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THE BUSINESS CASE FOR MANAGING END USER COMPUTING



ClusterSeven

EXECUTIVE SUMMARY

Spreadsheets and other forms of End User Computing (EUC)¹ applications occupy the grey zone of enterprise technology. This whitepaper discusses why EUC applications exist in modern businesses, exploring the issues of risk, reputation and cost overheads, highlighted by Chartis², before considering the returns to be gained by the use of ClusterSeven solutions to manage the EUC landscape.



EUCs provide a highly valuable agile capability for businesses, which must be weighed against the concerns of operational costs and potential risks. The principal EUC platform is Microsoft Excel, because it is available immediately, at zero marginal cost and is fast, flexible and familiar. The direct financial costs of EUC in business extend beyond the well-publicized issues of spreadsheet risk and errors. They include other factors such as the problems of inactivity, the issue of key man dependency, poor security and the inefficient use of human capital. A growing raft of financial regulations is also imposing additional costs (particularly BCBS 239, Solvency II and the Supervisory Guidance on Model Risk Management),

as a result of the need to implement additional controls and reporting processes or run the risk of fines and supervision orders.

Additional indirect costs are attributable to the use of uncontrolled EUCs. These include factors such as the loss of business reputation (following EUC related incidents) amongst multiple business stakeholders (including shareholders, executives and clients) and the lack of enterprise knowledge of EUCs, generating additional costs for IT planning and the potential for lost corporate investment. There are six factors to consider in assessing the Return On Investment (ROI) for managing EUC: the business agility provided by EUC, the reduction of financial and reputational risks attached to using EUC, the achievement of regulatory compliance requirements, the improvement of data quality, the improved efficiency of EUC usage, and the improvements resulting from wider corporate knowledge of EUC assets. In considering your firm's response to the need for EUC management it might appear that there is a choice of 1) implementing ClusterSeven EUC management technology, 2) adopting expensive, unreliable manual solutions, or 3) doing nothing and incurring the consequences of excess costs, lost opportunities, or potential regulatory and reputational impacts.

However, once all six categories of ROI have been fully evaluated, it becomes clear that only one option will practically, consistently and efficiently meet all the critical requirements for EUC management.

The only option is ClusterSeven.

¹ End user computing (EUC) is synonymous with other terms such as End User Developed Applications (EUDA), User Developed Applications (UDA), User Applications (UA), User Tools (UT), User Developed Tools (UDT) and Personal Productivity Tools (PPT).
² The Quantification of End User Computing Risk in Financial Services, Chartis.

INTRODUCTION

This white paper looks to analyze why businesses use spreadsheets and the value they provide. Undoubtedly, this value comes with costs, including potential risks. Only by considering value alongside costs can one consider enterprise approaches to management that will maximize value and minimize costs. This is not an impossible goal – it has already been achieved by firms operating in the most financially complex environments – so is a realistic ambition for all.

The spreadsheet – and for most readers it will be concerns surrounding the business use of spreadsheets that will have brought them to this paper. In practice, the spreadsheet is just one example of a class of software that shares characteristics in terms of usage, value, cost and control. This class is known as ‘end user computing’ or EUC.

What is an EUC?

EUCs have been defined as “systems in which nonprogrammers can create working applications”. For the purposes of most businesses (and particularly financial services firms) this definition is not satisfactory as many of their EUC applications are created by persons who are extremely capable programmers. This paper therefore advocates that a more useful definition for businesses is “systems in which individuals can create working applications outside the segregated development cycles (design, build, test, release) typically employed by professional software engineering teams” – i.e. it is not the application itself that is good or bad, it is the way it is used that creates the issues.

Microsoft Excel® is the most pervasive example of EUCs, but they occur wherever users are technically capable (but not necessarily fully competent) to create their own business applications. These range from other Microsoft

Office solutions such as Microsoft Access to modelling languages such as MatLab, data extraction such as SQL scripts and reporting/visualization platforms such as QlikView and Business Objects. Many are promoted as ‘better’ replacements for Excel. No doubt in their area of specialized functionality they offer richer capabilities. However, once widely adopted by the user base outside IT and its formal development processes, their power for value and potential for risk and cost is just as great.

The growing technical capabilities of many professional workforces is also leading to an increasing variety of the EUC problems. Many graduates will have used modelling languages beyond Excel before they enter employment and hence see these skills as part of the knowledge they bring to the workplace and hence not to be left at the door.

From an enterprise solution perspective it makes sense to consider how to manage all applications that share the common issues of EUC. However, the ‘elephant in the room’ is the spreadsheet which in most businesses means Excel. For this reason many of the real life risks and problems discussed in this whitepaper are drawn from this application. Nonetheless, any application that aggregates and manipulates financial information using code that is not developed under proper IT methodologies will demonstrate similar value and risks.



THE VALUE OF END USER COMPUTING

So why do employees use EUCs? Quite simply, the language of all financial processes is in numbers and only the very simplest of numerical problems can be communicated without any form of documentation. Users must therefore turn to some form of technology to conduct, record and present their analysis.



THE LIMITATIONS OF EXISTING CORPORATE SYSTEMS

For any new financial analysis, the preferred option ought to be the existing enterprise financial systems as these are the fully tested and approved locations for working with corporate financial information. But, almost by definition, if the financial problem has not been addressed before, then the existing corporate systems probably do not provide the required functionality – i.e. there is a gap between what the system can do and what the user needs.

Gaps between corporate systems and user requirements are inevitable. Even if the latest version of the software provides the required functionality, it may not be available internally as enterprises are rarely on the latest version. Moreover, the anticipated timetable for upgrading to this next software version, with the required functionality, may be many months or years into the future. How long can the user wait if the business problem they want to address is here, today?

Gaps in corporate systems could, alternatively, be addressed by extending them through additional internal software development. However, such projects will usually require formal project proposals with business justification, costs and timetables. Even if the user has the time and patience to complete these submissions, it is common that prioritization against other business needs will delay or prevent the approval of resources for their project.

There is also the mundane possibility that the functionality required by the business user already exists

in the corporate systems, but due to lack of training, misunderstanding or forgetfulness, no one has this awareness.

Faced with these challenges, real or anticipated, it is not surprising that business users look for other ways to achieve their goals. In looking to their own resources, rather than enterprise systems, they need an available, capable technology with which they are familiar and within their budget (i.e. none). For most business users these constraints reduce the available options to a single one – Excel.

At the end of the day and most importantly, the business problem gets solved, with no budgetary impact and the user moves on. Of course, if this new EUC solution proves valuable then it may be re-used and/or shared. In so doing, it enters the systemic fabric of the business and becomes a production or operational EUC.

The train of events described above can be considered as the reactive use of Excel in the enterprise. While those responsible for enterprise control and transparency may dislike this route, the practical reality is that the business gets the data analysis it needs. Nevertheless, however negative this might seem, the only other option – i.e. do nothing – might cause the business to stall an outcome far more immediate and almost certainly worse. In such situations, a spreadsheet is much, much better than nothing.



HOW TO BE AGILE

There is an alternative, positive interpretation of the above. If a business user can see the need for a new piece of financial analytical capability through a particular piece of innovation or insight, it is likely that such an idea will need time to develop and mature.

At such an early stage it would be difficult for the business user to fully specify requirements to enable a software engineer to build a solution, even if central IT resources were available. This is not the fault of either side. It is easier for the business user to build and tear down ideas than to continuously ask a software engineer to start again. Besides, the market opportunity may be limited or disappear without being truly exploitable. A senior budget holder cannot afford to throw money at every concept, nor chop and change development plans as new, unproven, ideas emerge and decay. Businesses need technology sand boxes for ideas to be battle hardened and mature to the point where it is worth spending hard cash on a full system extension. By building the idea into a EUC, it is possible to continuously develop and improve it, creating a solution that fits the business need.

All these positive elements provide that highly prized business capability – agility, in this case the opportunity to locate and exploit a business opportunity such as revenue, efficiency or insight. There is little doubt that, when it comes to supporting financial innovation by employees, EUCs and spreadsheets in particular, have no competitor.

Of course, few would challenge the concept of using the spreadsheet as a non-production prototype. In practice, however, the process of battle hardening and maturing the concept requires exposure to real data and market conditions.



Any interesting prototype will almost inevitably slip into production to prove its underlying concept – the need for agility and innovation does not stop with the first encounter with live conditions. For the user and the spreadsheet, the transition from non-production prototype to agile production application may well be uneventful. However, from an enterprise perspective, this transition is critical and is the point at which enterprise awareness and controls become important.

THE COSTS OF END USER COMPUTING

The costs of EUC can be divided into three categories: the first of these are the direct costs and risks. These are the easiest to understand as they have, or may have, a demonstrable impact on the finances of the business, either on a systemic basis because they contribute to ongoing operational costs, or when potential risks actually materialize as financial loss events.

The second category of costs are regulatory requirements and expectations. These costs are realized either by the implementation of added operational processes to satisfy regulations, or when the failure to satisfy these requirements leads to fines, extended audits and/or external monitoring (e.g. Section 166 projects in the UK). The Chartis report provides a summary of specific regulatory references to EUC

and spreadsheets. However, these specifics are only part of the broader data quality requirements of these regulations. Firms should therefore understand the implications of these data oriented regulations for EUCs as part of critical data flows, alongside their practical existence as separate, individual files. This will ensure that firms' EUC control approaches align with both the letter and the spirit of these regulations, thereby avoiding the possibility of additional control costs at a later date.

The third category of costs are the indirect losses that may be introduced into the rest of the business because of the use of EUCs. This includes the potential for loss of reputation and the fact that EUCs create local knowledge that is not easily shared with other parts of the business.

These categories of costs are explored in more detail on the next page.



THE COSTS OF END USER COMPUTING

Errors

Spreadsheet errors can be divided into those that have always been embedded in the spreadsheet (by virtue of its original design or construction) and those that are introduced as a result of subsequent activities. This is because the processes and technology for reducing risk in these two categories include different requirements – for example it is easier to analyze changes from a known base state, than detect fundamental integrity issues such as flawed logic.

It may be noted that some frauds have been perpetrated by introducing incorrect changes (e.g. for the purposes of bonus calculations) and then over writing them with the correct changes once the incorrect numbers have been propagated into other systems. This demonstrates that risk can be dynamic and cannot necessarily be addressed by widely interspaced audits.

Inactivity

For newcomers to EUC operational risk, the primary concern is that a user will accidentally or deliberately create or alter an EUC to produce an incorrect result.

Therefore, the concept that an EUC can go wrong when nobody does anything to it may seem counter intuitive. However, it should be noted that most EUCs are only 'live' applications when opened, data populated and calculations refreshed. If any of these actions are omitted, the results may be erroneous. This may be the accidental result of staff on vacation or a deliberate attempt to avoid bad news. For example, during the financial crisis it was common for spreadsheet valuations of illiquid derivatives to go untouched as the owners knew the results would be unwelcome.

Key man dependency

One of the greatest risks of operational EUCs is that knowledge of their structure, appropriate operations and even their very existence may be very limited and localized within a business.

This is because documentation is usually scant to non-existent. EUCs are commonly created by one person and problems are usually referred back to the originator as the sole source of true understanding long after their creation. When the creator and any knowledgeable operators have moved on, any misuse can lead to problems that may be hard to recognize (such as incorrect results) and difficult to recover, leading to expensively stalled operations. Often the only solution is to rewrite the application from scratch.

THE COSTS OF END USER COMPUTING

▶ Security

It is often stated that end users are the weakest security link in all technology environments and EUCs are no exception.

The security risks attached to EUCs fall into four main categories:

1. **The inconsistent use of passwords.** Modern Excel passwords are very secure. However, for many users, EUC passwords, even when known, are an obstacle to rapid access. When dealing with multiple EUCs and multiple users, password administration can become arduous. The result is that passwords are only infrequently used.
2. **Their powerful capabilities as data consumers.** Many operational EUCs depend on extracting data from other operational systems. In order to do so the data connections will often adopt 'backdoor' protocols, based on unencrypted passwords and user names. This means that, in the event an EUC were to come into the possession of unethical users, the security of these other data sources would be compromised.
3. **The lack of awareness by systems administrators about the potential importance** of the firm's EUC population. This is hardly surprising, given that the EUC population will probably run to many millions, of which only a small percentage will have any critical or sensitive content. For those in charge of applying user access control permissions to files or folders, they are unlikely to have the facts to know whether certain permissions should be granted, withheld or deleted, particularly as users move between departments in their career. Only the business has this knowledge.
4. **Data leakage inside and outside the organization.** EUCs are very transportable applications, whether attached to emails or held on a memory stick. Once sensitive data is in a spreadsheet or similar application – for genuine business or malevolent reasons – it is very easy for this data to be transferred to others. Data leakage prevention technologies can significantly reduce this risk but their usage is still limited.



THE COSTS OF END USER COMPUTING

Inefficiency

Many operational EUCs are created to solve operational gaps that cannot be met by existing systems. In so doing, their creation usually delivers a significant improvement in speed, reliability and costs compared to the absence of any technical solution. However, this does not mean that the solution is in any way ideal.

The use of the EUC may still require manual operational processes such as data aggregation and filtering. These problems may be compounded when the EUC solution is handed on to new owners over the coming years, as these new users may not be sufficiently familiar with the EUC to operate it efficiently or reliably.

The recognition of the time taken to reliably operate an EUC, including the resolution of any problems, can be considered as the opposite side of the coin to the operational risks discussed by Chartis. Most errors are noticed by diligent and intelligent users before the erroneous results are passed on – i.e. the cost of the risk is replaced by the extra costs of operation. This explains why the manifestation of spreadsheet risk in actual financial losses is much rarer than the underlying occurrence of errors. Of course, the detection and remediation of these errors is extremely time consuming, often requiring many hours of patient analysis that will never be formally allocated to any resource budget. A calculation can illustrate this point:

Assume:

a population of 100 operational EUCs
an average of 8 hours per month spent on each EUC
a fully costed employee rate of \$50 per hour

This means:

each EUC costs \$400 per month to operate
or \$4800 per year.

For the full EUC population, this is a cost of \$480,000 per year. Given that for many organizations these assumptions can be seen as conservative, it is clear that there is a substantial enterprise cost in operating EUCs which is rarely recognized beyond the immediate users.



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Regulatory requirements

There is no doubt that regulators have made increasing reference to their concerns and expectations with regard to EUC.

Arguably, however, there are two elements to satisfying regulatory expectations. The first, a basic and explicit requirement for EUC control, for example as expressed by BCBS 239 is 'that banks relying on spreadsheet and database applications should have effective mitigants and controls in place to manage the associated risk'.

The second element is the recognition that these specific EUC requirements sit within a much broader set of expectations around data quality. It is only by recognizing that key EUCs are embedded as critical data links within end to end business processes that it becomes apparent that the need is not just for firms to demonstrate EUC control, but also to use this local understanding to support a much greater awareness of data quality and data processes - i.e. EUC control programs should not be an end in themselves but must also satisfy these higher level expectations.

From the perspective of the financial services industry, three pieces of regulation in particular - BCBS 239, Supervisory Guidance on Model Risk Management (SR11-7) and Solvency II - have set the stage both for specific EUCs control issues and for the wider expectations on data quality. The data aspects of these three regulations are considered below in order of increasing demands.

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Solvency II

The data perspective within Solvency II has been helpfully summarized by the UK regulator as a framework for data governance and quality in the 'External Review Scoping Tool'³ or Data Audit. Although aimed at the insurance sector, the expectations provide excellent principles for data control in any financially complex institution.

Subsequent supervision visits based on these expectations have concluded that the links between data governance (policies), data ownership (individual responsibilities), data understanding (collectively and individually) and data controls are particularly challenging to implement. From the perspective of firms looking to minimize the cost of regulatory failings in this area, these findings demonstrate that EUC control projects must consider how to minimize the costs of reporting across the same governance hierarchy – i.e. linking data governance policies with stewardship responsibilities and with the front line user activity in deploying EUC controls and remediating problems.

It may also be noted that the current UK PRA regulatory approach is strongly led by the examination of material data flows and they place a strong focus on the mapping of data flows and associated control points.

The emphasis on data understanding is highlighted in two elements of Solvency II. The first is the requirement that the data used is 'appropriate' – i.e. that the right data is being used. For example, it may not be appropriate to use Asian typhoon data in the calculation of East Coast USA catastrophe risk. From a project perspective, this means that EUC control projects should consider the costs of capturing the metadata attached to understanding the EUC (e.g. its context and purpose).

The second element is a requirement for a data directory – i.e. a repository where different end users, not technologists – can go to understand how input data is being used in the model. This mandate reinforces the need for EUC control solutions to enable the collection of flexible and user friendly metadata. By requiring this metadata to be collectively accessible, Solvency II creates an additional market requirement for EUC management to provide centralized inventory information on the controlled assets and data.



³ http://www.fsa.gov.uk/static/pubs/international/external_review_scoping_tool.pdf

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► Model Risk Management (SR11-7)

SR11-7 is directed at all financial models in banks, covering a broad range of activities, which it defines as ‘analyzing business strategies, informing business decisions, identifying and measuring risks, valuing exposures, instruments or positions, conducting stress testing, assessing adequacy of capital, managing client assets, measuring compliance with internal limits, maintaining the formal control apparatus of the bank, or meeting financial or regulatory reporting requirements and issuing public disclosures’. These are highly fertile environments for the use of EUCs.

SR11-7 considers models generically, based on the concept that all models have three implicit components: an information input component, which delivers assumptions and data to the model; a processing component, which transforms inputs into estimates] and a reporting component, which translates the estimates into useful business information. Firms should note that EUCs may form part or all of, any of these components. With regards to data and processing expectations that may impact EUCs, SR11-7 contains the following paragraphs:

‘The data and other information used to develop a model are of critical importance; there should be rigorous assessment of data quality and relevance, and appropriate documentation. Developers should be able to demonstrate that such data and information are suitable for the model and that they are consistent with the theory behind the approach and with the chosen methodology. If data proxies are used, they should be carefully identified, justified and documented. If data and information are not representative of the bank’s portfolio or other characteristics, or if assumptions are made to adjust the data and information these factors should be properly tracked and analysed so that users are aware of potential limitations.’

‘Models typically are embedded in larger information systems that manage the flow of data from various sources into the model and handle the aggregation and reporting of model outcomes. Model calculations should be properly coordinated with the capabilities and requirements of information systems. Sound model risk management depends on substantial investment in supporting systems to ensure data and reporting integrity, together with controls and testing to ensure proper implementation of models, effective systems integration and appropriate use.’

It may be noted that the reference to suitable data in SR11-7 mirrors the requirement for appropriate data in Solvency II. In order that senior management can demonstrate the suitability of data being used, this requires context and documentation, reinforcing market requirements for EUC management to minimize the regulatory costs by the efficient collection of information on important data components – i.e. metadata. Of course, knowing what metadata a firm will want to collect, now and in the future, is a very subjective decision. For this reason, it is imperative that any schema for collecting EUC metadata is highly extendable and may be flexed/ amended with minimal effort. It is also likely that different business processes and departments will require different metadata to be collected and solutions should accommodate this.

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Interestingly, both Solvency II and SR11-7 have spread their influence beyond their immediate target audience, Solvency II is forming the basis of national insurance regulation in many non-European jurisdictions] SR11-7 is now specifically quoted as required practice by other US regulations (e.g. Dodd Frank Act Stress Testing (DFAST), the Federal Reserve Comprehensive Capital Analysis and Review (CCAR) and the Federal Housing Finance Agency. The model risk principles espoused in SR11-7 are also gaining ground in the mindshare of European banking regulators.

BCBS 239

Whereas Solvency II and SR11-7 are focused on the data management of end to end business processes, BCBS 239 additionally requires that data can be aggregated with integrity and control across such processes. EUC control projects in institutions impacted by BCBS 239 must therefore consider how their projects can also reduce the costs of cross enterprise integration at both a data level (for example if they restructure or normalize data as part of the control process) and at a metadata level (how they label that data for contextual understanding).

Besides data quality and aggregation, there are two other agendas within BCBS 239, which are highly relevant to EUCs. The first is the requirement that banks understand and control today's data process weaknesses. BCBS 239 contains multiple references to the existence of manual solutions (a term which is synonymous with EUC usage) in data architectures, their deficiencies and the need to understand them. This implies the need for EUC inventory and usage metadata to be collected, aggregated and reported to senior management.

Secondly, BCBS 239 imposes the principle of 'adaptability' on firms' data architectures. While systems architects can plan for anticipated business changes, the reality is that the increasing volume, variety and velocity of data will stress any architecture to the point that new agile EUCs will inevitably emerge to fill the gaps. In many ways the demand for adaptability therefore reinforces the long term strategic relevance of EUCs within corporate systems. This does not necessarily mean spreadsheets, but it does mean that business users will always need access to some forms of rapid code manipulation outside central IT platforms.



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▶ Indirect costs

While EUCs may be well structured as applications in their own right, their location within the firm, the knowledge of their existence and the information they contain is usually very poor. This means that data or understanding that might be of value to the rest of the business is difficult, if not impossible to harness because it will be drowned in a sea of low value EUCs.

Not surprisingly this view commonly leads to a general dismissal of EUCs as being only marginally relevant to the operations of the firm. It is only when a significant EUC based financial incident occurs that the critical importance of some EUCs is exposed. The low level of attention paid to important EUCs and the data they contain often results in a significant indirect loss of value for firms with some of the main consequences described below.

▶ Reputational loss

One of the major indirect costs of EUCs is the consequent reputational cost that is attached to financial and/or operational incidents resulting from EUC miss-management. These reputational costs are in addition to the headline financial costs summarized in the public incidents reported by Chartis. Reputational costs are likely to impact all the stakeholders of the business including:

1. **Shareholders.** For incidents in public companies that come to the attention of the press, the most immediate secondary cost is likely to be on their share price. For example 'double counting' in a spreadsheet led Marks and Spencer to announce that sales had risen by 1.3% in the three months to July, when in reality they had fallen by 0.4%. The C&C Group – the firm that owns Mangers Cider – saw its share price nosedive by 15 per cent after admitting that spreadsheet errors lay behind the fact that company revenues had not risen by 5 per cent, but had actually fallen by 3 per cent. No doubt part of the drop was attributable to the negative financials, but this could not explain the whole fall. Similarly, support services group Mouchel, went into meltdown after an accounting error caused an £8.6m blow to its profits, resulting in its shares plummeting by 30 per cent. In all cases, the market impression of lack of proper financial control was perceived as prospectively more significant than the financial loss itself.
2. **Executives.** The public implicitly assumes that executives should be running a well-oiled company machine, based on expensive corporate software. This assumption does not include the use of the same 'primitive' and familiar technology solutions that they use at home for their household budget (i.e. spreadsheets). The fact that almost all organizations use spreadsheets in business critical environments is no excuse. The results of publicized spreadsheet errors are therefore particularly harsh on executives, since they are thought to be paid enough to 'do things better'. As a result, it is not surprising that the level of press criticism following spreadsheet errors in business can lead to executive changes. For example, CEO Richard Cuthbert from Mouchel felt compelled to resign following the discovery of the spreadsheet error that caused the share collapse described above.

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3. **Clients.** Client organizations and individuals invest in financial services companies with the anticipation of financial gain. It is therefore a fundamental assumption that their money will be carefully managed. For them the loss of confidence following a public spreadsheet error will be even more exaggerated than the response of the general public. However, these clients will usually also have a more intimate relationship with the managing firm than just public information. For example, insurers and high wealth individuals receive portfolio reports from asset managers and asset managers receive reports from custody and transaction services firms. The level of detail and degree of customization of reporting for clients means that many of these reports will be generated in Excel. Errors in these reports are unlikely to become public, but when detected by client, they will generate a significant loss of confidence in the client's mind, potentially leading to lost business and/or compensation.
4. **Auditors.** After the Enron scandal, the phrase 'expectation gap' gained currency, meaning that non-auditors had assumed that a clean audit conferred a general comment on the audited company as being properly run – even though this is not what an audit actually provides. Despite efforts to avoid this responsibility, auditors now recognize that they are reputationally exposed to failures in the operations of their clients and spreadsheet errors are part of this risk. For this reason, auditors are increasingly reporting their concerns over EUC risk as part of their audit reports. So the net result is that clients must respond to the reputational risk of their auditors.
5. **Regulators** are caught in a similar trap as auditors. If a regulated company admits an operational failing, such as a material spreadsheet failure then, while the most immediate criticism will be levelled at the firm itself, experience shows that the envelope of condemnation will subsequently grow to include the reputation of the regulator as well. For this reason, regulators usually feel empowered to comment on any systemic issue that might undermine confidence in the operations of their supervised firms. This is why the repeated incidence of public spreadsheet errors has moved this issue from being implicit (i.e. originally only in the spirit of financial regulations) to the explicit requirements discussed earlier.



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▶ Asset investment

Perhaps the simplest oversight leading to loss of value is the lack of recognition of a firm's investment in its portfolio of EUCs. Earlier, a short calculation showed that a typical EUC used on a monthly basis might require about \$5000 per annum of employee time investment. Many important EUCs will have operational lives of a few years, suggesting a net investment of at least \$10,000 in each of these corporate assets.

This invested value will be far higher for longer term assets used on a daily or weekly basis. However, while no self-respecting CTO would be in any doubt about maintaining an inventory of corporate laptops, typically with much lower values, the inventories of valuable EUCs are usually incomplete and out of date. To have no record of these technology assets, leaves the door open for the intellectual property they contain to be lost, deleted or stolen. Down the line, such losses are likely to be reflected in excess cost or lost revenue.

▶ IT road map and implementation

As recognized earlier, EUCs are commonly built to fill the gaps in the functionality of existing corporate systems. These gaps will cover a wide range of different requirements such as innovative products, new pricing strategies, data incompatibilities or alleviating manual checks. They represent the working prototypes of new functionality that may be sufficiently valuable that it should be incorporated into existing corporate systems by the devotion of formal IT development spend.

For teams seeking to design IT road maps, prioritize corporate IT initiatives or scope projects; their work will be more difficult and potentially compromised if they do not have access to the knowledge held in, and workflow represented by the existence of the corporate EUCs relevant to their area of systems development.



THE COSTS OF END USER COMPUTING

The Return on Investment (ROI) for Managing End User Computing

The business case to manage EUC is therefore derived from six factors:

1. Retaining the value of the business agility enabled by EUC
2. Reducing the risk of using EUC
3. Meeting regulatory compliance requirements
4. Improving data quality in the business processes that incorporate EUC
5. Improving the efficiency of EUC usage
6. Improving the corporate knowledge of EUC assets

When selecting an approach (and potential technology solutions) to manage EUCs, it is therefore necessary to consider the contribution to all these objectives. Within the spectrum of solution approaches, two 'end member' options will be necessarily considered.

Firstly, there is the option to do nothing – i.e. retain EUC capabilities in the business in an unmanaged state, with the associated risk and inefficiencies, and respond to consequential requirements, such as regulation and control, using purely manual and reactive responses. As with all manual solutions, firms considering this option need to ensure that it is fully costed and that processes are in place to ensure that the manual actions are sustainably consistent and reliable. Not surprisingly, those firms that have accurately monitored their own attempts to deploy such manual solutions have found them highly unreliable.

The second option is to commit to complete replacement of EUC by building alternative 'robust' technology solutions using standard IT project resources. Companies that have embarked on costing such an exercise have found the potential IT development bill to be unexpectedly high and beyond any reasonable attainment.

In considering alternative technology solutions, it is obviously important to ensure that any subsequent end user development in the new software environment is appropriately restricted and/or controlled. If this is not achieved, then firms run the risk of creating another EUC problem, but on a different platform. It is interesting to note that some companies, who have sought to replace Excel with other adaptable technologies, report that they have subsequently created two different EUC problems. Firstly, they failed to eradicate Excel leaving a latent spreadsheet control problem. But secondly, once users became familiar with the new platform, their development abilities reached the point where it demonstrated all the same failings (and benefits) of an EUC environment.

If the options of doing nothing or wholesale EUC replacement are considered non-viable then other technology options should be mapped against the above factors. Alternative solutions and approaches (including a combination of both manual and technology elements) will deliver different returns against these factors. In order to provide a framework for this evaluation, it makes sense to review each of the six factors in more detail.

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1 Retaining the value of the business agility enabled by EUC

The fundamental challenge in the management of EUC is to ensure that the introduction of control and management processes do not stall or overly compromise the speed and agility for which the EUC is so valuable. For example, it is often impractical to have control approaches that are based on potentially lengthy approval cycles. Equally, if additional access control processes are implemented, these must demonstrate very high reliability in order to ensure that users are not accidentally locked out of their applications at the most critical times.

In terms of persuading users to adopt changes to their EUC experience, there is a salient lesson from Microsoft SharePoint. This has offered some EUC management capabilities for several years, but has largely failed to deliver in this respect. One of the main reasons is that it creates added complications for the users of Excel. From an independent perspective, these complications may seem relatively minor, but from the perspective of experienced users, they are unnecessary and frustrating obstacles.

ClusterSeven EUC management technology is unique in ensuring that users can continue to use their EUCs with no change in their experience. This means that, for the most time sensitive business processes, there are no delays (and no risk of delays) introduced by implementing an EUC management solution and full business agility can be retained. For business processes that are not so time sensitive, ClusterSeven offers a range of workflow options to ensure that with very minor changes to user experience, non-approved EUCs are not unwittingly used.

2 Reducing the risk of using EUC

Clearly, this factor is the primary business justification for implementing EUC management processes. For those firms that retain loss registers or have suffered EUC related operational incidents, this factor will demonstrate the clearest return on investment. For others, the Chartis quantification process provides an estimate for firms as to the size of the risk inherent in their business and the available returns in terms of risk mitigation.

There are two primary aspects of EUC control functionality that are unique to this software solution sector and offer substantial improvements over traditional manually dominated processes. These two aspects are Discovery and Control, both of which form the core of the rich functionality of ClusterSeven solutions. ClusterSeven's Discovery functionality enables firms to locate potential EUC failings and supports the need for management awareness of process weaknesses advocated by BCBS 239. Discovery is conducted by high performance scanning of file shares and repositories, alongside analysis of the EUC structure, properties and contents.

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Functionality also enables the discovered files to be risk ranked in terms of aspects such as complexity and data content. Other returns from using Discovery functionality include the rapid detection of security vulnerabilities, such as poorly defined access control lists, absent passwords, insecure connection strings and the detection of personal data.

ClusterSeven Discovery results often prove valuable in providing objective evidence for senior management of both the scope of the EUC estate and the details of associated risks. In contrast, more generic approaches using other search methodologies will uncover general population statistics, but rarely home in on the key factors that can substantiate risks.

ClusterSeven Control functionality enables the detection of potentially anomalous activity (or inactivity) in the use of EUCs. Functionality also provides alerts and reports to enable an appropriate speed and confirmation of remediation. Detective capabilities cover the range of issues identified in the Chartis report. It should be noted that all of these capabilities would incur substantial costs to emulate manually, for example, requiring as a minimum, significant test and regression management teams.

ClusterSeven EUC management also contributes to lowering the opportunity for fraud. This is not just because of the ability to detect anomalous behavior, but also because the very act of monitoring EUC activity will assist in dissuading employees from considering the possibility.

3 Meeting regulatory compliance requirements

It has been said that the three key aspects of compliance are documentation, documentation and documentation. To this end, the ability of ClusterSeven EUC management solutions to automatically record EUC activity and the process of any remedial actions provides an invaluable audit record to respond to any regulatory enquiry.

For supposedly equivalent manual solutions, the reality is that whether they provide effective control over potential errors or not, any expectation that users will reliably record the granular details of their EUC activity is overly optimistic. Such evidence gaps between automated and manual recording of activity are easy to demonstrate as part of any introduction to ClusterSeven software.

In addition to basic activity monitoring and analysis capabilities, ClusterSeven EUC management solutions provide the opportunity to capture metadata attached to EUC applications. This metadata provides support for two important regulatory requirements. Firstly, it enables the reporting/aggregation of EUC population information for inventory purposes (e.g. BCBS 239) and data appropriateness/suitability (Solvency II, SR11-7). Secondly, it provides the transparency and awareness of EUC operations for senior management to demonstrate that they understand how the business is preparing its financial reports. In so doing, this metadata also provides the important links down the governance hierarchy, from policies through stewardship roles and down to front line user activity and remediation, the requirement highlighted by the UK regulator.

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4 Improving data quality in the business processes that incorporate EUC

Data quality programs have become increasingly important due to both the pressure on business margins and the demands from regulators. ClusterSeven EUC management can make an important contribution to data quality in a number of areas:

Firstly, the data lineage from core systems to EUCs can be demonstrated visually by ClusterSeven's Discovery capabilities, automatically producing maps of data connections within a few hours. Once armed with data lineage diagrams, business process owners and systems architects are both much better placed to plan data improvements. Comparable manual processes are likely to take many weeks.

Secondly, the inputs and outputs from EUCs provide easily accessible control points for ClusterSeven EUC solutions to monitor data tolerances and staleness that may indicate integrity problems within the EUC operations or the source data. ClusterSeven EUC management solutions also offer the opportunity to apply larger scale reconciliations to identify data anomalies that would be impractical using purely manual approaches.

Thirdly, ClusterSeven EUC management solutions provide the opportunity to capture and document the incorporation of so called expert judgement – i.e. the imposition of human judgement to alter data sets. This is particularly important in Model Risk Management and Solvency II, where the contribution of extra data inputs or the manipulation of existing data is often used to improve the alignment between theoretical calculations and the real world.

5 Improving the efficiency of EUC usage

The efficiency of EUC usage is impacted by multiple factors often related to the poor and undocumented business processes to which the EUC contributes. For example, it is common for users to work on out-of-date versions of EUCs, or unknowingly recreate existing EUCs. It is also all too easy for users to corrupt EUCs without quick access to a restoration option. This may require hours of work to unpick the problem, or days of waiting to obtain a copy from a back-up tape via IT.

All of these problems can be eliminated or significantly reduced by use of ClusterSeven EUC management solutions. In terms of calculated ROI, internal surveys on time lost due to EUC loss or corruption have demonstrated significant benefits in this area.

The issue of key man dependency can also be mitigated by using Clusterseven's metadata capture capabilities to ensure wider knowledge and existence of the relevant documentation, including purpose and operational requirements.

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6 Improving the corporate knowledge of EUC assets

A common internal cultural problem with EUC management is that it can be seen by more traditional IT managers as perpetuating the use of uncontrolled and inadequate technology, when their aspiration is to create a smooth suite of business applications that facilitate end to end high quality processes.

As a result, it can be difficult to gain the IT mindshare and resources to provide the platform on which EUC management will be conducted. This challenge can become an opportunity if the EUC management process and information is used as a feed to the IT project prioritization and scoping processes. If one envisages the EUC inventory as a 'hopper' of potential IT development then, provided the appropriate metadata on these EUCs has been collected, this can be used as a source of criticality and prioritization to help determine whether to apply core IT resources to build a more robust replacement. Those EUCs which demonstrate the most frequent usage and reasonable structural maturity (i.e. limited changes in formulas and macros) are likely to be the most suitable candidates for replacement by IT development work on core systems.

The concept of EUC management programs providing a conveyor belt of business functionality from newly innovative EUCs, through improving stability and maturation to eventual corporate systemization is now an embedded business process in leading ClusterSeven client firms. Of course, some important EUCs will never be valuable enough to merit conversion to core system functionality. These are likely to stay in the 'hopper', managed by ClusterSeven for their entire production lives.

IT managers will also be pleased to note that ClusterSeven EUC management solutions also enable the reduction of IT storage costs. This is because the implementation of management ensures that business critical EUCs can be segregated from the high volume of non-significant EUCs. Only the business-critical and newer EUCs are likely to merit high availability storage, allowing the less important ones to be rapidly archived to lower cost storage media.

It was noted earlier that firms commonly have substantial, but unknown, investments in their EUC population. Importantly, the process of creating EUC inventories, when supported by the relevant metadata such as within the ClusterSeven Inventory Management System, provides an excellent opportunity to catalogue this investment and ensure appropriate protection and disaster recovery protocols for these assets.



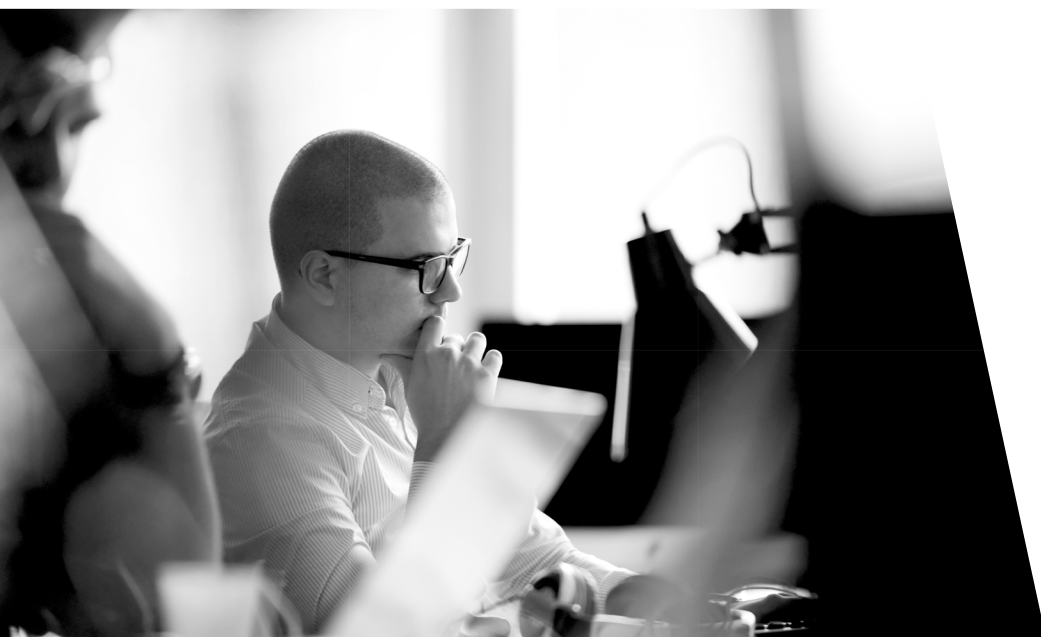
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► Overall returns

In considering your firm's response to the need for EUC management, it might appear that there is a choice of 1) Implementing ClusterSeven EUC management technology 2) Adopting expensive, unreliable manual solutions or 3) Doing nothing and incurring the consequences of excess cost, lost opportunity and undertaking potential risk and regulatory losses.

However, once all six categories of ROI have been fully evaluated it becomes clear that only one option will practically, consistently and efficiently meet all the following key requirements:

1. Retaining the value of the business agility enabled by EUC
2. Reducing the risk of using EUC, including potential reputational damage
3. Meeting regulatory compliance requirements
4. Improving data quality in the business processes that incorporate EUC
5. Improving the efficiency of EUC usage
6. Improving the corporate knowledge of EUC assets



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