
Failure Analysis



Failure Review's Value

- Improves ability to foresee types of failures
- Makes the audience feel smart about causes and effects
- Answers questions “two levels down”
- Identifies process leading to difficulties
- Places event in context of industry, organization, technology, and decisions



How Audience Listens

- Creates expectations about purpose
- Creates “mental hooks” or questions
- Chunks new information from speaker
- Interprets new information on basis of prior understanding



How Speaker Adapts

- Elicits appropriate expectations
- Suggests “mental hooks” or questions
- Chunks new information
- Builds on audience’s prior understanding
- Establishes a clear point or message for argument as a whole



Failure Analysis Structure

- Overview
 - Introduction of team, summary of situation, nature of the problem, parts team will discuss, main claim
- Discussion
 - Divide by issues or questions relevant to failure
 - Probably one to each team member
- Conclusion



Unit Content and Delivery

- Organize content for listeners
- Reinforce with delivery
- Reinforce with visual cues



Team Presentation Criteria

- Accessible
- Comprehensible
- Usable
- Personally engaging
- Culturally appropriate



How to Meet Criteria

CRITERIA

- Accessible
- Comprehensible
- Usable
- Interpersonally engaging
- Culturally appropriate

STRATEGIES

- Coherent, consistent overall design
- Reinforcement
 - Content
 - Delivery
 - Visuals
- Colors, images, and terms chosen to fit audience's needs, preferences



How to Increase **Accessibility**

- Organize from known to unknown using
 - Visuals
 - Metaphors and acronyms
 - Stories
 - Diagrams
- Use message headings or verbal cues
- Reinforce spoken words with visuals



How to Increase Comprehensibility

- Establish a context for audience
- Give “sound bite” or Main Claim early
- Explicitly link reasons or subclaims to Main Claim at beginning of new section
- Define terms as you introduce them
- Use visuals to reinforce connections or give overviews



How to Increase Usability

- Select content relevant to failure
- Give “sound bite” or Main Claim early
- Organize according to listeners’ need to recall your presentation in future
- Define terms as you introduce them
- Conclude with factors to watch for to avoid this problem in future (lessons learned)



How to Engage Others

- First impression - build connections
 - Look at audience before you speak
 - Smile, show goodwill
 - Don't read, know your first few sentences
 - Look at individuals
 - Have an open stance, arms casually positioned



Culturally Appropriate Deliver

- Engineers value conciseness, completeness, relevance
- US business culture emphasizes “bottom-line” communication: main example or main points first, support afterward
- US culture values directness, open delivery, confidence, honesty



How to Instill Confidence

- Don't read
- Look at PPT on computer, not on wall
- Begin each sentence looking at the audience
- Show certainty by ending sentences with downward voice contour
 - Upward contour indicates a question, in English it shows uncertainty
 - Don't speak a fact or claim as you would speak a question



Speak to Aid Comprehension

- Vary speed to separate levels of importance
 - Slow down for key points
 - Speed up for details
- Tuck in definitions for unfamiliar terms
- Pause before new sections of your presentation or between points
- Repeat cues about where you are in the talk



Emphasize with Voice Variation

- Emphasize key terms
- Vary speed and pitch
- Stress transitions, logical signals
 - “On the other hand”
 - “Notice the difference”
 - “Nevertheless,”
 - “Two years ago In the future”



Voice Conveys Character

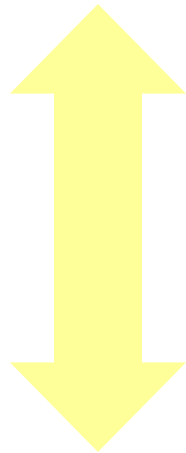
- Expresses intellectual enthusiasm
- Indicates seriousness, concern
- Reflects mastery of material, expertise
- Should “go with” dress, stance, and other aspects of appearance



Reinforcing Content with Visuals



Organize with Blank Space



- Blank Space: An empty area
- Directs viewer's eyes
- “Pushes” or groups items and separates them from others



Organize with Blank Space

Incompatibility reduced the market

- Europe, US had different videoconferencing standards
- Multinational companies could not connect offices
- Videoconferencing equipment could not be marketed internationally

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

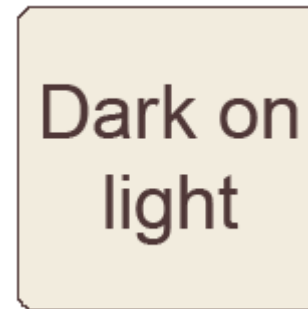
Identify
items
separated
by Blank
Space in
this overhead



Choose Colors for Legibility

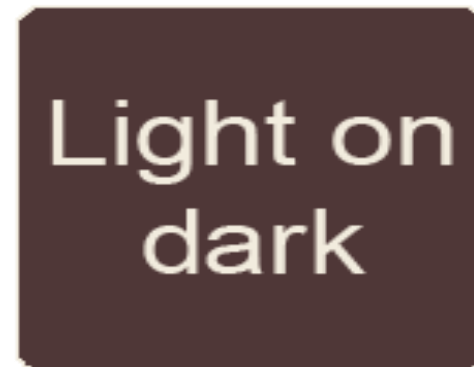
Well-lit room:

use light background/
dark text & visuals



Dimly-lit room:


use dark background/
light text & visuals



Strong light reduces contrast on dark background



Avoid Vibrating Colors



Vibrating
Colors



Vibrating
Colors

Bright complementary colors
that are close to each other in intensity
“vibrate” or reduce legibility



Choose Easy-to-Read Fonts

Good for print



Serif

Good for projecting



Sans Serif
(uniform shaft width)



Font Aspects Affect Legibility

- High contrast between background and text foregrounds word shapes
- Uniform shaft width increases readability
- Size of font should match size of room
- Type treatment of font should increase contrast

S

32 pts Times

S

Arial

Drop Shadows

Reduce Legibility

Which one in each pair is more legible and why?



Use Text Properly

- Use keywords instead of sentences
- Avoid “orphans”
 - This is an example of an
“orphan” ←
- Be consistent in your capitalization
- Use grammatical parallelism



Use Short Phrases

- Write complete sentences rarely; use with
 - Hypothesis
 - Questions
 - Quotations
- Generate clear, accurate phrases
- Use slide show as an outline, not as a script



Design Rules

Parallelism → Comprehension

- Makes text easy for audience to skim
- Creates logical coherence through grammatical, spatial equivalence



Use Parallelism → Equivalence

Parallel:

- **Use** keywords
- **Avoid** wordiness
- **Opt** for bullets

VERBS

Not Parallel:

- Use keywords
- Wordiness is bad
- You should opt
for bullets

Each verb expresses an action of equivalent importance.

List similar items in the same grammatical form.

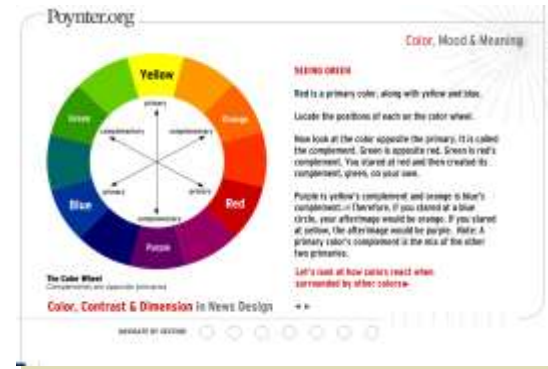
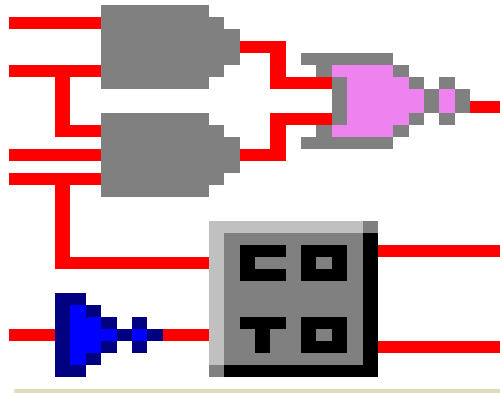


Displaying Visuals

- Insert needed visuals
- Use color
- Resize appropriately
- Draw attention



Use Legible Graphics



- Don't stretch them to the point of graininess
- Don't shrink them to be too small to read



Offer Familiar Images First

- Offer figure or image familiar to audience first
- Technical image next
- Water treatment example for government

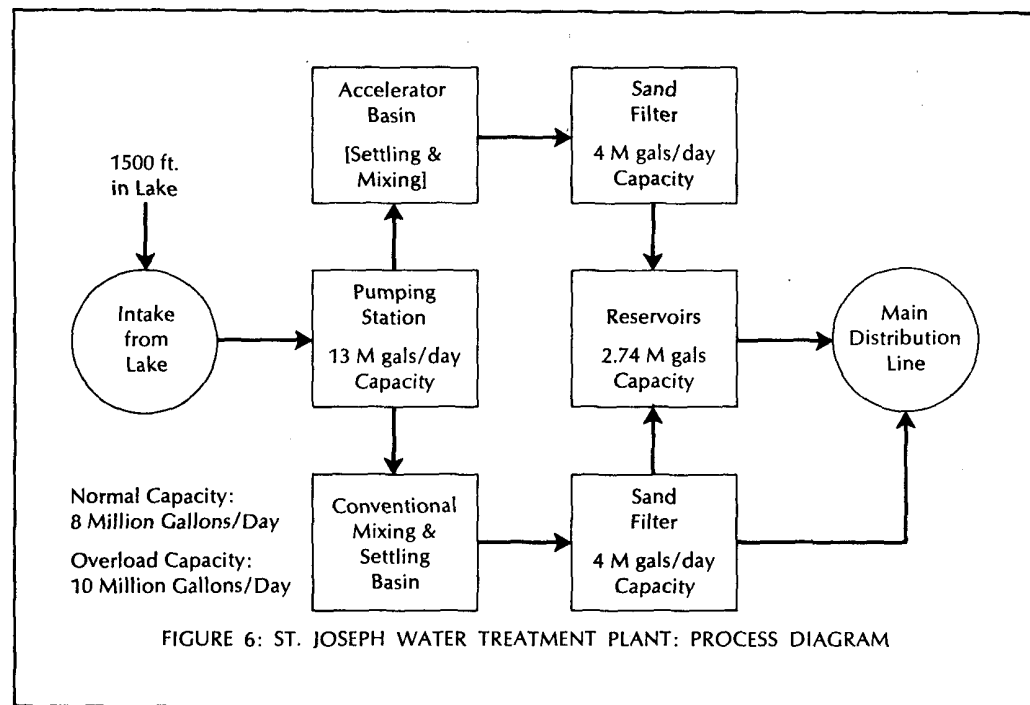

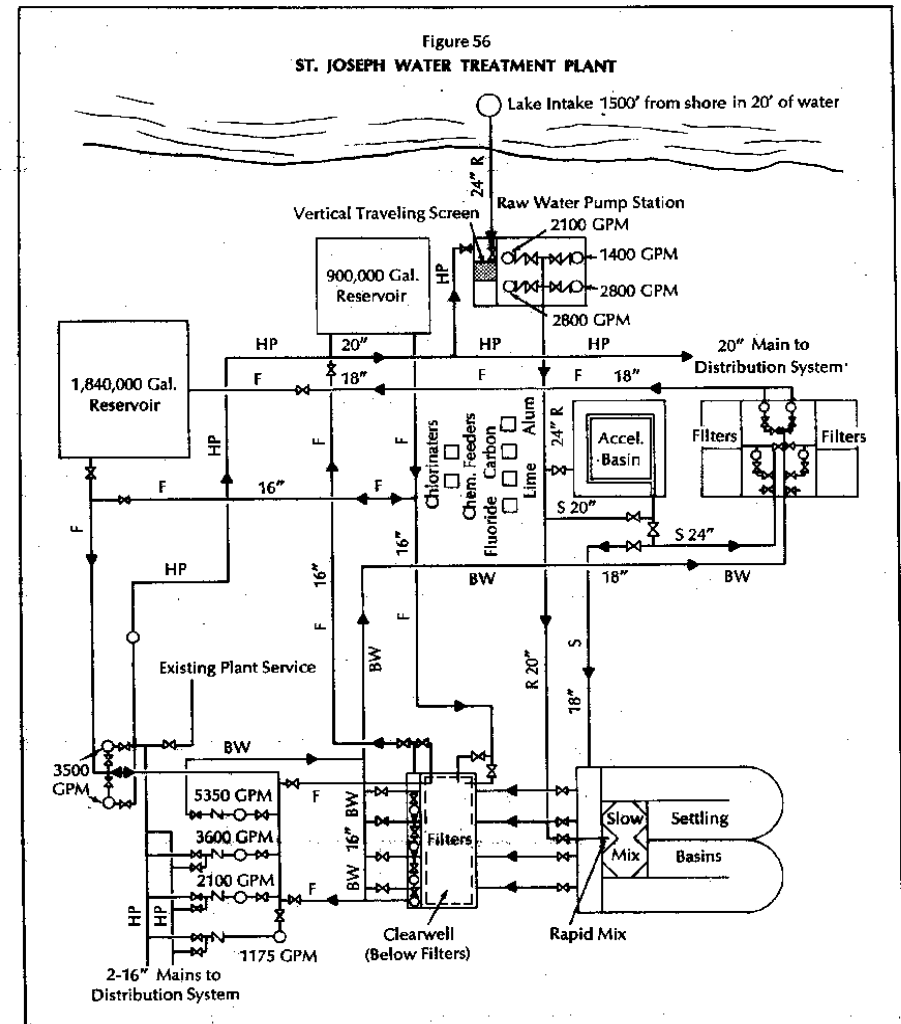


Figure 9–10. A simplified flow diagram appropriate for nontechnical audiences (as it appears in the discussion).

Design Rules

Show Technical Images Next

- Build toward technical understanding
- **Sequence:** Photo / diagram/schematic/cross-sections/other technical drawings
- Water treatment example 

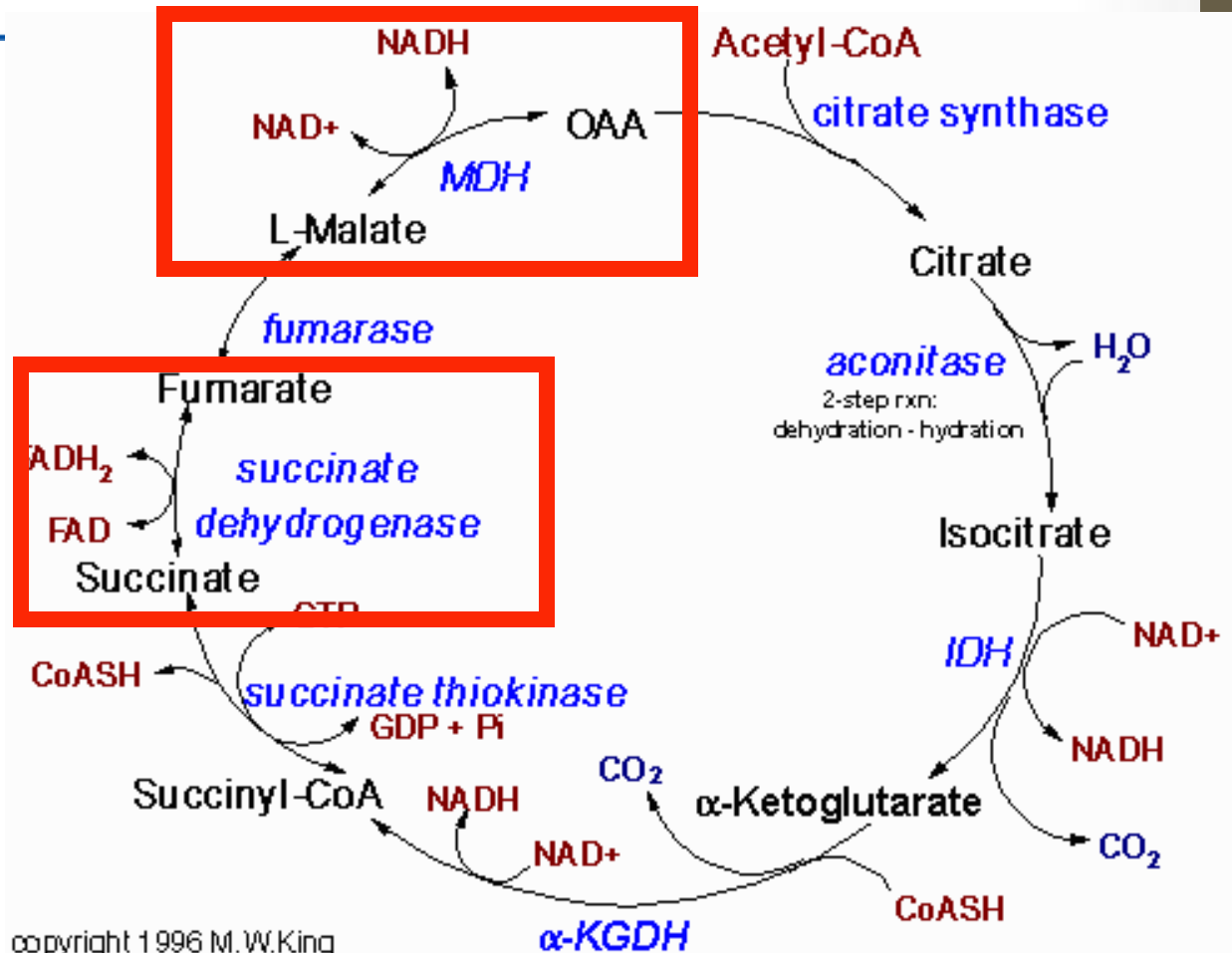


Animating: Tips

- Use animation purposefully (and sparingly!)
 - Animating should help audience comprehend your message
 - Don't animate solely for aesthetic purposes



Simplify and Draw Attention



copyright 1996 M.W.King

CAIN PROJECT

Choose Effects Judiciously

- Avoid slow moving or fancy effects:
 - Crawl-in effect
 - Swivel effect
 - Spiral effect
- Effects should have a point/support your message
- Don't overuse special effects
- Keep effects and transitions consistent



Test Presentation with Team

- Show draft PPTs
- Combine media to provide multiple ways of relating to your material
- Watch for difficulties, errors
- Practice talk
- Ask for process feedback
- Allow time for review and revision



Some Samples to Evaluate

The X-38 Return Vehicle Problem



CAIN PROJECT

X-38



Student 1 F Name LName
Student 2 F Name LName
Student 3 F Name LName
Student 4 F Name LName

CREW RETURN VEHICLE

Introduction

- going to be the crew rescue vehicle (lifeboat) for the International Space Station
- When returning from orbit, it would have flown back like the Space Shuttle and would have used a steerable parafoil and skids for landing.



Drop Tests



- Unpiloted free-flight drop tests from the B-52 began in March 1998



X-24a

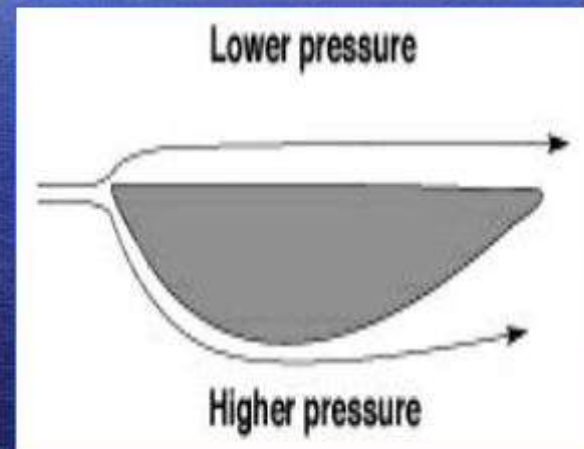


- First lifting body ever designed by NASA
- Developed primarily to observe flight characteristics from high altitudes and supersonic speeds
- Also used to investigate the feasibility of using lifting bodies to return from space
- Maximum speed of 1,036 mph (Mach 1.4)
- Maximum altitude of 71,407 ft.



Airfoil Characteristics

- Uses “lifting body” design
- No wings – lift generated from shape of the fuselage itself
- Two wing-like structures on back don’t provide lift
- Vertical control surfaces provide lateral stability and maneuverability



X-38 Replacement: the Orbital Space Plane



- Both crew transport and crew return capabilities
- Testing delayed due to Columbia disaster

- Known as X-37

- Will be America's first military space plane when completed

References

- <http://homepages.cae.wisc.edu/~wiscengr/issues/nov00/nasa.htm>
- <http://www.astronautix.com/craft/x38.htm>
- <http://www.fas.org/spp/guide/usa/launch/x-38.htm>
- <http://www.nasa.gov/lb/centers/dryden/news/NewsReleases/2000/00-16.html>
- http://www.spaceandtech.com/spacedata/rlvs/x38_sum.shtml



Dark Red, Aqua on Navy Blue NOT LEGIBLE!!!

Lead through Excellence in Engineering Communication

More resources are available for you

- under “Engineering Communication” at Connexions at <http://cnx.org>
- at the Cain Project site at <http://www.owl.net.rice.edu/~cainproj>
- in your course Communication Folder in OWLSPACE.

