

Protect your time, set proper expectations, and leave yourself an out · **Virtues of the Troubleshooter: Be Skeptical · Use all your senses · Organized, systematic, detail-oriented, and logical** · *Find creative ways to meet the end goal · Give your full attention to the problem*

The Right Questions, A Universal Troubleshooting Guide (v8) by Jason Maxham (<http://artoftroubleshooting.com/>)

TROUBLESHOOTING BASICS:

- Have **ALL** the prerequisites for operation been satisfied? For example, is it plugged in?
- Is the problem clearly **defined**?
- Can the problem be **reproduced**?
- What makes the problem **worse**? **Better**?
- What's **changed** or **new**?
- Have I done a full **inspection** (eg, a walk-around)?
- Is the system operating beyond its known **limits**?
- Can I perform **routine (or neglected) maintenance**?
- Can I **reduce complexity** by: 1) restoring defaults, 2) restarting/power cycling, or 3) turning off unneeded features or subsystems?
- Has someone else **already solved** this problem?
- Do I have the right **tools**?
- Should I **document** my work? Notes, pictures, etc
- How is it **supposed to work**? What is **normal operation**?
- Does the machine know what's wrong? Are there **error messages, diagnostics, or logs** I can examine?
- Is troubleshooting the best use of my **resources**? Is there a **workaround** that's better? Can I **swap** or **replace**?

MORE STRATEGY QUESTIONS:

- Have I kept **presuppositions** about causes out of the problem description? What are the **facts**?
- Can I **change the order** of the startup or workflow?
- Is everyone **who might know** the answer aware of the issue?
- Should I **clarify or add detail** to problem reports?
- Can I come back to this **later**, or work on a different aspect of the problem?
- Can I **follow the flow**, from beginning to end, to find the problem?
- Is the system a **Black Box**? Can it be opened up so I can examine its inner workings?
- What other types of failures could produce these **same symptoms**?
- Are **environmental conditions** (noise, temperature, weather, etc.) impeding my ability to work?
- Can I **copy one that works**?
- Have I made a **logical leap** that isn't justified? Have I chosen the **simplest explanation** possible?
- Can I deploy **dedicated resources, limiters, or governors** to lessen negative interactions between components and bring usage in line with capacity?
- What's the **extent** of the problem? Are symptoms repeated across systems? Conversely, what's NOT affected?
- How can I **narrow down** the problem space? Can I use half-splitting (aka, binary search)?
- Can I get **another perspective** on the problem? Can I troubleshoot with a partner? A team?
- Is there a **bottleneck**? If so, where?
- Is this my problem** to solve? Is a co-worker, business partner, manufacturer, or vendor avoiding responsibility?
- Am I **in over my head**? Should I call in someone more experienced, like a professional, to help?

CLEANING UP:

- How do I **know** that I've fixed the problem?
- Should I add **redundancy** or **capacity**?
- Can I **collect data** to better understand the problem and detect it in the future?
- Would a **routine maintenance** program prevent recurrence? If already in place, can I perform maintenance more often (or better)?
- Is this problem the **"tip of the iceberg?"** Does it foreshadow something worse?
- Can I analyze the problem using **Root Cause Analysis** (like 5 Whys)?
- Will I **use this situation** to make changes that would have been difficult before?
- Was the failure **intentional** (sabotage, fraud, etc.)?
- Is it possible to devise a **detector** that automatically alerts me to this type of failure?
- Could the problem be avoided with **stress testing** or a **break-in period**?
- When will I **communicate** what was learned so that others can benefit? Can I create **documentation** like an incident report, service bulletin, or troubleshooting tree?
- Can I prevent recurrence with a **checklist**?

BEFORE I MAKE A REPAIR I ASK:

- Will this repair cause **downtime**? Who is affected and needs to be notified?
- How long** will this repair take? What happens if it's not finished on time (or ever)?
- What are the **risks** of this repair? Can it be **reversed** and what are the **steps to get back** to where I started?

CHANGE JUST ONE THING AT A TIME