



Cloud Computing within the Education Workspace

BY DIMENSION 2

The background of the slide is a photograph of a clear, vibrant blue sky filled with large, puffy white cumulus clouds. The clouds are scattered across the frame, with some appearing closer and more detailed, while others are further away, creating a sense of depth. The lighting is bright, suggesting a sunny day.

Introduction



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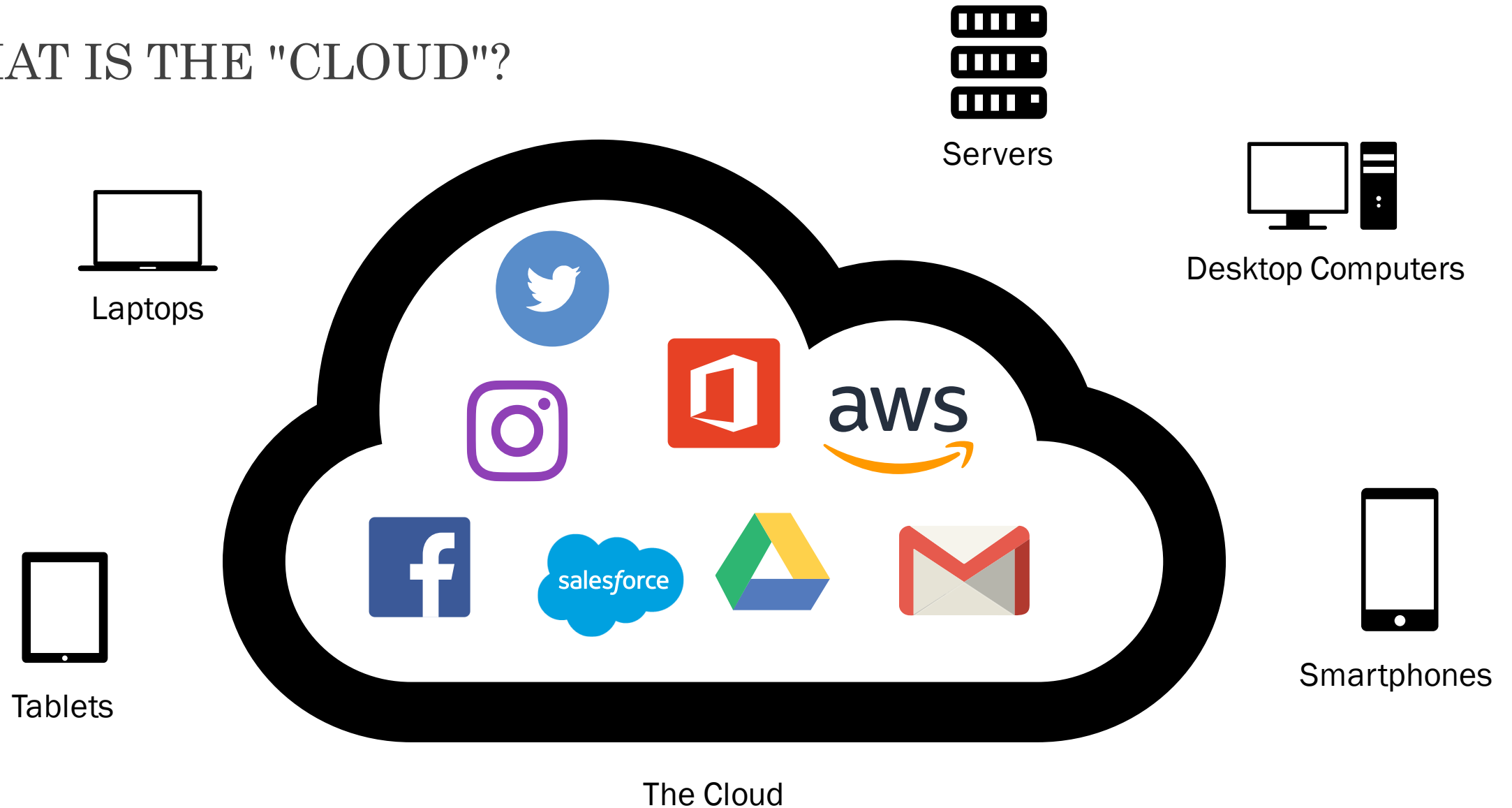
A magician in a dark tuxedo and a bright red bow tie is shown from the chest up. He wears white gloves and holds a black wand in his right hand, pointing it towards a top hat held in his left hand. The hat is tilted, and a bright, glowing light emanates from its interior, surrounded by numerous small, sparkling particles that float upwards. The background is dark and textured.

WHAT WE PLAN TO SHOW?

A bright blue sky with large, fluffy white clouds. The clouds are scattered across the frame, with a particularly large, dense cloud formation in the lower half. The text 'The Cloud' is centered in the upper half, overlaid on a cyan rectangular background.

The Cloud

WHAT IS THE "CLOUD"?



CLOUD LAYERS



Software as a Service (SaaS)

Provides always accessible software from the web browser over the internet.
E.g. Email, communication, games, I.e. Gmail, Facebook



Platform as a Service (PaaS)

Create own tools that are distributed over web.
E.g. Web servers, databases, development tools, I.e. Salesforce Lightning Platform



Infrastructure as a Service (IaaS)

Provides infrastructure to work on.
E.g. Network, servers, virtual machines, etc.
I.e. Amazon Web Services



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Benefits

BENEFITS:

- **Books:** Makes access to books more affordable for students and it is good for the environment.
- **Hardware:** No need to have hardware in house as data is stored online.
- **Software:** Software is more affordable for students due to the Software as a Service model.
- **Opportunities:** Students that are unable to attend Universities, Colleges or schools are able to earn their qualifications online



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Financial



FINANCIAL BENEFITS OF USING THE CLOUD

- Scalable hardware means that you only pay for what you use – in a college for example there will be many times where facilities are not being utilised whereas the cloud will constantly be being used.
- Money will be saved through not having to have a physical college (all the costs that come with the upkeep of building will be saved).
- Money will also be saved by streamlining the workforce. This means cutting out non essential people, so for a college we only need the teachers and IT department for the upkeep of the systems.
- By using cloud services, the government will not have to invest upfront to buy IT infrastructure, which again saves money to be invested elsewhere in the education sector.




COSTS OF USING A CLOUD BASED SOLUTION

- There is less cost agility with using SaaS as if clients pay for more licences than needed, then that money has been wasted, however, in a college, each year the college will know how many students are starting and how many existing students there are, so can buy the exact amount needed. If people leave the college that licence becomes spare, which can be used for students that may transfer to the college.
- Higher subscription fees will potentially make a cloud based solution more expensive in the longer term (after five or so years). With the cuts made by the college in not having to have the building or any maintenance staff the money saved there will ensure that this is not the case.



THE SET-UP

- With the education budget for Stoke-on-Trent coming to £98 million, a lot of this money will be saved by removing the schools as you don't have to pay maintenance or pay for the plot of land.
- Implementing our solution will cost around £5 million this includes giving students out thin client and setting up the services with the correct privileges. With this money you would either be able to set up your own server to host it from, so you know where the data is being kept or use a service already provided.
- The teachers will still need to be paid as they will still be preparing lessons and film/livestreaming them for classes.
- Money will be saved on not needing to upgrade computers and not employing people that maintain the building.

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Problems



PROBLEMS

- Server goes down.
- No internet. Solution: Have a way to work then upload when you connect back to the internet
- Impacts of downtime: Students will be unable to work while the server is down whether this is for maintenance or a problem.
- Missing files
- Training staff and students Solution: IT staff will have to be more specialised to deal with servers for cloud computing, teachers students will need to learn essentials.



PROBLEMS

- On-going costs. Solution: Saved money from not upgrading the computers will cover the cost of the server maintenance.
- Hacking/Data safety: If a cloud provider hosts multiple clients if there is a threat against one that gets to the main server it affects all other clients. People with malicious goals can cause many of the computers to be useless with a distributed denial of service attack.
- Data Portability: From current businesses that use cloud-based systems complain about being locked in to the cloud technology and cannot switch without restraints so must have the capability to integrate efficiently
- Transparency of service provider: You don't know the exact location where your data is being stored or processed.



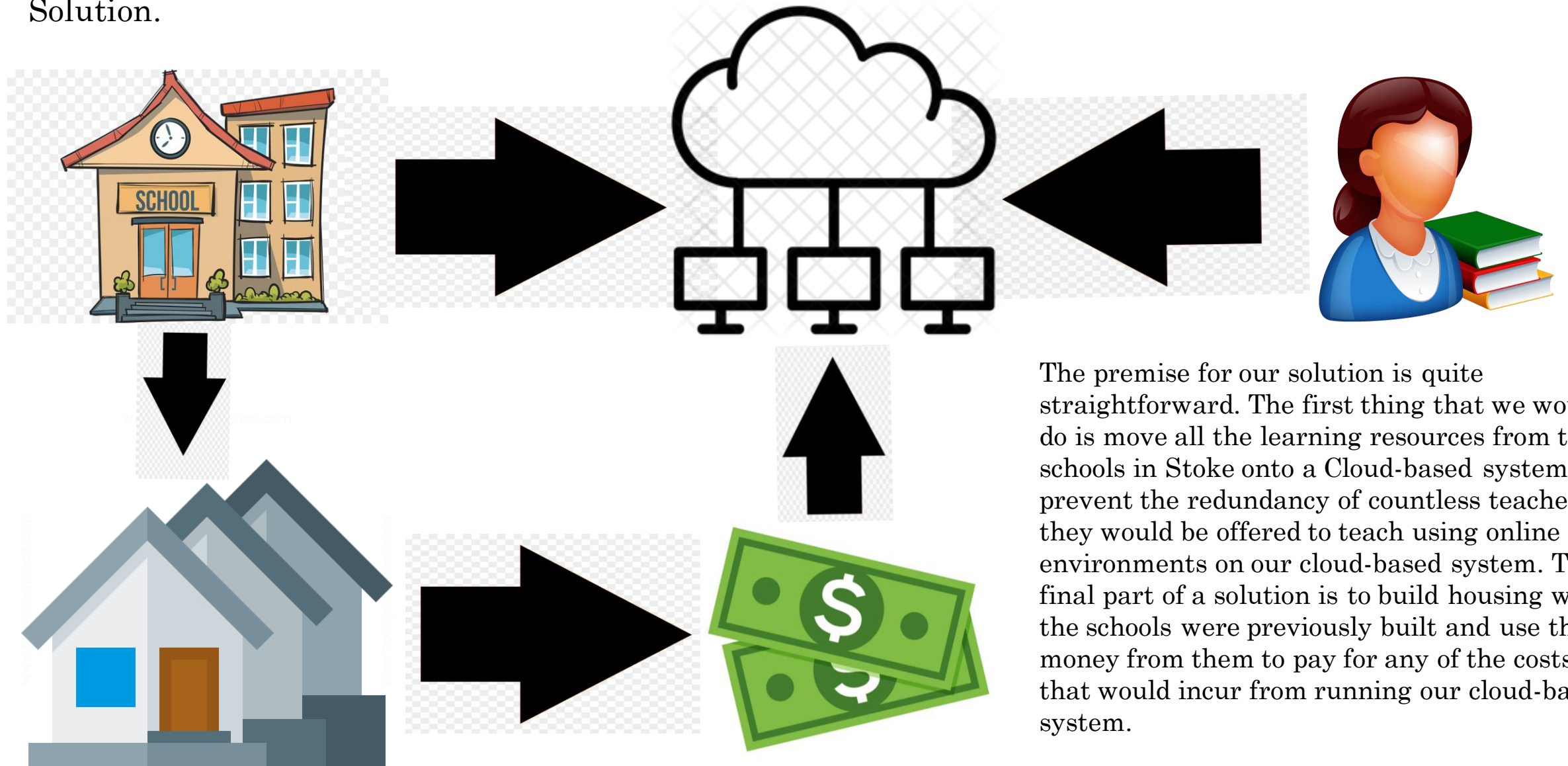
PROBLEMS

- Time taken to implement. Solution: Implementing the system should be done in one of 2 different ways, over the summer all at once or slowly testing with a certain class for example IT or Computer Science then to other departments as they will be the ones using the system the most.
- With our proposed solution, we have the problem of what to do with the buildings
- Not everyone will have computers.

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System Overview

A System Overview of Our Recommended Solution.



The premise for our solution is quite straightforward. The first thing that we would do is move all the learning resources from the schools in Stoke onto a Cloud-based system. To prevent the redundancy of countless teachers they would be offered to teach using online environments on our cloud-based system. The final part of a solution is to build housing where the schools were previously built and use the money from them to pay for any of the costs that would incur from running our cloud-based system.



Plan/Technical



VIRTUAL MACHINE

We plan to use Microsoft's Azure cloud platform to host all virtual machines

Reliable – Run by Microsoft

Secure – Locking down the firewall settings

Safe – Only approved IT staff will have access to the Azure portal

Scalable – Easy to add more resources



USING YOUR CURRENT SERVERS

We plan to use DFS and read only domain controllers to have faster load times when on site

This way even if the internet at the teaching location goes down the staff there will still have all their data



THIN CLIENTS AND REMOTE DESKTOP

Students get thin clients with access to a remote desktop server on the Azure cloud platform.

For added security we suggest using Cisco Duo a duo factor authentication app that you can get on your phone

We suggest that teachers still have full-fledged desktops, but for security we will be using file redirection with no active sync, so even if the PCs get stolen there will be no important data on them, application data will not be synced due to loading times



BACKUP AND REDUNDANCY

Backup is something that is a must and we will not proceed without a solution; we plan to use the Azure virtual machine backup solution for block level backups and iDrive for file level backup, allowing easy recovery of data and/or whole virtual machines.

For the physical servers still on site we will use Veeam to back a whole instance of the machine to NAS, we suggest an encrypted back up to USB once a week and then storing said USBs in a safe.

It is important to use two different backup solutions to maximize redundancy proficiency

All critical hardware on site must have a UPS

We also suggest that once a week we test the virtual machines in a closed off environment, we will boot the machines up in a lower virtual machine resource allocated state, then we will run several tests including virus/malware scans, this way the tests can be run during the day without impacting the live servers

DATA STORAGE



We plan to give every student and member of staff an Office 365 and OneDrive for students

Members of staff have sensitive data so they will either need to be on a domain computer with file redirection or using the remote desktop server, we would advise not having client to site VPN access to documents



MICROSOFT CRM

We plan for you to use Microsoft's CRM system, it is cloud hosted and is fully office 365 integrated

This will provide you with a data base to store your most sensitive information, as student's information should not be stored in an Excel document



VOICE OVER IP (VOIP)

We suggest using Microsoft 365 Business Voice which is a cloud VoIP service that will allow your members of staff to call not just from their office tabletop phone, but to use their PCs or their mobiles, with easy voice mail access and call redirect, communication has never been easier.



INTERNET

Daisy wholesale internet

WiFi Cisco Meraki – Cloud managed Wi-Fi

Stormshield/ Sonciwall Firewalls

HPE switches



DNS AND HOSTING

Will would like to move all your DNS hosting to FreeParking and then use Amazon Route 53 for any records that need to be updated often and fast.



STEAMING SOFTWARE

We plan to use Zoom virtual classroom

Both teachers and student can share their screen, live video and file

Live chat

Teaching sessions are recorded along with a live audio transcript

SECURITY

Tread Hosted email security and server/desktop protection

Or Bitdefender server/ desktop protection





SUPPORT

TeamViewer for over the internet connectivity

TightVNC for when TeamViewer is down – Site to site VPN needed

Support company Monday-Friday school times

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The Future



WHAT HAPPENS NEXT

- It will take a few years to implement it fully for the maximum benefits
- Using our solution you would be able to combine the colleges into one as you don't need the physical space for classes.
- Once implemented they will need £150,000 a year for maintenance.
- Teaching costs will stay the same because they will still need to provide lesson through a live classroom, filming/streaming learning materials for the students.

A bright blue sky with large, fluffy white clouds. The clouds are scattered across the frame, with a large, dense cluster in the lower half and a smaller, more isolated one in the upper half. The sky is a deep, vibrant blue.

Questions?