

Building an Effective Cross-technology Troubleshooting Team

An Advance7 White Paper

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EXECUTIVE SUMMARY

The demand for increasingly sophisticated IT applications is leading to complex systems that are interconnected with other complex systems. This in turn is driving an increase in the number of difficult performance and stability problems.

The cause of such problems is often hard to determine, which makes it difficult to allocate the problem to the correct technology team. Consequently, the problem bounces from team to team, as each in turn 'proves' that their technology is not at fault.

More often than not, some of the technical support teams involved are from service providers, and so, rather than being a problem just bouncing between internal teams, it bounces between commercial organisations. This can result in disputes, with circular behaviour driven by the need to avoid reputational and commercial damage.

Unfortunately, problem management doesn't provide the solution. Whilst problem managers may coordinate the troubleshooting activity of multiple technical support teams, these teams operate in silos. This paper explains why a siloed approach is ineffective when investigating difficult performance and stability problems.

Some organisations are aware of these potential issues and are tackling them by creating service-orientated Cross-technology Troubleshooting Teams (CTT).

In this paper, we outline the need for a CTT, the benefits it delivers, its structure and strategies to optimise its effectiveness.

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GREY PROBLEMS

Anyone who has spent time in IT operations will have first-hand experience of issues that drive the need for a CTT. The typical scenario is:

- A recurring performance, fault or incorrect output problem arises
- The causing technology is not obvious
- By default, the problem is passed to the application or network support team
- The problem is then repeatedly passed from team to team as each 'conclusively proves'¹ that their technology is not the cause

Advance7 refers to such issues as *grey problems* in that the causing technology is not black-or-white. Right now, there is no formal recognition of this type of issue as a distinct class of problem; for example, they are not defined in ITIL. Consequently, IT Departments attempt to fix them using the break-fix workflows and techniques they use for all other problems.

Break-fix workflows focus on troubleshooting within specialist technology silos. If we face a true break-fix situation, the causing technology is obvious and so using the skills of a technology specialist is naturally the right thing to do. Usually, grey problems are treated in the same way and so siloed investigations are the norm. Unfortunately, when grey problems are investigated in this way progress is extremely slow and findings are often unreliable.

Advance7 has found that this lack of recognition of grey problems as a distinct class of problem is an important reason why support teams struggle to fix such issues.

THE NEED FOR A CTT

Many IT Departments pull together ad-hoc groups to solve problems. However, these arrangements are often very informal; a few people are invited to attend a

¹ Of course, it's near impossible to prove conclusively that a technology IS NOT causing an intermittent problem, but relatively straightforward to prove conclusively that it IS causing it.

'brainstorming' session where ideas are tossed around until a solution to the problem is found. Some of the issues that arise with this approach are:

- The brainstorming sessions may not be well structured
- Proposed solutions are unlikely to be based on proof of root cause
- There may be little commitment to attending the session
- Different people of differing skill levels turn up to the sessions
- The group may not have access to necessary data and/or tools
- The group may not have the remit or consent to delve into certain areas
- Whilst a group member may be expert in a particular technology they may not be willing or able to undertake broader problem analysis

Even when a formal process exists, some structured methods rely on the knowledge or experience of Subject Matter Experts (SMEs) to define possible causes of the problem. This leads to a situation where the determination of root cause becomes a matter of opinion, and natural biases² have a considerable effect.

A Problem Management function certainly has a role to play in a CTT but it is not a solution in its own right. Whilst problem managers may coordinate the troubleshooting activity of multiple technical support teams, these teams typically struggle to quickly and reliably investigate Recurring Grey Problems.

Rather than look at a grey problem in isolated vertical silos, what's needed is an end-to-end investigation across the technology silos. This calls for a team with the skills, tools and remit to investigate problems in this way. That team is a Cross-technology Troubleshooting Team (CTT).

The objective of the CTT is to determine what *is* causing the problem rather than focusing on what *isn't* causing it. The difference seems subtle, but actually it's a critical mindset for the successful operation of the CTT. It's also very difficult to

² Biases are described extensively in *Thinking, Fast and Slow* by the Nobel laureate, Daniel Kahneman.

prove conclusively that a component of a system is not causing a problem unless you prove what *is* causing it.

To improve the effectiveness of the CTT, steps must be taken to enable its operation, an area we cover later in this paper.

CTT OR PSG

In an earlier version of this paper (and in the RPR manual – see *Additional Resources* on page 22 of this paper), we referred to a Cross-technology Troubleshooting Team as a Problem Solving Group. This was to align our thinking with ITIL terminology. In ITIL v3 2007, the ITIL Service Operations Manual described the role of a ‘Problem-solving Group’. In the 2011 revision of the Service Operations manual the ‘Problem-solving Group’ term had been dropped completely. We have found that a number of organisations use the CTT term, and so we have fallen in with this.

SERVICE PROVIDERS

Throughout this paper we refer to service providers, by which we mean any third party that supports an element of a production system. This could include anything from network services, through public cloud and SaaS, to fully managed service provision.

Unless an end-user business has totally outsourced IT support, or a particularly clever SIAM arrangement is in place, it is for the end-user IT team to troubleshoot grey problems, at least to the point where the causing technology is identified. A CTT helps an IT team meet this responsibility.

Service providers consume services too, and so they too can benefit from the availability of a CTT. There is also an opportunity for service providers to offer CTT capabilities to customers as a unique value-added service.

THE BENEFITS OF A CTT

The benefits of operating a CTT fall broadly into seven areas:

1. Reduced time to problem resolution; improved service levels
2. Reduced IT workload
3. Reduced time and capital expenditure on unnecessary upgrades
4. Smoother project execution
5. Improved IT Department (and service provider) reputation
6. Addition of a career step for senior technical support staff
7. Fewer disputes between service providers, their customers and commercial partners

There are further benefits for service providers:

- Heightened reputation for technical excellence
- Immediate relief from pressing problems and consequential easing of transformation schedules
- Fewer high-profile disputes
- Fewer service credits
- Reduced risk of reputational damage
- Improved account retention

Reduced Downtime

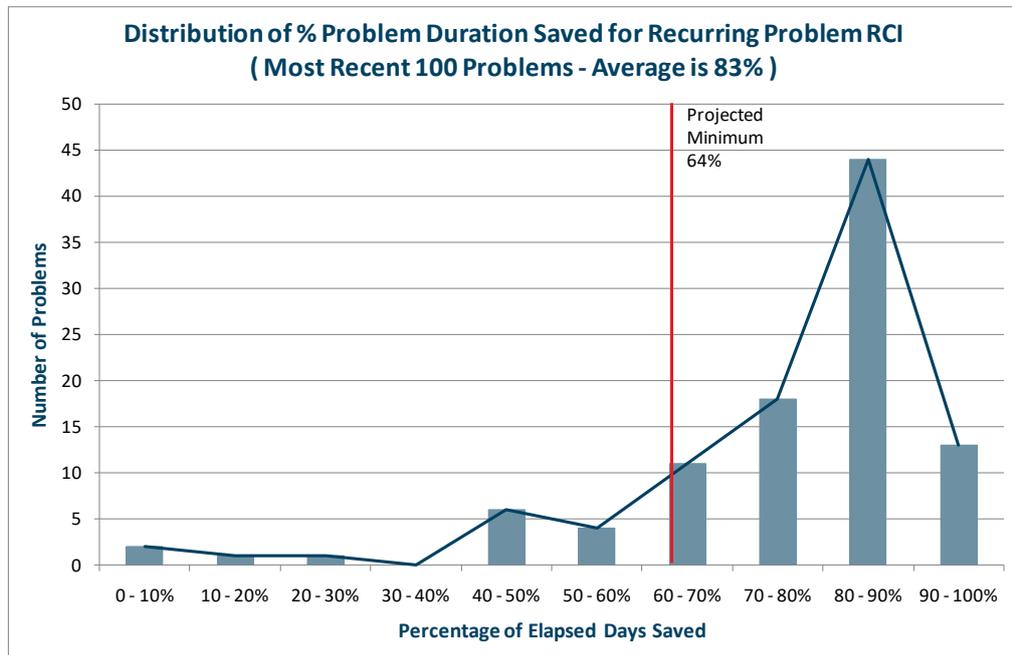
Downtime is a widely used term that covers a variety of service situations. Grey problems rarely cause a true 'service down' condition. In those situations, the cause is often quite obvious and so the problem is not grey. Grey problems mainly cause recurring service impairments such as slow performance or intermittent faults. The fact that a service is not completely unavailable has several negative consequences:

- Grey problems are often dealt with as low priority³
- Although a service is available it may be so impaired that the business adjusts around the problem
- IT may put the problem on the 'too difficult to deal with' pile
- These 'low priority' issues cause confusion when higher priority problems occur

These factors mean that grey problems can be ongoing for weeks, months or years.

As a result, grey problems often affect senior leadership perception of the overall effectiveness of IT, and ultimately influence key transformation and/or outsourcing decisions.

³ Ironically, long-running, recurring problems cause much greater dissatisfaction with IT than occasional major incidents.



Advance7 reviewed 100 projects where our Problem Analysts had helped clients create a CTT to deal with a difficult problem. We found that the average downtime saving through the operation of a CTT was 83%.

An insurance company that manages group health policies for large organisations ran into a problem with their core business system. Changes to policy terms and actuarial rates required a recalculation of policy costs. Unfortunately, this recalculation intermittently caused all users to be locked out of the system for 20 or more minutes. This in turn caused a backlog in writing new business.

To avoid the problem, the business adjusted its processes so that policy changes were only processed at certain times of the day. Although this reduced the new business backlog, it caused operational difficulties and inefficiencies in many parts of the business.

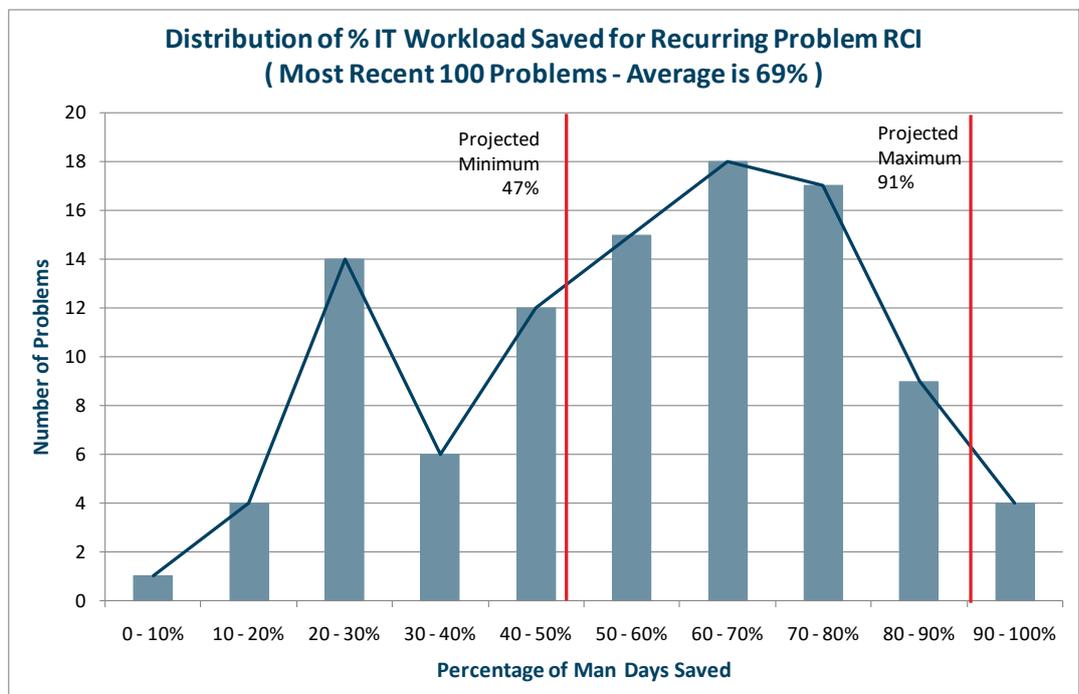
Reduced IT Workload

Grey problems cause a disproportionately high workload for IT people. An organisation may respond to a grey problem by creating a dedicated team of people to investigate it (such as a Tiger or Red Team).

The members of these teams tend to use techniques specific to their own technology to prove that their equipment, software or service is not to blame. The techniques are typically only suitable for break-fix scenarios, not for recurring grey problems.

As the causing technology is not known, all of the support teams must undertake time-consuming activities. A system may include technologies supported by ten different support teams, and so when each performs a detailed configuration analysis or diagnostic health check, *nine of the teams are probably wasting their time.*

In contrast, a CTT operates as a cohesive team, and its effectiveness reduces the overall IT workload. In the same study of 100 projects described earlier we found that the average workload saving produced by a CTT was 69%.



A major bank had a problem with a customer-facing reporting system. The problem affected around 100,000 users and had been ongoing for about 3 months. The bank's IT team and several service partners had invested more than 350 person-days into the investigation of the problem.

By pulling together a CTT that had a service-orientated remit and restructuring the investigation with RPR[®],⁴ the group determined root cause within 4 days through a total effort of 17.5 man-days.

Reduced Wasted Capital Expenditure

In too many cases it's decided that a problem will be resolved by an upgrade or a new piece of equipment even though the root cause is unknown. Such decisions are typically based on tenuous reasoning such as:

- The problem was resolved elsewhere through an upgrade
- A piece of equipment is believed to be overloaded, although no evidence has been produced that an overload is the cause of the problem
- A product or technology is rumoured to be problematic

Our review of 100 recent grey problems revealed that only 10% required upgrades for resolution of the problem.

The real drivers to support such decisions may be as diverse as:

- Supplier sales targets
- IT professionals wanting to add a technology to their CV
- Perceived competition between IT Departments in a particular industry
- The IT Department wants to be seen to be doing something about a problem

⁴ RPR[®] is a Rapid Problem Resolution method developed by Advance7.

The outcome from these upgrades varies considerably. Sometimes the upgrade resolves the problem, other times it may simply mask it. For example, the performance of a badly-written database call might be improved by installing a faster server. Although this gives temporary relief, it's likely that the problem will return at some time in the future as the workload on the server increases.

Smoother Project Execution

During the development of a new IT solution, problems will arise and in most cases these can be dealt with quickly. However, if a grey problem arises it can create significant delays, often resulting in expensive contractors having to sit and wait while the issue is resolved.

Moreover, IT projects cause business process change; a new way of doing things, a new system to use, etc. Most people don't like change and their resistance can be compounded if a newly-introduced IT system has a recurring problem.

Finally, in our service-orientated world, the CIO is under pressure to provide an agile IT service that can respond quickly to changing business needs. A recurring problem that arises during development or testing can increase the 'time to market'.

The availability of a CTT to deal quickly and effectively with grey problems can greatly ease the way to a smooth and timely project delivery.

An investment bank had built a new trading floor but had run into a problem during final testing; the workstations would intermittently lock-up for no apparent reason. After several days of investigation the blame was laid at the door of the network team, who then spent weeks testing equipment, cabling and power. This caused a big and costly problem. The project was part of a larger programme of work that involved moving various departments into different buildings. The programme stalled, resulting in lease and contract penalties. Eventually the bank created a CTT which solved the problem within days.

IT Department Reputation

For all of the reasons above, grey problems can damage the reputation of your IT Department. Not only does the availability of a CTT reduce the time needed to deal with difficult problems, it can also provide a visible extra level of support that improves the standing of the IT team.

Additional Career Step

Many senior technical people do not want to move into a management role, but they come to a point where 3rd line support or design roles are just not challenging enough. Membership of a CTT, and then leadership of the group, provides further options.

CTT CONSIDERATIONS

Types of People

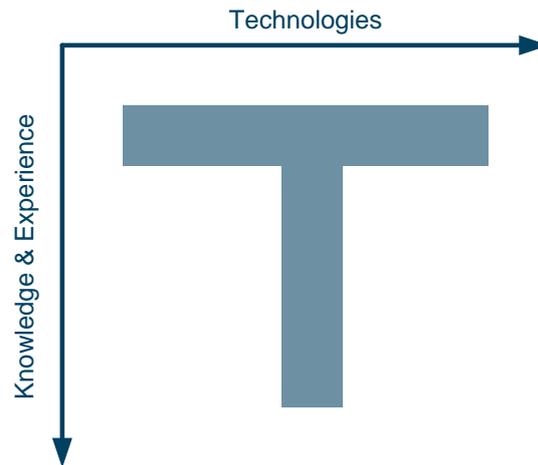
There are three different roles in the CTT:

- Facilitator – someone who manages execution of the method being used, arranges meetings, marshals resources, liaises with technical teams and service operations groups such as Change Management
- Subject Matter Expert (SME) – technical support people with a good fundamental understanding of one or more of the technologies in use in the business
- Technical Lead – a well-respected SME who has the strength of character and technical knowledge to lead discussions and keep the CTT on track

It may appear self-evident that a CTT should be staffed by the very best Subject Matter Experts in the organisation. However, these people may not be ideal if they

have a strong silo mentality. A UNIX server specialist who is not prepared to think about other areas of IT is of little use.

'T-shaped' people are ideal CTT members.



These people may specialise in one area but have a good broad background in IT.

They should also have:

- Problem-solving skills – an obviously useful character trait
- An enquiring mind – a real passion for understanding how things work
- Determination and stamina – pursuing a tough problem can be very wearing

Subject Matter Experts (SMEs) will come from various areas, such as:

- In-house 3rd line support teams
- Technical support people from key technology providers
- Technical support people from service providers
- Consulting partners

One of the SMEs or the Technical Lead may assume the role of Facilitator. However, the importance of this role and the work involved can be underestimated. Typically, Problem Managers⁵ are ideal for this role since:

- They probably have the necessary wide-ranging relationships within the organisation
- It fits neatly alongside their existing responsibilities
- Coordinating the activities of multiple teams in the investigation of a problem is an ITIL-defined problem management responsibility
- They are ideal people to monitor adherence to the agreed problem diagnosis method

If the Problem Manager has strong technical skills, he or she could also assume the Technical Lead role, although such a combination of skills is unusual.

Full Time, Virtual or Purchase?

The justification for a full-time team will depend on the number of grey problems that arise in the course of a year, as well as the type of business.

A part-time (virtual) CTT is a good first step and, if it delivers results, a business case can then be built for a full-time team.

A virtual CTT can be difficult to operate without a cast-iron commitment from technical support teams to make appropriate people available. It's also important to remember that an informal gathering of technical people to brainstorm a problem, or a Problem Management meeting, is not the same as a virtual CTT. A virtual team operates in an enabled environment i.e. barriers to the successful operation of the team have been removed (or at least lowered). Just like its full-time counterpart, a virtual team should have a structured approach to problem diagnosis.

⁵ Here we mean Problem Manager in the ITIL sense; there therefore may be a similar role with a different title.

Smaller organisations are unlikely to have enough grey problems to be able to support the formation of a virtual team because:

- The total support team may be small and may not be able to cope with the additional workload
- Supporting a small business often means that the IT team must deal with a wide range of technologies and so are unable to gain in-depth knowledge of any one area
- The low rate of problems means that the team develops too slowly to be effective

In this case, it will be more effective to purchase the problem analysis and diagnosis expertise as needed. The external team will need to collaborate with the in-house staff – it's almost impossible to diagnose a problem otherwise, since the in-house team have the local knowledge. It's also useful to discuss the approach of the external problem diagnosis service provider so that the IT team can prepare the environment by removing inhibitors. These are discussed below.

In our experience, the minimum effective size for a CTT is four SMEs plus 20% of the time of a problem manager acting as a facilitator. The SMEs need to be carefully selected to ensure adequate coverage of key technologies.

Service Integration and Management (SIAM)

It has been suggested to Advance7 that a CTT-type capability could be included in a SIAM arrangement. There may be merit in this idea, but at this time:

- SIAM addresses the ITIL Service Operations disciplines only and there is a significant technical support element to a CTT
- ITIL doesn't identify a recurring grey problem as a special case
- ITIL doesn't define any horizontally-aligned (cross technology) technical services

However, service providers recognise the need for CTT-type investigations and many are clients of Advance7.

Existing Teams

Some organisations have an operations Performance Team (not to be confused with a performance team that deals with development and pre-production testing).

These Performance Teams would find the ideas here useful for their own operation.

Application Support teams may also find the ideas here useful, particularly a team that operates Application Performance Management (APM) systems.

CREATING A CTT

Method

The key objective of a CTT is to determine the technical root cause of a problem i.e. what hardware, software or service component of a system is causing the problem, how is it causing the problem and under what circumstances. The technical root cause will lead the SMEs to a resolution.

The fastest way to determine technical root cause is by taking a structured, methodical approach. Organisations with a CTT are structuring their activity around formal approaches such as Advance7's RPR method. Others invest in developing their own structured approach in-house.

Without a methodical approach, a CTT will struggle to be effective and find it almost impossible to measure its effectiveness and hence prove its worth.

Removing Inhibitors

The problem diagnosis method and the other practicalities of operating a CTT, may be inhibited by issues relating to:

- People – e.g. who will be the members of the CTT and what is the commitment from their managers?
- Policies, Processes and Procedures – e.g. the activation of a diagnostic tool requires a Change Request and approval takes 5 days
- Tools, Utilities and Systems – e.g. the CTT is unaware of the full range of tools available and who controls each of them
- Other Resources – e.g. where will the CTT meet and what facilities are needed?

For efficient operation of the CTT, these inhibitors should be dealt with when the team is formed. A CTT can operate in an environment with these inhibitors, but reaching root cause will take longer and more resources will be used than would otherwise be necessary.

Skills

There is a widespread misconception that problem diagnosis skills are directly related to technical knowledge about a product or technology, and so training becomes focused on these areas. Problem analysis and diagnosis requires an additional set of skills that relate to:

- Problem analysis and diagnosis methodology
- Structured thinking
- Diagnostic tools and techniques
- Diagnostic data capture and analysis

At this stage in the development of a CTT as a concept, there may be some resistance from technical staff to this type of training. The CTT concept is not yet mature and so technical people are often far more interested in learning about a new technology or product than gaining an understanding of a method that they may believe to be only vaguely relevant to their job.

To build an effective CTT you need to overcome the resistance to problem analysis and diagnosis methods and skills. This can be accomplished by investing in a proof of concept or recommending a test period of operation.

Perceived Threat

An IT Department will always have at least one 'Go To' person. These people sometimes perceive the CTT as a threat to their status and job security. On the contrary, these people can make great members of a CTT, but the sensitivities here need to be carefully managed.

Advance7 has helped several businesses build a CTT and this has been the biggest obstacle in all cases.

PROGRAMME APPROACH

Recruiting staff and enabling the environment may be difficult if an IT team has little or no experience of a CTT.

Advance7 has been providing CTT services to clients for a little over 25 years, and with this experience we have created an easy path to an in-house team. Through a programme of work, Advance7 will:

- Produce a fully costed business case to justify the creation of a CTT
- Provide a turnkey CTT
- Work with the IT teams to enable the environment for the operation of a CTT
- Integrate the CTT into IT operations

- Deliver RPR problem diagnosis training to in-house staff
- Mentor in-house staff in the investigation of Recurring Grey Problems
- Gradually transfer ownership of the CTT function to in-house staff
- Continue to provide support as needed

In this way, Advance7 clients gain the immediate benefit of CTT capabilities with the longer-term benefit of growing the capability within its own IT Department.

Payback periods are typically 6 to 9 months in the first year and 1 to 3 months in subsequent years.

ADDITIONAL RESOURCES

ITIL definition of Problem Management:

ITIL Service Operation (2011 edition). The Stationery Office. ISBN 978-0-11-331307-5.

Problem resolution statistics:

<http://www.advance7.com/wp-content/uploads/RPR-Statistics.pdf>

The RPR® Method overview:

<http://www.advance7.com/wp-content/uploads/White-paper-RPR-Problem-Diagnosis-v2.pdf>

Definition of the RPR® Method:

Offord, Paul (2011). RPR: A Problem Diagnosis Method for IT Professionals. Advance Seven Limited. ISBN 978-1-4478-4443-3.

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