

ENVIRONMENTAL PROBLEMS & CRITICAL EQUIPMENT FAILURES ENCOUNTERED IN UK DATA CENTRES AND SERVER ROOMS IN THE LAST 12 MONTHS

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1. Introduction

The purpose of this survey is to attempt to identify the nature and regularity of environmental problems in IT locations. Problems that can be considered a major threat to the integrity of the network infrastructure and, therefore, a threat to system continuity, include air conditioning failure, UPS failure, water leaks, physical security breaches, etc.

The research also attempts to identify the proportion of companies that have some sort of alerting mechanism in place to provide early warning of potential environmental problems and gauge the level to which IT managers are involved in the control and management of these systems.

2. Summary of Results

- 45.7% of IT managers that completed the survey have experienced at least one IT room air-conditioning failure in the last year.
- 13.4% of companies have experienced a UPS failure in the last 12 months
- 8.6% of respondents have suffered an IT room water leak in the last 12 months
- 8.1% of respondents are using an integrated environmental monitoring system to monitor their IT rooms.

3. Methodology

The survey has taken the form of a telephone questionnaire conducted by an independent research organisation during March and April 2007. Of 1664 IT Managers called, 734 were successfully contacted and, of those, 186 agreed to participate in the survey. A cross-section of medium/large-sized organisations were contacted from private corporations to government departments and educational institutions. Several respondents chose to do so via email or post.

4. Survey Results and Analysis

4.1 Air-Conditioning Failure

Probably the most extraordinary finding of the survey is that 45.7% of IT managers questioned had experienced at least one air-conditioning failure in a server room or data centre in the last year. This figure is significant insofar as it highlights how vulnerable system operations may be to over-heating caused by air-conditioning failure.

As the heat output of hardware continues to rise in computer rooms, the need for air-conditioning systems to run reliably 24 x 7 is further increased. But if nearly one in two organisations are already experiencing computer room air-conditioning failure at least once a year, this highlights how crucial it is for businesses to have well developed contingency plans to accommodate and deal with these failures.

4.2 UPS Failure

13.4% of those surveyed had encountered some kind of UPS problem in the last 12 months. These problems may not have specifically resulted in downtime but can be classed as 'UPS Failure'. Although the proportion appears relatively high, we should also highlight that many organisations will have multiple UPS and that a single UPS problem will have resulted in a positive 'Yes, we have had a UPS failure' response.

4.3 Generator Failure

Less than 1% of those asked had experienced a generator failure during the past year. Although we did not qualify the number of respondents using generator back-up, it's fair to assume that this would not be 100%. Also, of those using generator back-up, it's probably also fair to assume that not all of these would have been called into 'action' over the last 12 months.

4.4 Physical Security Breach

Just 1.1% of respondents said they suffered a security breach during the last year.

4.5 Water Leaks/Floods

8.6% of those surveyed confirmed that they had suffered a water leak or flood in an IT room in the last 12 months. The nature of water ingress can range from water dispersal from air-conditioning units through to full-blown burst water pipes. The fact that almost 1 in 9 respondents have experienced some form of computer room water leak highlights what a common occurrence this is. The over-riding concern from an IT management perspective is that the nature of a water leak threat is such, that it can easily go undetected until it becomes a much more serious issue.

4.6 Fire

None of those surveyed experience a fire or smoke problem in their IT rooms in the last 12 months.

4.7 Early-Warning Mechanisms

In order to try to identify what measures are being taken by organisations to guard against the above environmental threats, 3 questions were asked:

- (i) Are your computer rooms manned 24 x 7?
- (ii) Do you have an alerting mechanism in place?
- (iii) If 'Yes' to (ii), what is that mechanism?

From the research we were able to identify that 13% of IT rooms were manned 24 hours a day, 7 days a week. 69% of respondents said that they had some sort of alerting mechanism in place although, of these, many confirmed that the alerting mechanism related specifically to a fire alarm system, or security system, rather than an integrated facility designed to monitor a whole host of environmental conditions.

31% of the respondents who confirmed they had an alerting mechanism in place, were unable to identify what that mechanism actually was. This is possibly the result of a legacy system being used, or the control of that mechanism being the responsibility of facilities personnel rather than the IT department.

Based on additional information gathered, we were also able to identify that only 8.1% of the organisations that took part in the survey were using a fully integrated environmental monitoring facility to monitor temperature, water, smoke, security, power, etc.

Of the respondents that said they had no alerting mechanism in place, 78% of these had considered, or were currently considering, the implementation of such a system.

5. Conclusions

The following significant conclusions can be drawn from this research:

- With nearly 46% of IT Managers confirming they have experienced at least one air-conditioning failure in the last year, it is apparent that aircon failure is an extremely common occurrence. Consequently, it poses a very significant threat to the well-being of data-centres and server rooms. IT Managers may not have responsibility for air-conditioning systems in their IT rooms since this may be the remit of facilities personnel, but ultimately, an air-conditioning failure leading to hardware over-heating can have a significant impact on system continuity.
- Although, based on the research, incidences of physical security breaches and fires are low, the survey has identified that water leaks (8.6%) and UPS failures (13.4%) are both much more common occurrences. Several companies researched had implemented water leak detection systems, although many of those had already suffered water leak/flood problems in the past. IT personnel should be aware of the threats posed by both of these conditions.
- Only 8.1% of respondents could confirm that they have a mechanism in place to provide early-warning notification of over-temperature (air-conditioning failure), water leaks, UPS/generator failure, and other environmental alarms, in addition to fire and security. Consequently, many organisations are not currently very well equipped to manage problems such as air-conditioning failure, as soon as they occur. This can have catastrophic consequences for sustained network operations and system continuity. A large proportion of those organisations researched (69%) were able to confirm that they have some form of early-warning alarm mechanism in place. However, on further analysis, it is apparent that these systems typically relate specifically to the building fire alarm or security alarm systems.
- It is also apparent from the results that many IT departments do not have responsibility for the maintenance and well-being of air-conditioning systems that are absolutely vital to the integrity of IT system operations. Consequently, alerting mechanisms that may provide vital early-warning to IT personnel of impending problems are not necessarily being controlled or managed by them.

APPENDIX I

IT Manager Questionnaire

Research into Data Centre / IT Room Environmental Threats

1. Have you experienced failures of any of the following in the last year?:

Air conditioning

UPS

Generator

2. Have you experienced any of the following in your computer room in the last year?:

Security breach

Fire

Water leak or flood

3. Is your computer room manned 24 x 7?

4. Do you have some form of alerting mechanism in place should any environmental alarms such as temperature, fire, water leaks, etc. occur?

5.1 If 'Yes' to Q4, what product or system do you use to do this?

5.2 If 'No' to Q4, have you ever considered using some form of monitoring and alerting system?

APPENDIX II

Survey Results Summary

Critical Equipment Failures in the Last 12 Months	
Air-Conditioning	45.7%
UPS	13.4%
Generator	0.5%
Security Breach	1.1%
Water Leak	8.6%
Fire	0.0%
Management of Alarms & Alerting Mechanism	
Room manned 24 hours?	13.0%
Is there an alerting mechanism in place?	69.4%
Respondents that specifically identified that they have an environmental monitoring system in place	8.1%