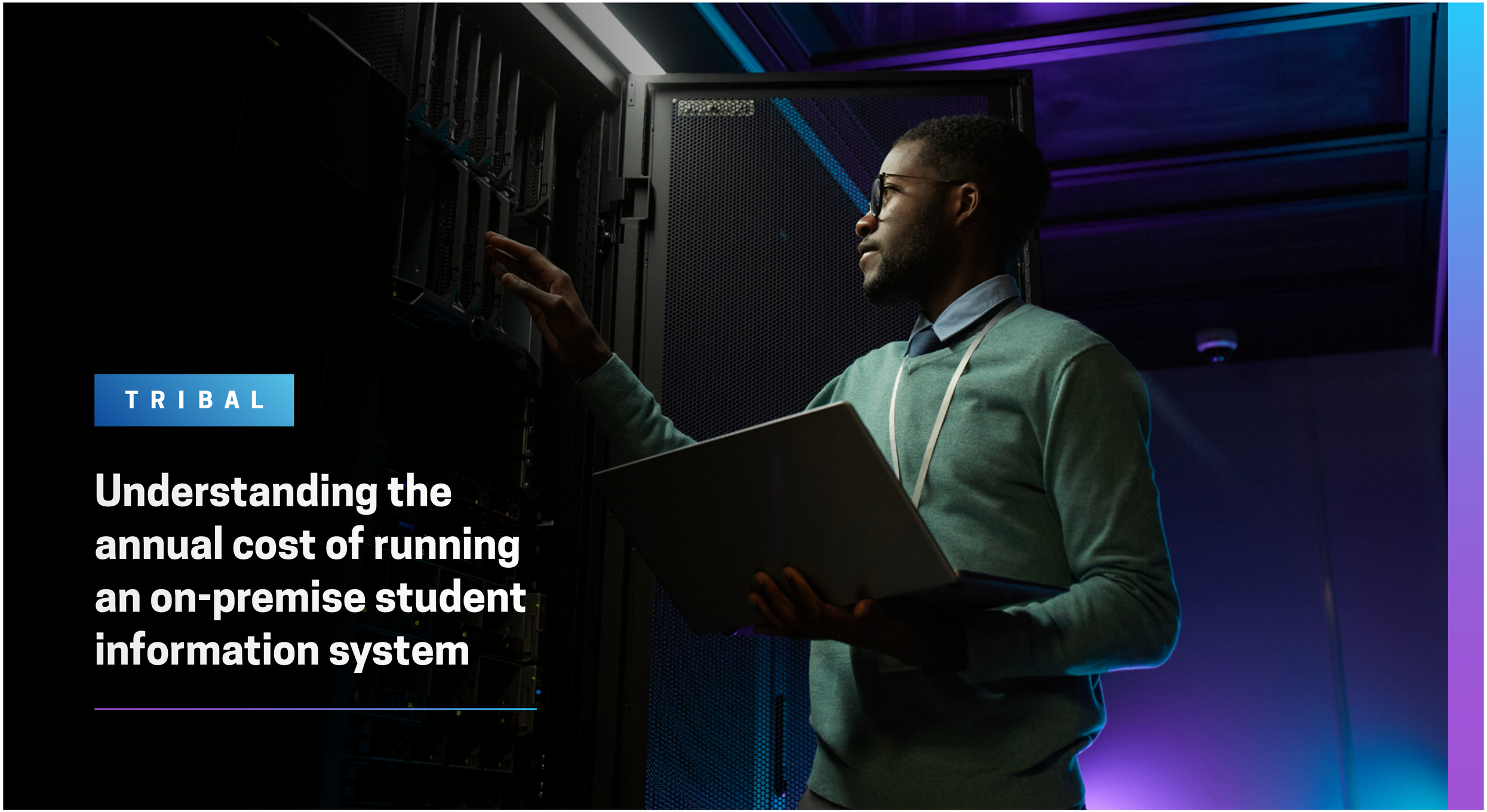

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Understanding the annual cost of running an on-premise student information system

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Introduction

This whitepaper explains how the real cost of the on-premise implementation of a student information system (SIS) is often significantly underestimated.

This document identifies each direct cost element associated with an on-premise SIS based on our experience gained over 20 years supplying software solutions to Higher Education.

Where possible, we have considered scenarios for as wide a range of institutions as possible, based on metrics such as size, together with the complexity of existing systems and structures. In addition to the direct costs that can be validated easily, there are other factors that can drive significant unaccounted costs and impact revenue associated with an on-premise implementation that we will highlight as an integral part of our analysis.

We hope that this document helps you evaluate the implications and opportunities that a better understanding of these costs brings, along with potential next steps.

Assessing the cost of a current on-premise implementation

There are established ways to determine the cost, but even then, factors can be omitted - underestimating the actual cost. Besides cost, one also needs to consider upgrades, availability, and security, which all have a significant impact. Mitigation of these factors may be limited by the on-premise implementation of a SIS and the resources available within an institution with the necessary skills and experience.

In this assessment, we will focus on those elements that it's possible to estimate without more extensive analysis of the situation within a particular institution and therefore, this is likely to be an underestimate of the actual cost. For example, the impact of downtime can be estimated more easily than the impact of a disaster recovery (DR) event in terms of attributing this to an on-premise implementation. Still, compelling evidence suggests an increased likelihood of an extended period of system unavailability should a DR event occur with an on-premise implementation.

Direct costs

- **Infrastructure and datacentres**
- **Software licensing**
- **Resourcing**

Infrastructure and datacentres

The following should be considered:

- **Server hardware and ongoing maintenance**
- **Network hardware and ongoing maintenance**
- **Power consumed including for cooling**
- **Cost of facilities**
- **Storage facilities and backup**
- **Security facilities**
- **Monitoring facilities**

Infrastructure is typically purchased and depreciated over a 5-year period, which provides an amortised annual cost. In addition, hardware support should be considered, and this is typically 10% of the purchase price per annum.

Shared infrastructure such as networks and firewalls should be considered as well as infrastructure directly related to the SIS such as storage systems, application servers, web servers and load balancers.

Software licensing

The following should be considered:

- **Database licensing**
- **Operating licenses, Citrix (or other remote application delivery technology) and support**
- **Licensing and maintenance for other elements virtualisation software, security software, service management software etc**

Resourcing

Infrastructure management

Managing network, infrastructure servers and other infrastructure. Duties include building new infrastructure, maintaining existing infrastructure, troubleshooting issues, patch management, failover testing, log management of the infrastructure and capacity management.

One can estimate the FTE or base it on application servers supported, and it's typical for one FTE to be able to support infrastructure for 30 application servers.

Operating system administration

This includes managing the operating systems of the servers within the implementation and includes hardening and securing the operating system, maintaining the servers through patches, monitoring the servers and tuning the operating system.

Again, this can be based on known FTE or be estimated from the number of application servers supported, it's typical for one FTE to be able to support 50 application servers.

Application and database management

Duties include management of the application and the underlying databases including installation, configuration, tuning and security management. Trouble shooting issues and problems are part of the role as is monitoring and performance management. Undertaking annual upgrades and planning for key events and pre-scaling of the infrastructure as needed are also within this role.

It's typical for one FTE to be able to handle up to 10 application servers and their associated databases.

Architecture support

To cover periodic refreshes of the infrastructure and design including updates to the design and architecture to handle continuous improvement to leverage new technologies and address evolving university needs. Key to this is the monitoring of security threats and the updating of the architecture and design to addresses these.

Typically, there is about 0.3 FTE of architecture support for a SIS implementation.

Security monitoring, investigation and mitigation

This includes monitoring the environment and application for potential attacks and scanning the environments for potential vulnerabilities. Any security incidents need to be investigated which can be time consuming.

This will not require a full-time resource since these activities are likely to be undertaken by a central group covering all applications and infrastructure and so the number of hours taken to undertake these activities at average resource cost rates can be used.

Other activities

These include 24/7 cover to ensure the service is maintained around the clock. In addition, the resourcing needed to recover from outages and disaster events need to be considered and these typically pull in a wider range of resources when they occur. DR plans need testing each year and this will require planning and additional resources for testing.

Other factors to consider

- System performance/availability
- Upgrade process
- Disaster recovery
- Student experience

System performance/availability

Maintaining SIS performance and availability during normal operations is important in reducing the costs of downtime and optimising the use of specialist IT resources. This becomes critical at high load events such as clearing, enrolment or results announcement, when poor performance and outages would have the most impact.

This can be mitigated to an extent depending on the level of product and application knowledge. Greater product and application knowledge can help deliver better performance via application tuning and optimisation. However, this is becoming more difficult to achieve with increased complexity and specialist IT resources leaving Higher Education.

To assess the cost of this factor we need to look at the frequency of outages and their expected duration. From this we can calculate the cost of the time taken by technical resources to recover from the outage and the cost of lost time for the users of the application while it is not available. There could also be a significant impact on the student experience and wider reputational impact that is harder to quantify.

Upgrade process

While the value of keeping current is clear, the cost of the upgrade process each year is not insignificant, and some institutions struggle to complete upgrades on time due to a lack of product and application knowledge.

Extended User Datagram Protocol (UDP) testing can last several months before an update is deployed, which uses the limited specialist resources and the opportunity cost associated with this becomes high.

Disaster Recovery

Disaster events are, thankfully, historically rare but when they do occur, then they typically have an enormous impact on the organisation due to lost productivity during an outage, the costs of recovery and the lost opportunity cost of the activities and projects that are delayed due to the Disaster Recovery (DR) event. There is of course, the reputational impact of an outage on internal stakeholders and potentially external ones as well.

After making assumptions about the frequency of DR events with the current on-premise implementation. It is possible to quantify the cost of lost productivity.

It is hard to put a cost on reputational impact, but it could be significant. Some figures suggest that it can reduce admissions of new students by more than 1%.

The impact of increasingly sophisticated and frequent cyber-attacks means that disaster events are becoming more likely in HE. This puts an enormous strain on existing resources to stay ahead of the hackers and the impact of a Distributed Denial-of-Service (DDoS) attack can be catastrophic in terms of the costs and reputational damage. An on-premise implementation is generally more vulnerable than an equivalent cloud-hosted implementation.

Student experience

Maintaining a solid student experience is a key aim of all universities and a core objective of the IT department, but how can this be quantified? The performance and reliability of the service will contribute to this but also the ability to quickly push through initiatives aimed at improving student experience will help. Often these have been held up previously by stretched resources too focussed on running the existing SIS.

Institutions that do not adapt in an increasingly competitive sector will find that they are not able to attract the best candidates.

Expectation levels of incoming students have never been higher and how they research their choices has moved on.

Want to understand the annual cost of running an on-premise student information system?

AN EXAMPLE;

Assumptions

- Salary for infrastructure of application engineer: **£45,000 pa**
- Salary for a team manager: **£75,000 pa**
- Salary for architect or similar: **£85,000 pa**
- Employee salary burden rate: **33%**
- Application downtime pa: **1.6% (5.84 elapsed days)**
- Probability of a DR event (datacentre level failure) in any year: **5%**
- Duration of DR event: **30 working days**

Assumptions based on a university with 25,000 FTE

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https://www.tribalgroup.com/cloud-book-a-call

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COST ELEMENT	DESCRIPTION	COST PER ANNUM
Infrastructure and datacentres	▪ Datacentre capacity (30kW) ▪ Power assumed (20kW) ▪ Infrastructure costing £200k with a life of 5 years and 10% maintenance pa	£38,900 £20,000 £60,000
Software licensing	▪ Database license ▪ Operating system and Citrix licenses ▪ Security, backup, monitoring and other software	£40,000 £50,000 £25,000
Resourcing	▪ 2.5 FTE covering infrastructure management, networking, application management and dba activities ▪ 0.3 FTE architecture support including periodic refresh ▪ 0.4 FTE of management overhead ▪ Facilities, personal equipment and accommodation at £12k pp pa ▪ Out of hours support and callout at £6 per hour on call and £40 per hour on call out	£149,625 £33,915 £39,900 £38,400 £41,856
Direct Costs (Sub-Total)		**£537,596**
Upgrade costs	Annual upgrade costs	£100,000
Lost productivity from downtime	Based on 100 concurrent administrative users	£101.487
Lost productivity from DR events	Based on probability of DR event (5%), duration 30 days and 100 concurrent users	£40,800
Other Factors (Sub-Total)		**£242,287**
Total (Direct Costs + Other Factors)		**£779,883**

Implications and opportunities

The increased threat of cyber attack

Higher education is experiencing an increased threat of cyber attacks, with hackers targeting universities more frequently with more sophisticated techniques. This raises the prospect of increasing the probability of a DR event and that the impact of this would continue over an extended period. Based on the assumptions within the example, we have considered the cost impact due to lost productivity. However, the reputational damage of a data breach that limits access to the SIS during critical events like clearing could result in reduced revenue over a period of years through lower admissions. Even a drop in admissions in the order of 0.5% to 1% will impact revenue significantly for many institutions.

An on-premise implementation has some inherent vulnerabilities. Keeping one step ahead of the hackers and maintaining the systems at a high level of availability and performance is resource-dependent. Some of this can be outsourced to companies offering Disaster Recovery as a service, but this will potentially only get you back up and running more quickly rather than prevent the DR event itself. In order to minimise the probability of a DR event in the first place, a world class security capability should be deployed.

Adaptability of on-premise implementations to change

Like many other sectors, Higher Education has been impacted by the COVID-19 global pandemic. The shift to remote and hybrid learning alongside delivering/maintaining applications and services such as a SIS has been challenging. For some institutions approaching the end of the data centre hardware cycle, additional unforeseen costs have been incurred to extend warranties, for example. Analysis suggests that the pandemic increased a typical university's costs by 4% and reduced income by 1%. Institutions that were already more advanced in their digital transformation journey were most likely impacted less than others, as they could adapt to the necessary changes more quickly.

One area of upcoming change is the target to reach net-zero carbon emissions by 2030 within the sector. Running a data centre on-premise is a significant contributor to an institution's carbon footprint, and it is vital to consider the implications of achieving these goals. Even a very efficient data centre would not be able to match the optimised cloud-based systems. The example indicates that the data centre capacity (sized for up to 30kW) and energy consumption (20kW) are significant cost drivers. These figures were calculated without considering the anticipated increased energy costs coming in 2022. It is worth noting that from the perspective of reputation, the green credentials of an institution are becoming more and more important to prospective students and will factor into their decisions and potentially impact potential revenue by increased admissions.

Now more than ever, a SIS needs to be scalable to adapt to large increases in student numbers as well as being accessible in more places, whilst maintaining security.

Implications and opportunities

Delivering the best student experience

Expectations of the HE experience in the 2020s and beyond are evolving and reflect our modern behaviours as digital consumers that engage in detailed internet-based research about an institution before noting any interest in applying. The experience of a prospective student, through the entire process, needs to be optimised to ensure the best candidates are engaged and supported to deliver the best possible outcomes.

A world-class SIS plays an integral part in the student experience, and it is critical that this can support the expectations of 24/7, 365 days a year availability of systems. Anything that can improve current ratings from students regarding value for money (44% of students rating value for money as poor) and improves retention (on average in the UK, 937 students drop out every day) will positively impact an institution's reputation and potential revenue.

This also presents a massive opportunity for institutions ready to leverage their SIS to increase admissions and revenue against the knowledge that UK applications are set to reach one million in 2025. An admissions team will likely need to process on average 37% more applications and student queries than they do now, and PQA could see this increased number of admissions being processed in eight weeks.

The impact of specialist knowledge leaving the HE sector

The need for specialist knowledge in handling on-premises implementation of a student information system has never been more critical. Still, this knowledge is leaving the sector via retirement and a wealth of opportunities to join large tech companies with significant resources.

The challenge this presents is that nobody coming into Higher Education IT departments sees any value in learning the necessary skills to manage these applications and develop knowledge that would drive greater application tuning and optimisation to deliver better performance. Ultimately, new recruits don't see a future in developing skills around managing on-premises systems and applications.

This is exacerbated in institutions that may already have severely limited bandwidth/expertise in this area. This can be evidenced by the process of updating systems to the latest release, which can take a lot longer than expected - any impact on interfaces with other systems resulting in extended testing and resources.

Just 'keeping the lights on' with ageing IT infrastructure/systems is not very rewarding for highly skilled IT personnel. In the 'Great Resignation' age, there is an expectation that salaries for skilled IT personnel will need to increase, which would impact figures used in the example.

Conclusions

The annual cost of running an on-premise student information system implementation is likely to be significantly under-estimated.

Skilled resources critical to the optimal performance of an on-premise implementation of a SIS are leaving the sector in large numbers. This leaves institutions vulnerable to more frequent and more prolonged outages and protracted upgrades, which will increase costs.

The need to reduce the probability of a Disaster Recovery (DR) event is becoming more critical as the average cost of a data breach has risen to £3.4 million. Achieving this is difficult with limited resources and on-premises architecture.

Giving key personnel the scope and time to deliver the best possible student experiences can be extremely difficult if all they do is 'keep the lights on'. This limits potential revenue growth because there isn't the bandwidth to tackle rising drop-out rates or cope with more admissions.

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Next steps

If you would like to learn more about what this paper might mean for your institution, we have developed a calculation tool that can provide an estimate like that provided in the example.

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