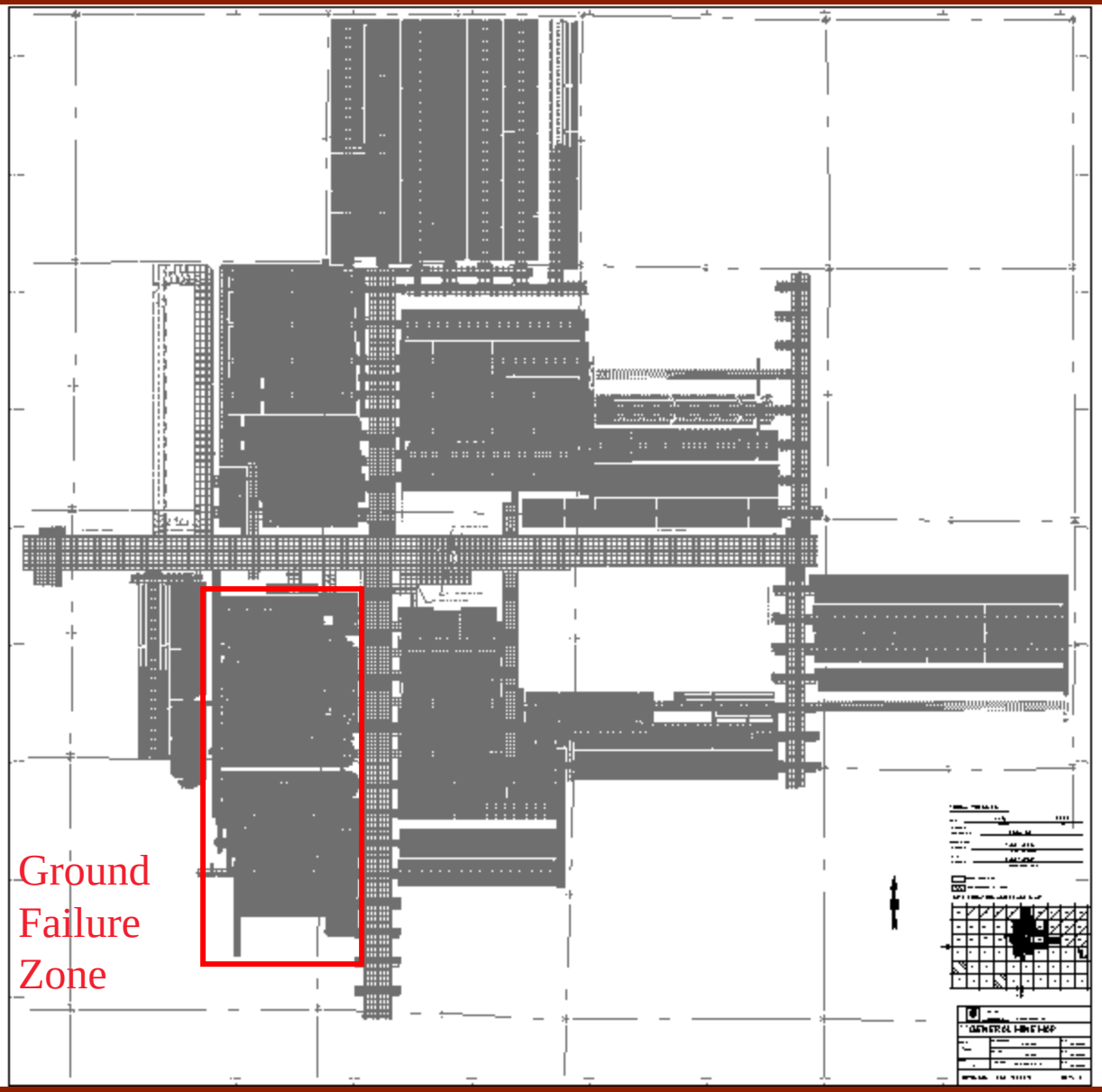
- A sudden earthquake-like ground movement
- Air rushing from both shafts – 17 minutes
- Mine power disconnected per S.O.P.
- Evacuation called
- 55 miners underground
- Explosive levels of methane at bottom of intake shaft at 8:35 am
- Ventilation and ground damage reported in south area of mine
- Unknown damage to hoisting gear

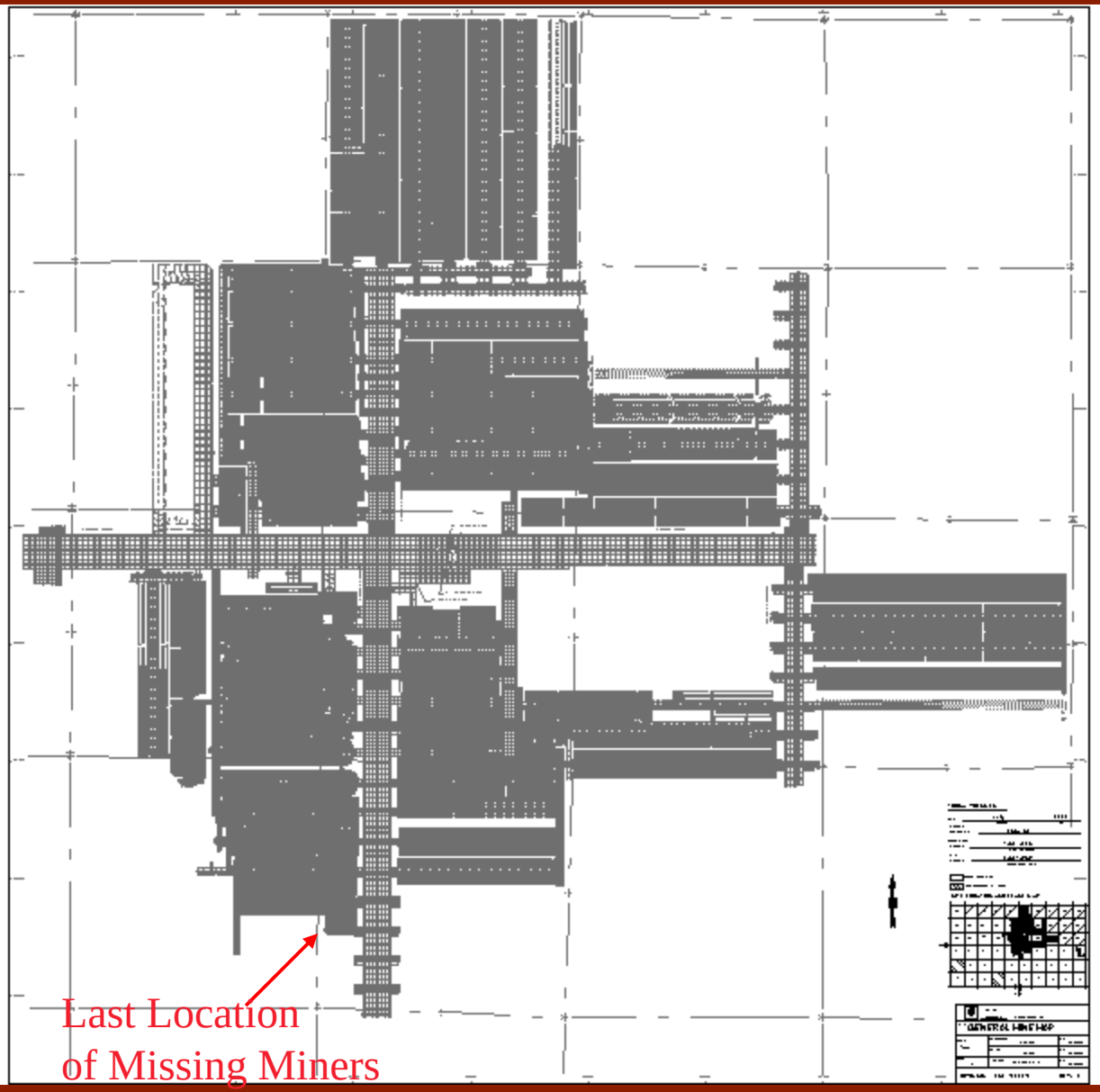
# Hour two

- 53 miners accounted for
- Two miners missing – last seen in 1S-13W panel – two weeks mining experience
- MSHA on site
- Solvay rescue teams notified

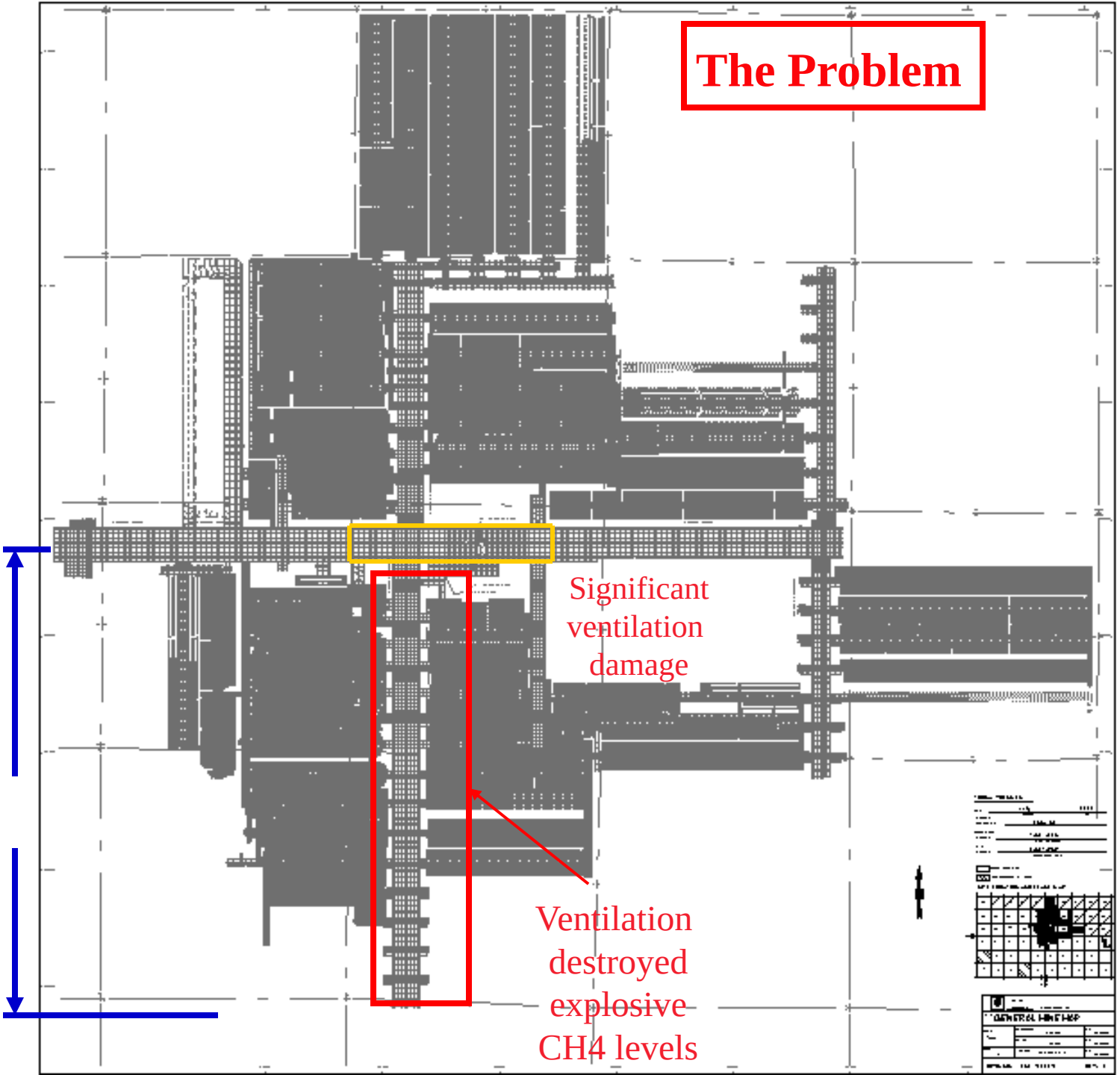
# What We Did Not Know

- Massive ground failure – 0.75 square miles – 5.3 seismic magnitude
- 17 minute air blast
- Estimated 250,000,000 SCF methane release along with high levels of ammonia and other gases
- Mine ventilation in south completely destroyed


Ground
Failure
Zone


Last Location
of Missing Miners

# The Problem


Significant ventilation damage
1.75 mi
Ventilation destroyed explosive CH4 levels

# What We Did

- 47 hour rescue attempt
- 10 local rescue teams
- Additional teams in Wyoming Utah, Colorado notified
- ~200 support personnel

# The Approach

- Rebuild ventilation system into 1S-13W
- Required up to 4 rescue teams in front installing temporary ventilation
- Additional ~40 support personnel re-installing permanent ventilation behind
  - Explosive levels of CH4 at leading edge
  - 7% CH4 at mine exhaust fans

# The Result

- One miner rescued alive
- Second miner died in the arms of rescuers - asphyxiation

# What We Learned

# Do Your Home Work!

Plan and prepare for those things
that can be planned
and prepared for

# Ahead of Time

- Emergency Action Plan
  - Evacuation procedures
  - Clear responsibilities
  - Local emergency response assistance
  - Communications
  - Family care
  - Media
  - Supplies
  - Support
- Practice (table top) and refine

# A Significant Problem!

In the Midst of Disaster,
How On Earth Do You
Create A
Plan With So Little…

# INFORMATION!

**There is never enough of it!**

# INFORMATION!

- As rescuers you will start with very little of it
- A plan must be created
- You have no other option but to do your best
- Make the most of what you have

# The Plan!

- This is likely the most valuable phase of the rescue
- It is also the most likely to not be done well
- There is a tendency to follow whatever initial course that is taken
- Once plan execution begins and resources are committed, it is very difficult to change course mid-stream

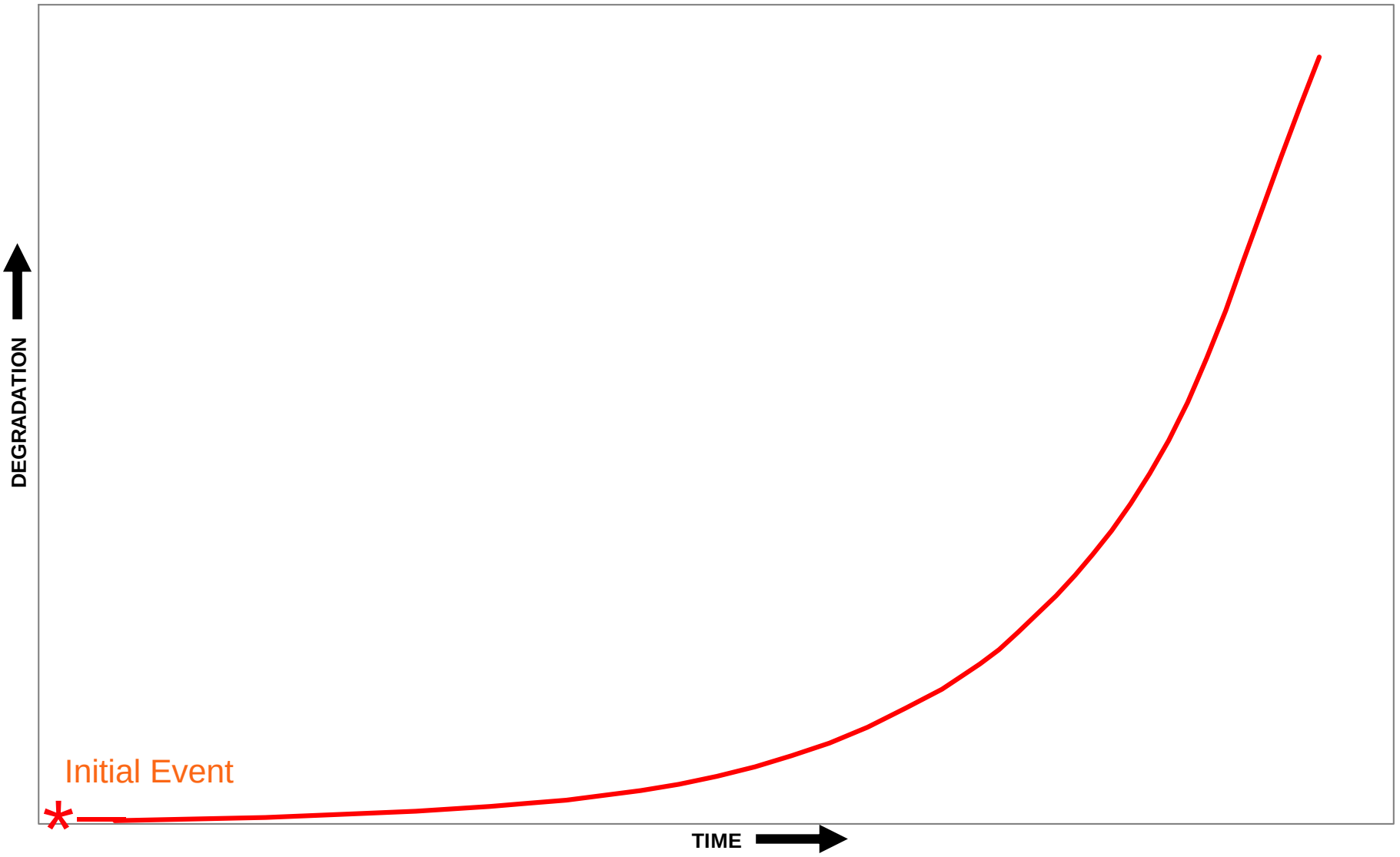
# Suggestions for the Plan

- Take the time to do it!
- Gather 6 to 7 of the most knowledgeable, experienced, and capable people available
- Carefully consider the information you have
- Consider "relative risk"
- Consider options and contingencies
- Assign roles
- Accept the knowledge that even in the best of circumstances the initial plan is likely not the best one

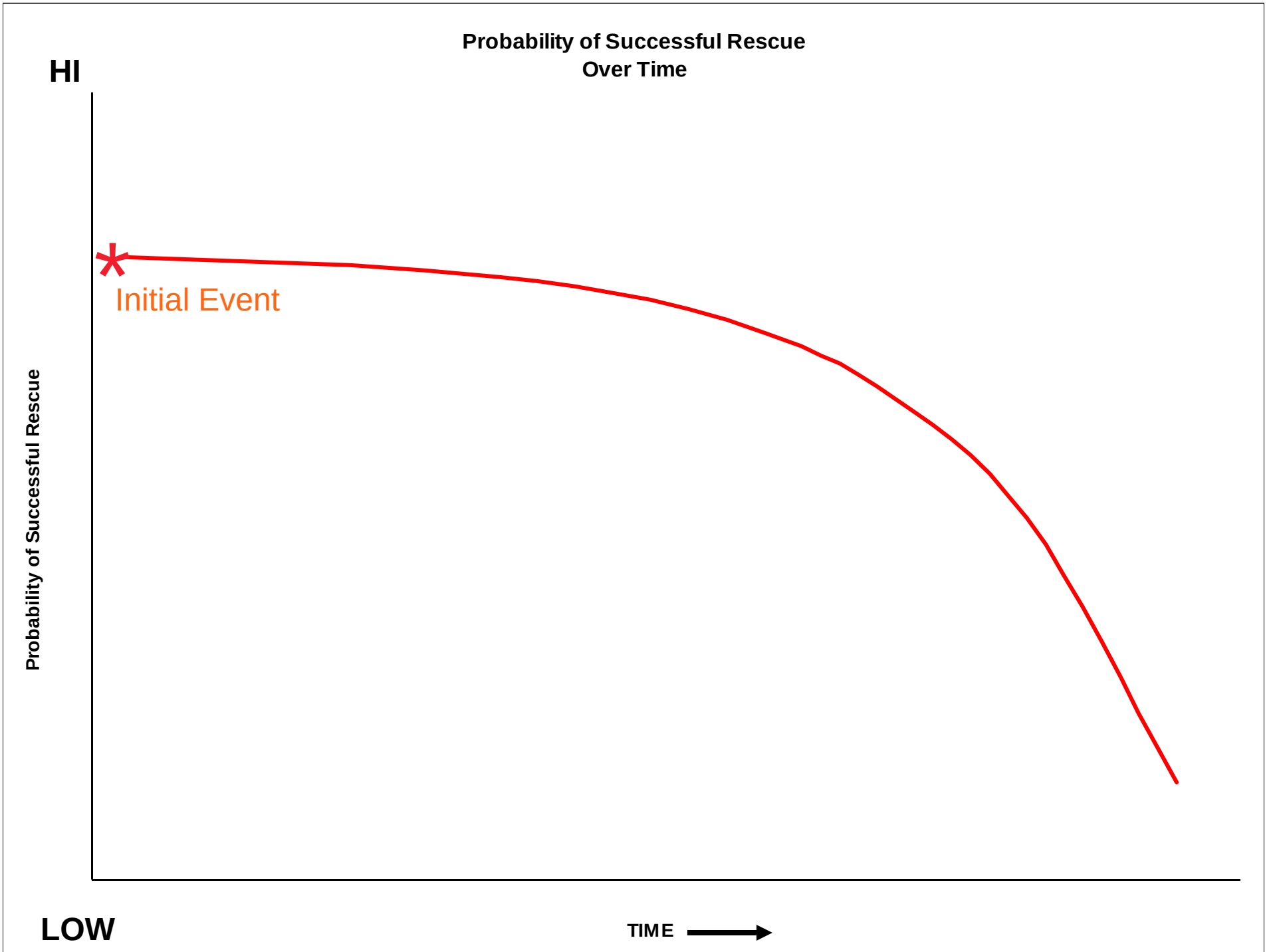

The Enemy!

Disastrous Events
Only Get Worse
Over Time!

## Degradation of Disaster With Time

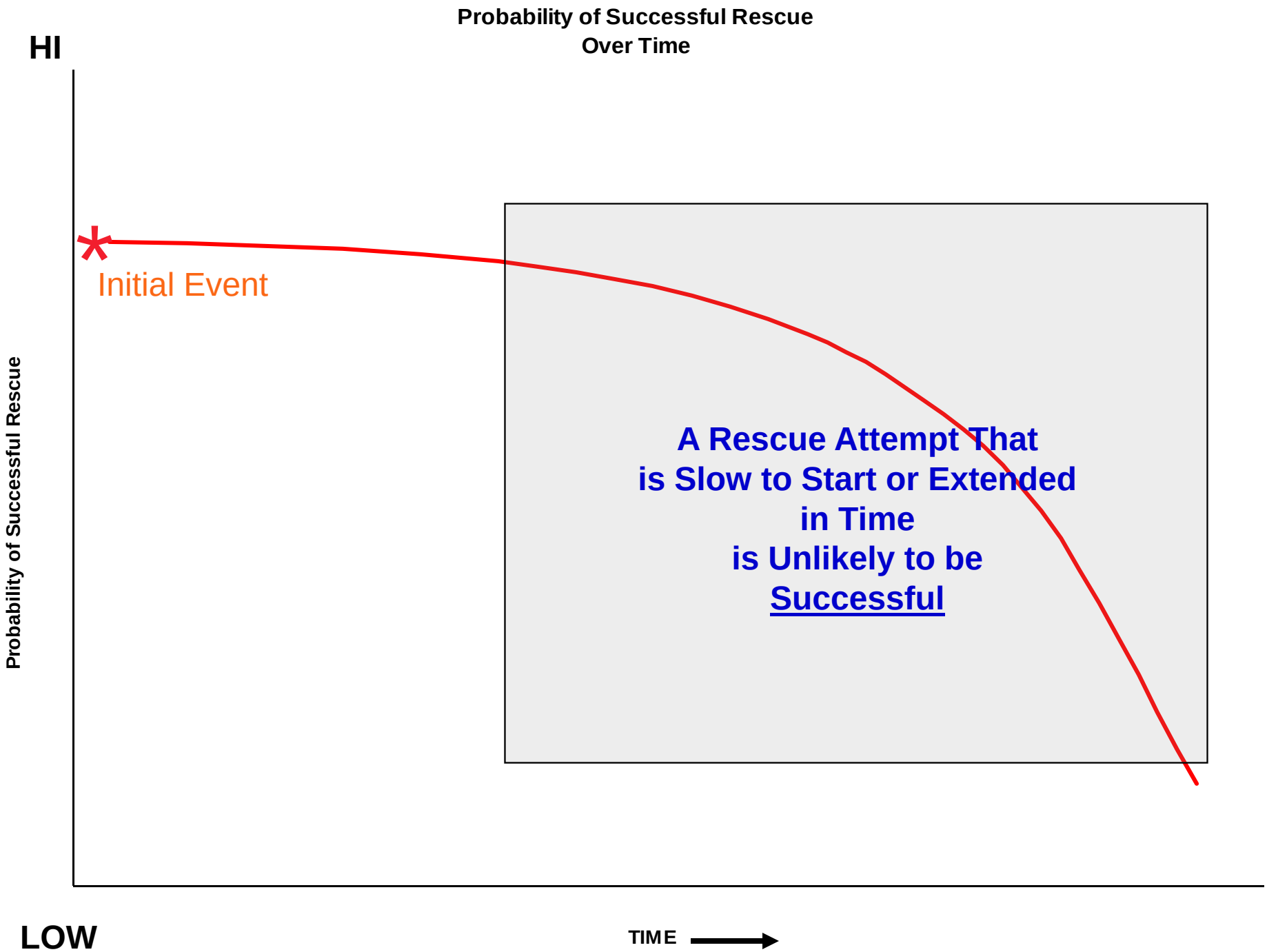


The Likelihood Of
A Successful
Rescue Diminishes
With The Passage
OF TIME!

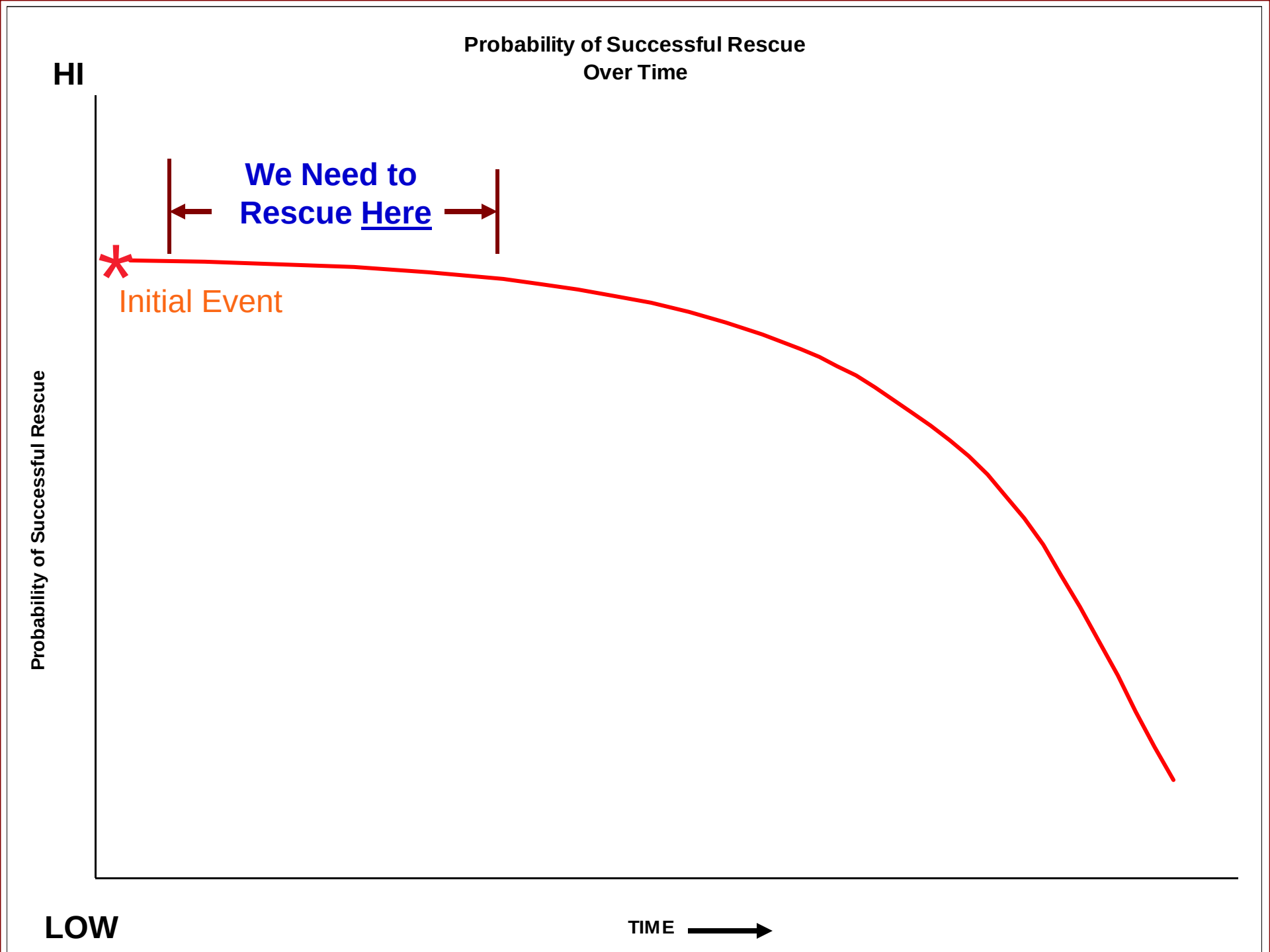

Probability of Successful Rescue
Over Time
HI
Initial Event
Probability of Successful Rescue
LOW
TIME

# Some Considerations for Mine Rescue

- Time is of the essence
- Relative risk


Probability of Successful Rescue
Over Time
HI
Probability of Successful Rescue
Initial Event
A Rescue Attempt That
is Slow to Start or Extended
in Time
is Unlikely to be
Successful
LOW
TIME

# To Improve Our Chances For Successful Rescue


Probability of Successful Rescue
Over Time
HI
We Need to
Rescue Here
Initial Event
Probability of Successful Rescue
LOW
TIME

# The Future of Mine Rescue

- Well Trained And Well Equipped Teams
- Focused And Trained On Rapid Response
- Review Of Team Protocols
- Review Of Command Procedures
- Allow Rescuers To Act In Early Stages