InterPARES Trust Project
Research Final Report

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1. Project aim, objective and research questions

The aim of this project was to explore the use or otherwise of economic models by archives and records management (ARM) professionals in practice to estimate or predict the medium to longer term cost implications of adopting the cloud for records storage as a service (StaaS) and to identify what issues of trust arise in making an appropriate economic decision and/or business case. It built on a previous ITrust project *- Economic models for storage of records in the cloud (StaaS) – A critical review of the literature (EU18)*.

The rationale for the project was twofold:

- The literature review identified a body of work (14 key articles) published since 2010 on modelling the cost of storage in the cloud. Four different economic or financial/management accounting theories (with some 'variations on a theme') underpin the models presented in the work. Included in this was one toolkit which considered a range of qualitative factors and was not purely economic. The authors were situated either in the computer science / information systems discipline (with one in economics) or in the library/archives discipline (focusing on digital preservation), and published in their respective disciplines. With one exception, there is little citation between the two disciplines suggesting that complementary work has been undertaken in parallel 'silos'. If this separation plays out in practice then there is a danger that records/archives professionals may not be cognisant of and consider the economics of cloud storage with their computer science/IT colleagues and vice versa.

- The literature review also revealed very few (published) case examples of the adoption of economic models in practice. Only three 'real' case examples were found, all of which were in university contexts, with five other hypothetical scenarios and three scenarios using actual service providers' pricing structures. ARM professionals might use these models, or others, to inform their decision-making and business case preparation for using (or not) cloud storage services but no published case examples were identified.

The purpose of this empirical project, therefore, was to explore whether or not such models are being used in practice to estimate or predict the long-term economic implications of moving to the cloud for StaaS. This is important in the context of trust in the economic viability and sustainability of using cloud storage for digital

records/information (not specifically digital preservation), including in service providers to give a fair deal and to continue to uphold their agreement in the future.

The project's research questions were:

- What economic/costing models are used in practice and why/why not?
- How are economic/costing models used in practice?
- What other models/approaches are used to underpin the decision-making process about the use (or not) of the cloud for StaaS? Why and how?
- How do the models/approaches used in practice compare with economic/costing models from the literature in terms of the factors considered?
- Who is involved in the decision-making process for using the cloud for StaaS and why?
- What are the issues of trust in using the cloud for StaaS and what factors contribute to trust in the decision-making process?

2. Research method

The study was conducted primarily via a survey using the online tool Fluid Survey. The survey was also used to identify organisations using economic/costing models (or related approaches) that were prepared to share them publically (anonymised or not) as case examples.

A pilot survey was conducted with selected InterPARES Trust transnational members, and their contacts, to refine the design prior to launch. This was useful in improving the clarity of some questions and the options provided to respondents. It also helped to better estimate how long the survey would take to complete. The final survey (Appendix A) was launched on December 10, 2015. Invitations to participate were disseminated through a purposively selected set of listservs, and ITrust members forwarded it to contacts and relevant stakeholders in their organisations (Appendix B). This ensured a global audience of ARM professionals was targeted. The plan was to close the survey after a short time, on the basis that respondents either complete surveys fairly quickly after discovering them or not at all. The project team did not want to send repeated reminders to listservs etc. However, the proximity of the launch to the end of the year meant the response rate was fairly low (30 complete responses out of 88 responses). A decision was taken to re-open and re-advertise it at the beginning of the new year. This was done and it was open from February 8 to February 29, 2016. The survey resulted in

61 completed responses and 115 incomplete responses.[1] Only the complete responses have been analysed and presented in the findings.

A total of 16 survey respondents indicated their willingness to be interviewed and provide a case example. From these five respondents were interviewed.

Ethical approval was sought and gained from Northumbria University prior to commencement of the data collection.

3. Survey Findings

*3.1 Respondents and Their Use of Cloud Storage*
61 respondents completed the survey through the last informational question.[2] Since the survey was targeted at archives and records management professionals, it is unsurprising that over half of respondents (54%) identified their area of responsibility within their organisation as records/archives (service, practice or advice). The largest group of respondents worked in a governmental organisation (33%), followed by education (23%). Other sectors included intergovernmental, private, non-profit, and public. Professionals from 17 different countries responded to the survey. However, the majority of respondents came from English-speaking countries, with Australia, Canada, United Kingdom, and United States accounting for 40 of the 61 respondents. Appendix C provides full demographic information on respondents and their organisations (see Figures 1-3 and 27-30).

The survey began by asking about the use of third-party cloud service providers for storage of records. It explained that third party cloud services include public cloud, community cloud, or hybrid cloud as well as private clouds managed by a third party. Roughly half of respondents (32) said that their organisation uses a third-party cloud service provider to store records. Respondents in organisations using cloud storage were asked further questions about the particulars of their use of the service, such as the cloud service model and the types of records stored (see Appendix C, Figures 7, 11 and 12).

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[1] Some of the "incomplete" responses include respondents who only clicked on the survey link but did not answer any questions (41 respondents). Another 12 did not make it past the first page of questions about demographic information (i.e. country, size of organisation, etc.).
[2] The last question of the survey asked if the respondent would be willing to be contacted for a follow-up interview. Some respondents answered the survey through to the penultimate question, and we considered these to be "complete" surveys, recording their answer as "no" to the last question if they did not answer.

Does your organisation use an external third party cloud service provider for storing any of its records?
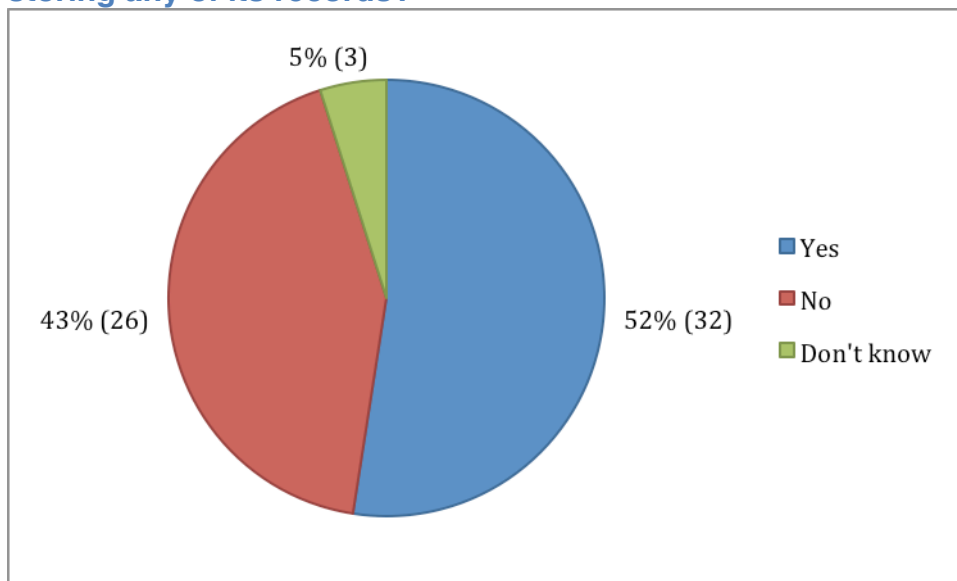

Respondents who indicated that their organisation uses an external third party cloud service provider for records storage (32 respondents) were further asked why they chose the cloud service. Cost savings in hardware and software was the response most chosen by respondents (25 out of 32). This data clearly supports the observation presented in the literature review regarding the tendency for cloud storage to be perceived as a cost-saving option.

Similarly, respondents in organisations choosing not to use external third party cloud service providers (26 respondents) were asked why their organisation did not use cloud storage. Lack of trust in cloud service providers was the most popular response (13 respondents), followed by legal/regulatory requirements (10 respondents). The survey also asked further questions about issues of trust for respondents in organisations that both did and did not use cloud storage (discussed below).
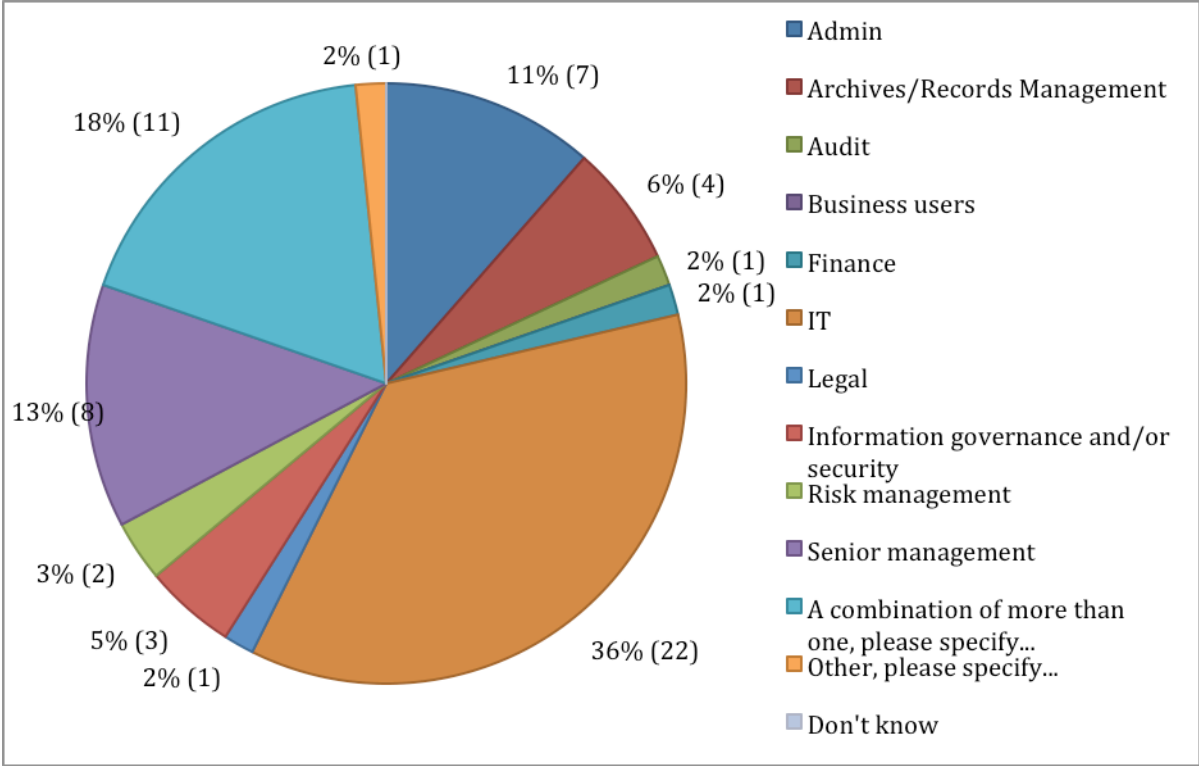
3.2 Cloud Adoption Decision-Making
The survey also sought to gain an understanding of the decision-making process in the adoption of cloud storage, including the persons and factors involved. All respondents were asked what departments were involved in decision-making about the adoption (or not) of external third-party cloud services in their organisation. They could choose all relevant options. IT was selected by the largest number of respondents (43), followed closely by archives and records management (38 respondents).

Which departments in your organisation are involved in decision-making about the adoption (or not) of third party external cloud services for storing some/all of its records? (Choose all that apply)
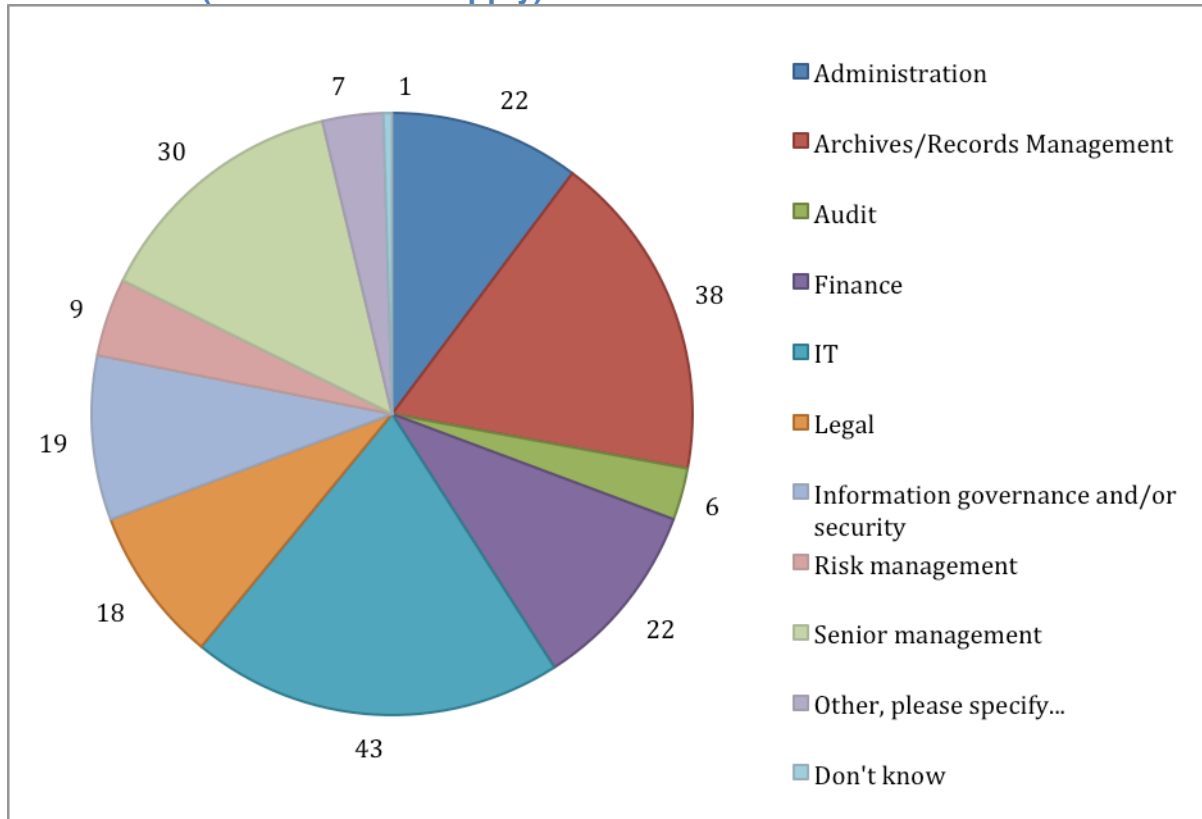
Respondents were also asked to specify which department played the lead role in cloud adoption. The largest number of respondents chose IT suggesting that, while in many organisations both IT and archives/records management are involved in the adoption process, IT plays the lead role. Moreover, of the respondents who chose "A combination of more than one," three stated that the lead department was a combination of archives/records management and IT (with one also adding senior management), and another two explained that it was a combination of information governance and IT (with one also adding security).

Which department in your organisation plays the lead role in adopting (or choosing not to adopt) third party external cloud services for storing some/all of its records? (Choose only one)

Further, respondents indicated their level of involvement in decisions regarding cloud adoption. The majority of respondents were either partly (49%) or largely (28%) involved. This is commensurate with that fact that over half of the respondents indicated both that they were archives or records professionals, and over half also said that records/archives departments were involved in decisions about cloud storage.

In addition, respondents in organisations both using and not using cloud storage were asked about the factors their organisation considered in the decision-making process. Respondents could choose as many factors as were applicable. The responses most chosen by respondents were operating costs (41 respondents), technological suitability (37 respondents), risks (31 respondents), and capital cost (29 respondents).

What factors did your organisation consider in deciding whether or not to use an external third party cloud service(s) for storing some/all of its records? (Choose all that apply)
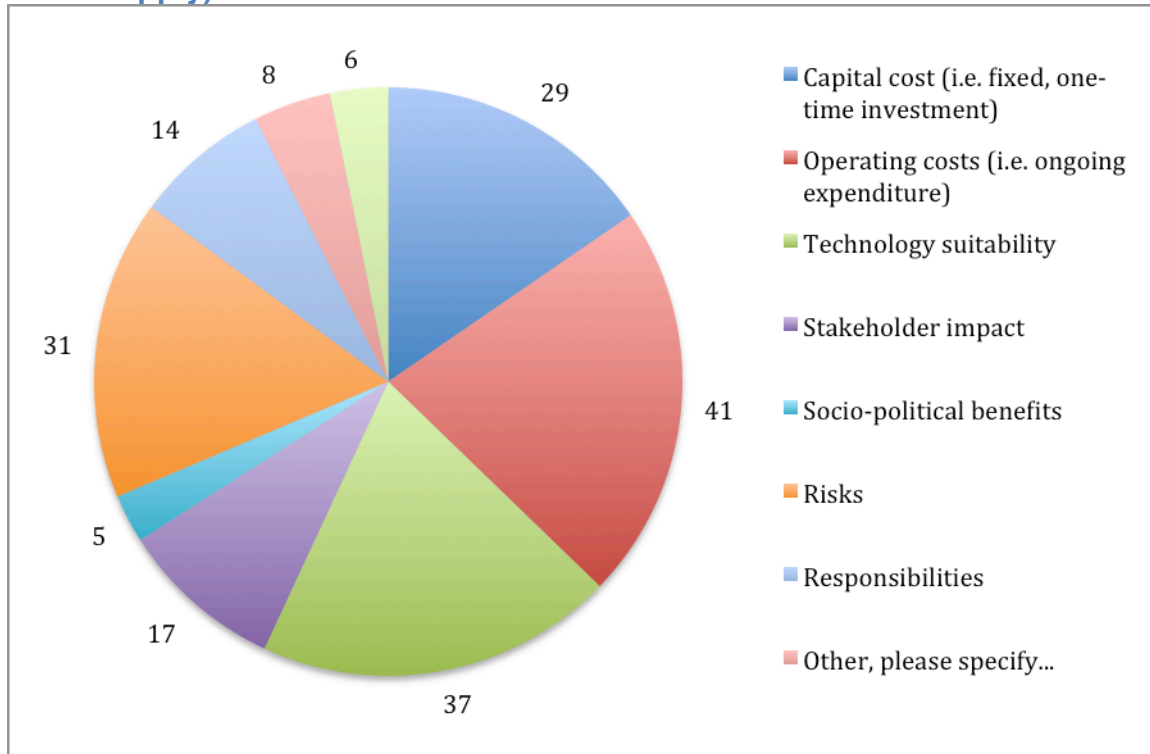
These respondents were also asked specifically about the importance of cost as a factor in the organisation's decision-making process. Their responses demonstrate that cost is clearly an important factor with most respondents indicating that cost was very important (38%), essential (28%), or critical (20%). Again, this data supports the observations that originally motivated the project regarding how the assessment of cloud storage appeared to be cost-driven.

3.3 Use of Economic/Costing Models
The next section of the survey specifically focused on the use of economic models in deciding whether or not to use a third-party cloud service provider. Respondents in organisations both using and not using cloud storage were asked the same questions. Respondents were asked about economic models twice. First, they were asked about the use of economic models in their organisation overall. Later, they were asked about their own use of economic models in their specific role within the organisation.

15 respondents (about 25%) said that their organisation had used an economic model for deciding whether or not to use a third-party cloud service provider for storage of records. Of these, 10 respondents were from organisations using cloud storage. The small number of respondents who had used a model limits analysis of this data. However, it is interesting to note that less than half of the respondents who said that

their organisation chose cloud storage for economic reasons had used an economic model to make this decision (10 of 25 respondents).

Does your organisation use any costing/economic model in deciding whether or not to adopt an external third party cloud service(s) for storing some/all of its records?
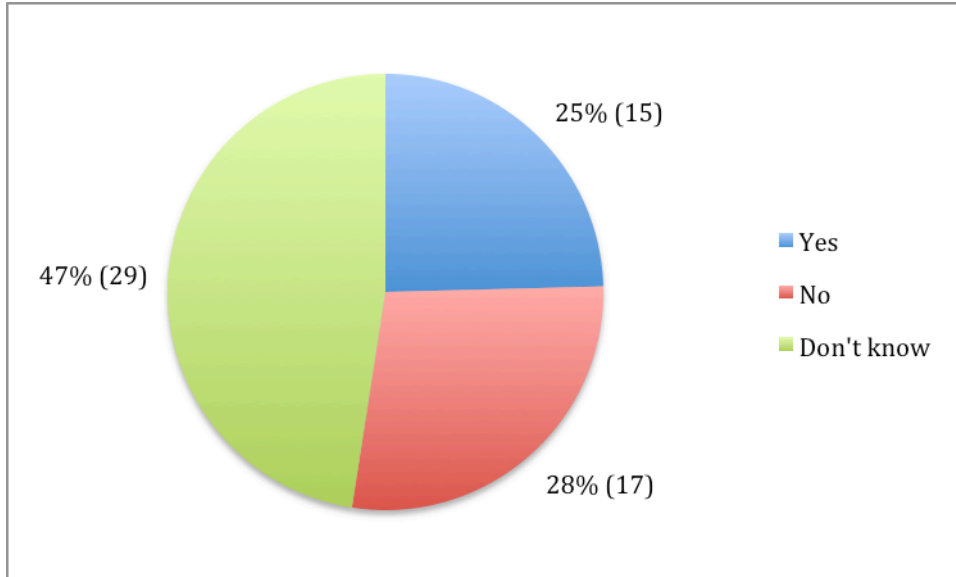
The 15 respondents who answered that their organisation had used an economic model were asked what model(s) they had used from a list identified in the earlier literature review. Respondents could select one or more models. Interestingly, fewer respondents used the more sophisticated models identified in the literature review. The most popular model was relative cost of operations (10 respondents), which was defined in the survey as the "comparison of costs that change between in-house and cloud, including service life of storage, redundancy copies, personnel and infrastructure." The other option most chosen by respondents was non-financial factors (nine respondents), which was defined as "technology suitability, stakeholder impact, socio-political benefits, risks, responsibilities." Some respondents also chose Discounted Cash Flow, Net Present Value, Full Cost Accounting, Total Cost of Ownership, and Acquisition Interval, but these options were less popular. No respondents chose the answer options Differential Net Present Value, Internal Rate of Return, Monte Carlo models, or Kryder's Law and no respondents indicated that they had used a model not included in the list.

Further, respondents whose organisation both used an economic model and used cloud storage (10 respondents) were also asked how they used the model in the context of using a third-party service provider. Responses indicate that these respondents generally use economic models to estimate costs for decision-making (8 respondents) and as part of a business case for cloud adoption (6 respondents), as well as to monitor costs post-adoption (6 respondents).

Which of the following models has your organisation used in deciding whether or not to adopt an external third party cloud service(s) for storing some/all of its records? Choose all that apply.
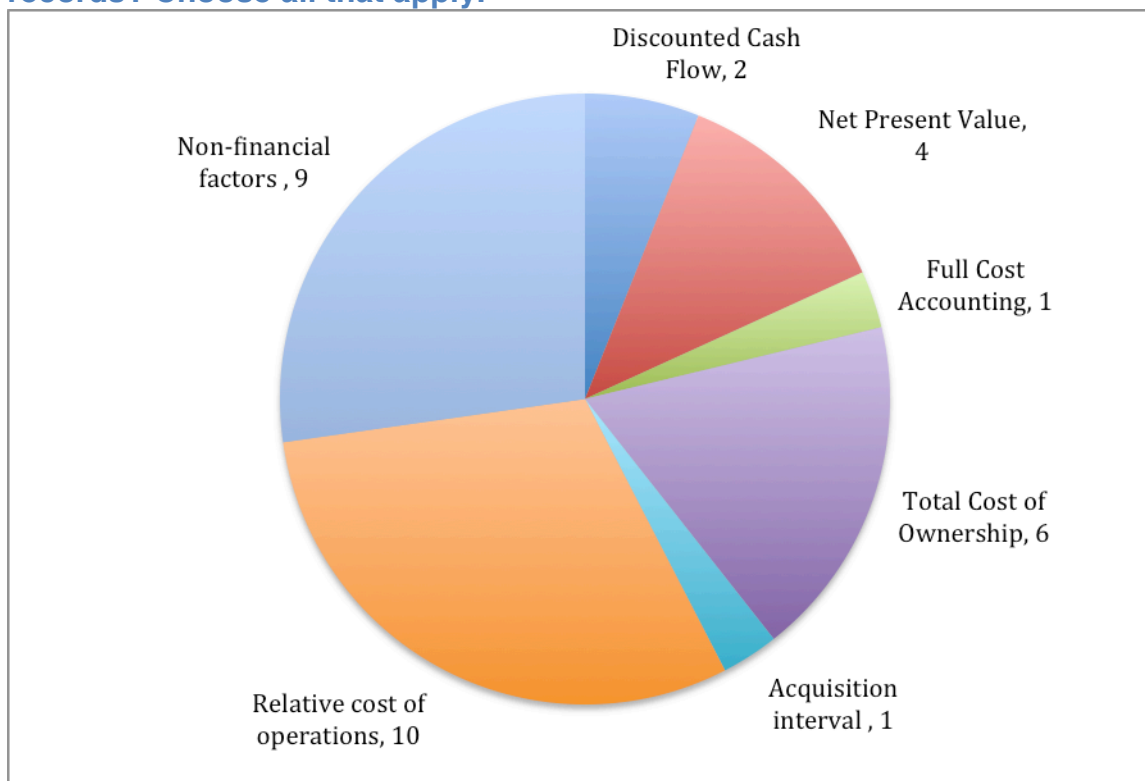
Respondents were also asked about their own use of economic models for determining the cost of cloud storage in their roles within the organisation (see Appendix C Figures 32 and 33). Respondents who answered "yes" they were involved in decision-making about cloud adoption, either largely or partly (47 respondents), were asked if they had used an economic model. 11 said they had. Their answers reflect similar trends observed at the organisational level. Relative cost of operations (10 respondents) and non-financial factors (10 respondents) were selected by more respondents than the more sophisticated models. Respondents who indicated that they were involved with cloud adoption decision-making or post-adoption monitoring and indicated that they had used an economic/costing model (9 respondents) also were asked how they had used economic models. Answer options related to estimating costs were selected by the most respondents (see Appendix C Figures 34 and 35).

3.4 Issues of Trust
Finally, respondents were asked a series of questions about issues of trust in decision-making regarding the use (or not) of cloud storage for records. Again, respondents were asked these questions for their organisation overall and for themselves in their specific roles within the organisation.

For your organisation, how important are the following issues of trust in adopting (or not adopting) an external third party cloud service(s) for storing some/all of your organisation's records? (all respondents)

Chart legend:
- Don't know
- Extremely important
- Very important
- Moderately important
- Slightly important
- Not (at all) important

Concerns about the internal/organisational decision-making process: Don't know 8, Extremely important 15, Very important 9, Moderately important 16, Slightly important 6, Not (at all) important 7

Lack of trust in cloud service providers: Don't know 5, Extremely important 16, Very important 18, Moderately important 13, Slightly important 4, Not (at all) important 5

Lack of trust in cloud computing models (e.g. public, private, community, and hybrid models): Don't know 6, Extremely important 16, Very important 18, Moderately important 9, Slightly important 6, Not (at all) important 6

Negligible or insufficient savings in human resources and time: Don't know 3, Extremely important 13, Very important 18, Moderately important 11, Slightly important 9, Not (at all) important 7

Negligible or insufficient financial savings: Don't know 2, Extremely important 16, Very important 19, Moderately important 9, Slightly important 9, Not (at all) important 6

Unfavourable contractual terms offered by cloud service providers: Don't know 8, Extremely important 22, Very important 13, Moderately important 9, Slightly important 5, Not (at all) important 4

Vendor lock-in: Don't know 16, Extremely important 11, Very important 14, Moderately important 8, Slightly important 9, Not (at all) important 3

Concerns about the service provider continuing to deliver a sustainable storage service: Don't know 2, Extremely important 30, Very important 16, Moderately important 6, Slightly important 4, Not (at all) important 3

Concerns about the service provider continuing to deliver an economically viable service: Don't know 1, Extremely important 22, Very important 25, Moderately important 9, Slightly important 3, Not (at all) important 1

Concerns about the service provider's offer of an economically viable service: Don't know 1, Extremely important 23, Very important 22, Moderately important 11, Slightly important 3, Not (at all) important 1

Number of Respondents

First, all respondents were asked to rank issues of trust in the organisation's decision to adopt or not to adopt external third party cloud storage of some or all of its records. Most issues of trust were considered either very or extremely important. In particular, almost half of respondents said that concerns about the provider continuing to deliver a sustainable service were extremely important for their organisation. Respondents were also very or extremely concerned about the providers' offer of a financially viable service and the continued economic viability of that service.

Segmenting the data by organisations that had chosen and those that had not chosen to use a third-party cloud service provider shows that cloud users tend to be somewhat less concerned with trust issues, whereas those who have chosen not to use the cloud are more likely to rank issues of trust as extremely important (see Appendix C Figures 17 and 18). However, cloud users are very or extremely concerned with the continued sustainability of the service as well as the economic viability of the service, and the continued economic viability of the service.

The respondents were asked the same question about issues of trust directed toward their concerns (as opposed to the concerns of their organisation overall). Their responses (see figure on following page) indicate that issues of trust were generally more important to individual respondents than to the organisation overall. Respondents were particularly concerned with the sustainability of the service in the future and unfavorable terms of contract with the provider. Cost-specific issues of negligible financial savings and savings in human resources appear to be slightly less of a concern. However, well over half of respondents indicated that concerns about the provider's offer of an economically viable service and the service continuing to be economically viable in the future were either extremely or very important.
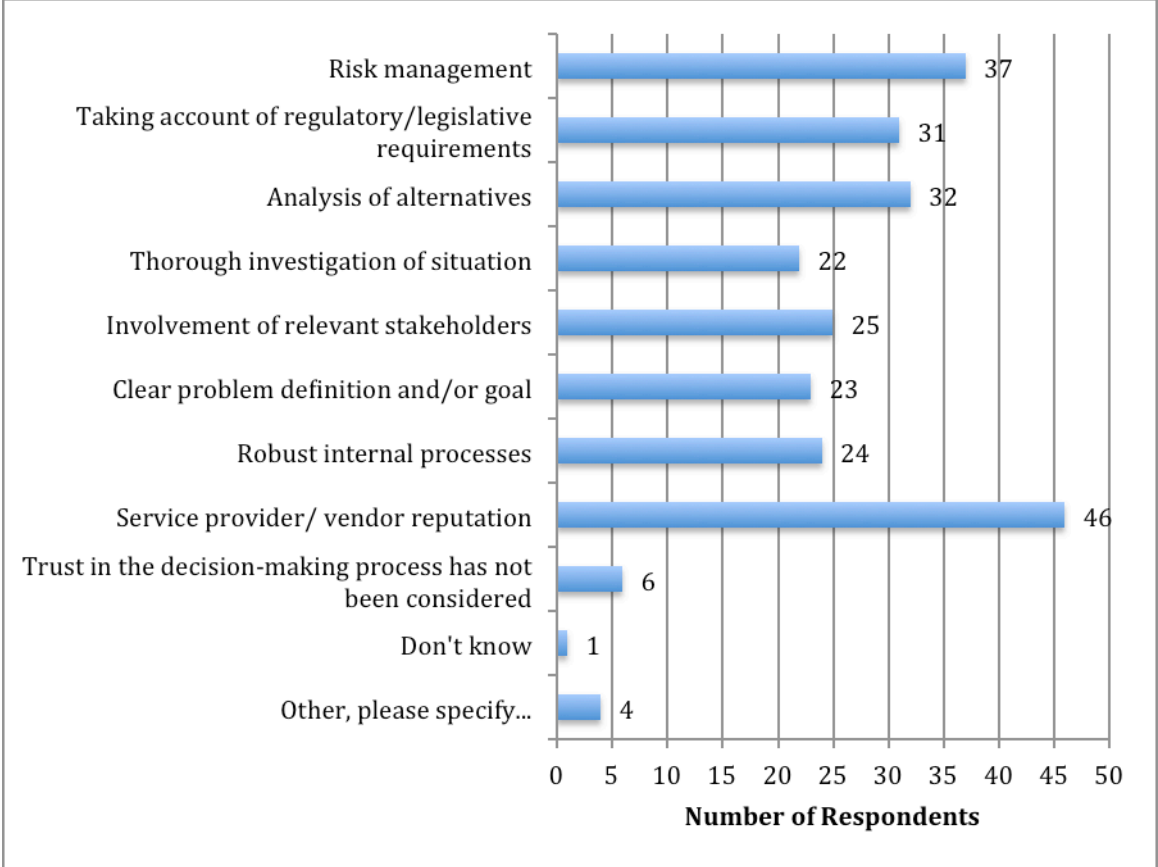
Sorting the data by respondents in organisations using and not using the cloud did not reveal substantially different trends; however, respondents in organisations not using cloud storage were slightly more likely to rank issues of trust as extremely important (see Appendix C figures 37 and 38). This follows the same trend as responses at the organisational level.

For you, how important are the following issues of trust in adopting (or not adopting) an external third party cloud service(s) for storing some/all of your organisation's records? (all respondents)
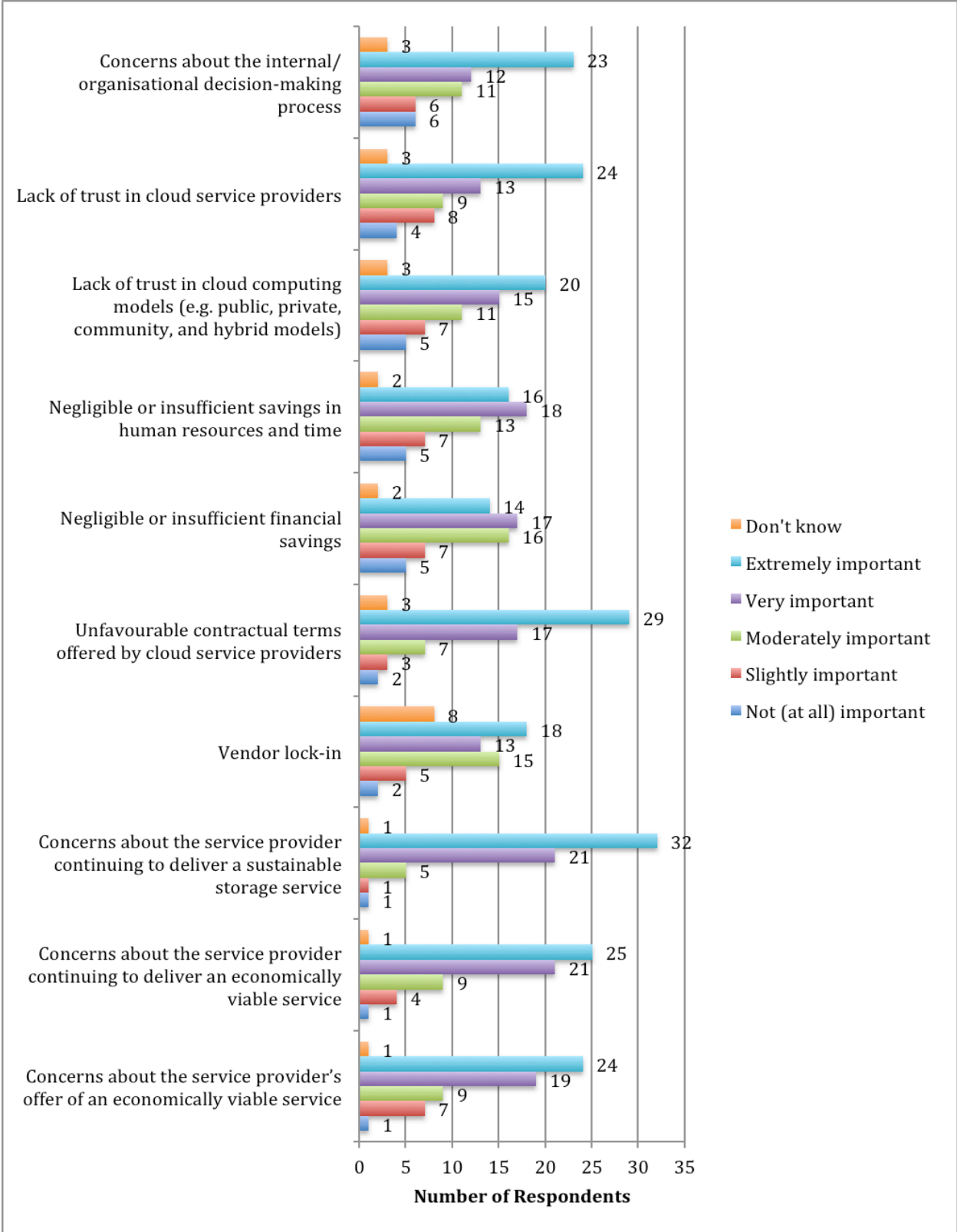
Respondents were further asked about the factors that contribute to trust in the decision-making process in their organisation. They could choose all relevant factors. The factor selected by the most respondents was service provider/vendor reputation, and several of the respondents who selected "other" also noted factors related to the contract with the service provider. Risk management was also an important factor for respondents. If the data for organisations using and not using the cloud is considered separately, these remain the top two factors for both groups (see Appendix C figures 20 and 21).

What factors contribute to your organisation's trust in the decision-making process? (Choose all the apply)

Factor	Number of Respondents
Risk management	37
Taking account of regulatory/legislative requirements	31
Analysis of alternatives	32
Thorough investigation of situation	22
Involvement of relevant stakeholders	25
Clear problem definition and/or goal	23
Robust internal processes	24
Service provider/ vendor reputation	46
Trust in the decision-making process has not been considered	6
Don't know	1
Other, please specify...	4

Respondents were also asked to answer this question for themselves (as opposed to the organisation overall). Their answers were similar to answers for the organisation-level question. Service provider/vendor reputation, followed by risk management, were the top two factors. Taking account of regulatory/legislative requirements was also important. In fact, this factor ranked slightly above risk management for respondents in organisations using cloud storage (see Appendix C figures 40 and 41).

What factors contribute to your trust in the decision-making process for adopting (or not adopting) an external third party cloud service(s) for storing some/all of your organisation's records? (Choose all that apply)
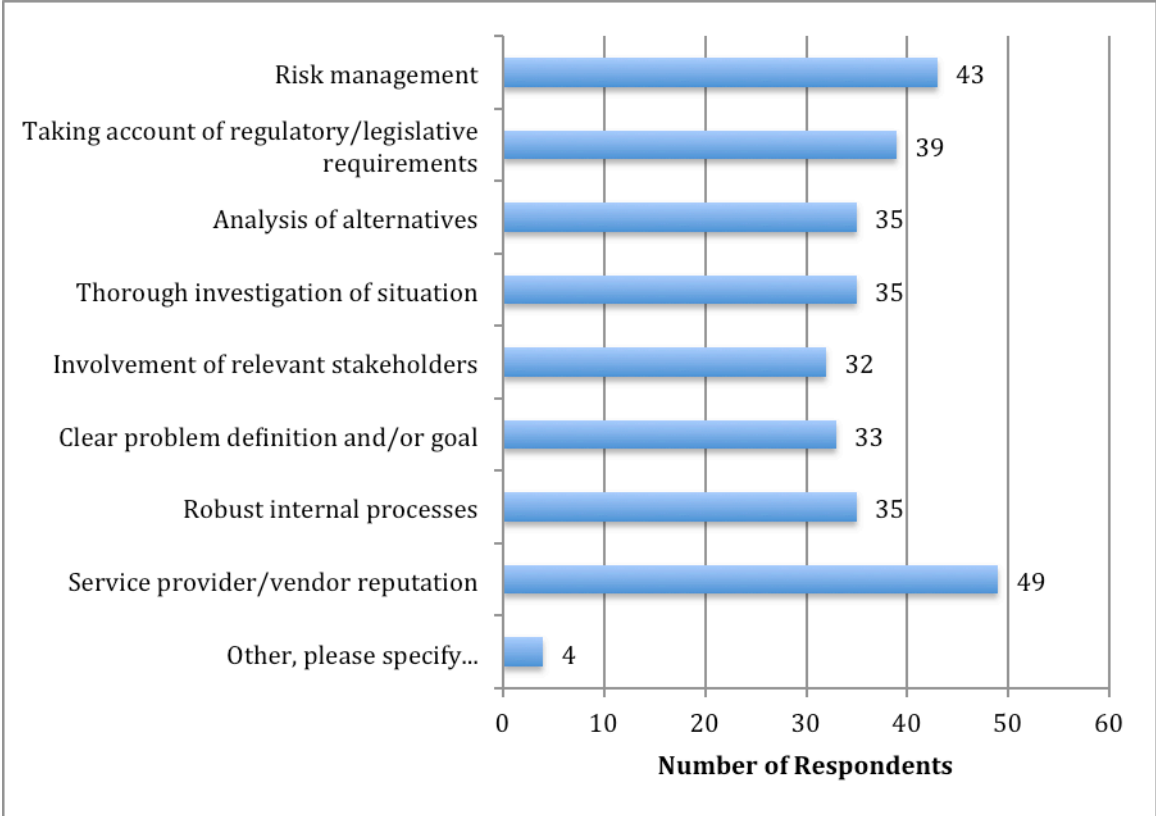
4. Case examples

The 16 survey respondents who indicated their willingness to be interviewed and provide a case example are characterised as follows:

Use cloud, use model	Use cloud, don't use model	Don't use cloud, use model	Don't use cloud, don't use model	Don't know if cloud or models are used
4	3	2	5	2

The two respondents who did not know if their organisation used the cloud or economic models were thanked but not followed-up with further questions. Of the nine respondents using the cloud and/or an economic model, five were interviewed. One of the respondents whose organisation does not use the cloud but uses economic models provided some further details and offered to be interviewed but was then unable to do so meaning a case example in this category was not possible. The five respondents who said their organisation neither used the cloud nor an economic model appeared not to be relevant for follow up. However, their responses to questions about the importance of cost in the cloud decision-making process (see Appendix D) and their involvement in the process (partly or largely involved) indicated it would be interesting to follow up. Table 1 characterises the eight (of the 14) organisations that responded to the follow-up.

Case/ Ref No	Organisation	Location	Use cloud, use model	Use cloud, do not use model	Do not use cloud, use model	Do not use cloud, do not use model
1	Public sector body	UK	X			
2	University	Canada	X			
3	State owned body	New Zealand	X			
4	City Council	Spain		X		
5	Religious organisation	Canada		X		
R07	Non-profit society	USA				X
R13	Non-profit professional organisation	Canada				X

Table 1: Characterization of organisations followed-up from the survey

The five respondents whose organisation neither used the cloud nor an economic model were asked:

- If cost is so important in the decision-making process, why does your organisation not use a costing/economic model in the process?
- If cost is so important and you are involved in the decision-making process, why do you not use a costing/economic model in the process?

The situations of the two respondents (R07 and R13) who replied are summarised as follows:

Organisation 07 is a non-profit organisation cultural/preservation organisation focused on preserving a segment of local history in the United States. Started by volunteers, the organisation has had very little staff throughout its existence,

never enough to make the progress they would like. Today it has one full time and two part time employees. It does not use the cloud; it has operated for 45 years on raising funds as needed and not looking for the most modern technology. An Executive Director in the Administration Department, who has been there for only three years, has been trying to change that, starting with getting three bids for any upgrade or improvement. "Our big challenge is finding experts who can tell us what we need, how to scale it and then, how much it will cost." Although cost is essential the organisation does not use any economic models in their decision-making process, however the Executive Director tries to do a cost benefit analysis for virtually every purchase.

Organisation 13 is a Canadian non-profit national professional organisation with 1000 members. It has one full time and one part time employee. It does not use the cloud and is not investigating its use since it has a server that has been paid for. Its Executive Director, who is partly involved in the decision-making process, says that as cost is essential in deciding whether or not to use the cloud the organisation "will do a cost analysis when the service is at full capacity and/or breaking down" and that they have not yet reached that point.

The five case examples are diverse in terms of their use of the cloud for storing records, with one using it specifically for its digital archives, three using it for business systems and therefore by default storing records, and one using it for a specific business function (teaching) but with no organisational records created. They use a range of economic/costing models and share a range of trust issues; these are discussed further below.

A number of lessons learned emerged from them relating to:

- Attitudes towards and perceptions of the cloud
- Requirements – both organisational and records management
- Stakeholders (ARM professionals, IT, senior management, records creators/users) – their roles and responsibilities, expertise, and knowledge/ understanding
- Economic modelling - scenario / context specific and needs to fully consider all hidden costs.

These are points for further analysis. Appendix D contains the complete short, descriptive case examples.

Summary

The project proposed a number of research questions:

- What economic/costing models are used in practice and why/why not?
- How are economic/costing models used in practice?
- What other models/approaches are used to underpin the decision-making process about the use (or not) of the cloud for StaaS? Why and how?
- How do the models/approaches used in practice compare with economic/costing models from the literature in terms of the factors considered?
- Who is involved in the decision-making process for using the cloud for StaaS and why?
- What are the issues of trust in using the cloud for StaaS and what factors contribute to trust in the decision-making process?

Regarding the use of economic/costing models in practice, the survey data was particularly significant in demonstrating how little such models are being used in decision-making. Only 15 respondents (roughly 25%) said that their organisation used any kind of economic/costing model to decide whether or not to use a third party cloud service provider for records storage. In the small number of respondents who did use a model, there is a tendency toward more basic comparisons of in-house vs. cloud costs as opposed to using the sophisticated models identified in the literature review. When asked how they used economic/costing models, these respondents indicated that a model was most often used to estimate costs (both for decision-making and as part of an adoption business case) and, at the organisation level, to monitor costs post-adoption.

The case examples largely confirmed these trends, illustrating the use of a range of economic models, the most popular being relative cost of operations (3), non-financial factors (3) and total cost of ownership (2). However, one organisation also used discounted cash flow and net present value. The choice of models was influenced either by those used by the organisation or due to the knowledge of those taking the lead role in the decision-making process or preparing the business case. With one exception the case organisations that used an economic model used more than one model and, like the survey respondents, as part of the business case and decision-making process more generally. None of these organisations is currently using the models in a formal way to monitor costs post-adoption. No other models or approaches were used to underpin the decision-making process about the use (or not) of the cloud for records storage.

Comparing the most popular models used in practice that emerged from the study with the models reported in real/hypothetical scenarios in the literature, only total cost of ownership (TCO) was common. Ostensibly TCO is the sum of *all* costs – direct and indirect - associated with a project or system e.g. energy/environmental, personnel, software/hardware, overheads[3]. However, the case examples from this study confirmed the point made by Reichman (2011, p. 13)[4] that whilst TCO is a good approach it is difficult to use accurately in practice, for example:

"TCO for on-premise solutions has often not factored in the hidden or 'unconscious' costs, such as someone's time helping to get something done. The organisation bears these, hidden as operational costs. TCO in the cloud environment is proving to be challenging" (Case example 3).

Reichman (2013) suggests that "a more pragmatic approach is to compare only the costs that change" i.e. the relative cost of operations. Taken together this perhaps accounts for TCO, relative cost of operations and non-financial models being the most popular in both the survey and the case examples, and ensuring as many key factors as possible are considered.

The survey identified the departments involved in making the decision whether or not to adopt cloud storage for records. The data indicates that IT and archives/records management are the departments most often involved in the decision-making process; however, IT generally plays the lead role. This was borne out in the case examples, although in some cases the archives/records management professionals were not involved. The case examples revealed that sometimes other stakeholders were involved (e.g. important departments with specific needs) and in one case the whole organisation

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[3] Dutta, A. K., & Hasan, R. (2013) How much does storage really cost? Towards a full cost accounting model for data storage. In: *Economics of Grids, Clouds, Systems, and Services.* Paper presented at the 10th International Conference: GECON 2013, 18-20 Sept, Zaragoza, Spain (pp. 29-43). Springer International Publishing. doi: 10.1007/978-3-319-02414-1_3
Rosenthal, D. C. et al. (2012a). Toward an economic model of long-term storage. *Poster presented at FAST2012 Work-In-Progress.* http://static.usenix.org/events/fast/poster_descriptions/Rosenthaldescription.pdf
Rosenthal, D. S. et al. (2012b). The economics of long-term digital storage. *Paper presented at Memory of the World in the Digital Age, Vancouver, BC.* Retrieved from http://www.lockss.org/locksswp/wp-content/uploads/2012/09/unesco2012.pdf
[4] Reichman, A. (2011). *File storage costs less in the cloud than in-house.* http://media.amazonwebservices.com/Forrester_File_Storage_Costs_Less_In_The_Cloud.pdf

was consulted. Either the Finance Department/Director and/or the senior management team were usually responsible for making the final decision.

Finally, survey respondents overall demonstrated high levels of concern about issues of trust related to using the cloud for records StaaS. The largest areas of concern, for both respondents and their organisations, were around issues of sustainability, including economic sustainability. Specifically, about half (30 respondents) said their organisation was extremely concerned about the provider continuing to deliver a sustainable storage service. Other major issues of trust were concerns about the provider offering and continuing to deliver an economically viable service. In identifying the specific factors that contributed to trust in the decision-making process, the service provider/vendor reputation was selected by the most respondents and risk management was also a factor for many respondents. However, levels of concerns about the cloud tended to be less acute in the case examples, irrespective of their use or not of the cloud for records storage (deliberately or by default in business systems). In fact all of the case organisations suggested that the cloud is here, should not be viewed as wholly different and needs to be considered carefully and proactively in terms of both potential benefits and risks.

Although the survey had a limited number of complete responses, the results do provide an indication of the use, or not, of economic models in the decision-making process concerning adoption of cloud computing services for records storage. Since no published case examples of the use of any economic models by ARM professionals were identified in the literature[5] the five case examples help to fill a gap. They provide ARM professionals, and others, with a range of experiences and offer lessons learned which could lead to recommendations on the use of economic models for decision-making in the context of cloud storage for digital information. This issue is key to trusting in the economic viability and sustainability of using cloud storage for digital information (not specifically digital preservation).

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[5] McLeod, J. & Gormly, B. (2015). *Economic models for storage of records in the cloud (StaaS) – A critical review of the literature (EU18).* InterPARES Trust Project. Retrieved from https://interparestrust.org/assets/public/dissemination/EU18_20150713_CloudEconomicsLitReview_Final Report.pdf

Cloud Services for Records Storage

Cloud Services for Records Storage – Use of Economic Models in Decision-Making

We invite you to participate in a survey as part of the InterPARES (International Research on Permanent Authentic Records in Electronic Systems) Trust project exploring issues concerning digital records and data entrusted to the Internet (https://interparestrust.org/). Its purpose is to explore the use, or otherwise, of economic models in making decisions about adopting external, third party cloud services for storing organisations' records, and to identify case examples that illustrate the role of economic models in cloud storage decision-making. The research is being conducted by Professor Julie McLeod, Northumbria University (julie.mcleod@northumbria.ac.uk) and Ms Brianna Gormly, University of British Columbia, Canada (brianna.gormly@alumni.ubc.ca).The survey should take 15-20 minutes of your time. It does not ask for organisational or personal identifiers unless you are willing to take part in a short follow-up interview to provide a case example. Case examples can be anonymised should you wish. The data from the online survey tool will be stored securely in Canada. The research has been approved by the Northumbria University's Ethics Committee.

Part 1: About Your Organisation

Which of the following categories best describes your organisation?

○ Governmental

○ Intergovernmental

○ Private

○ Non-Profit

○ Public

○ Education

○ Other, please specify… _____

What is the approximate number of persons employed by your organisation? (Please choose only one of the following)

○ Less than 100

○ 100-299

○ 300-499

○ 500-999

○ 1,000-4,999

○ 5,000-10,000

○ More than 10,000

Please state the country where you work. If you work in multiple countries please state the country where you are based.

○ Afghanistan

○ Albania

○ Algeria

○ Andorra

○ Angola

○ Antarctica

○ Antigua and Barbuda

- ○ Argentina

- ○ Armenia

- ○ Australia

    ... 171 additional choices hidden ...

- ○ United Kingdom

- ○ United States

- ○ Uruguay

- ○ Uzbekistan

- ○ Vanuatu

- ○ Venezuela

- ○ Vietnam

- ○ Yemen

- ○ Zambia

- ○ Zimbabwe

Use of Third Party Cloud Service Providers for Records Storage in Your Organisation

Does your organisation use an external third party cloud service provider for storing any of its records? (Third party cloud services include public cloud, community cloud, or hybrid cloud as well as private clouds managed by a third party.)

- ○ Yes
- ○ No
- ○ In the past but not now
- ○ Don't know

Why? (Choose all that apply)

- ☐ Cost savings in hardware & software
- ☐ Cost savings in human resources
- ☐ Trust in cloud computing deployment models
- ☐ Trust in cloud service providers
- ☐ Increased flexibility; energy savings
- ☐ Sustainability; access to specialised services
- ☐ Access to specialist skills
- ☐ Improved reliability of service; backup
- ☐ Disaster recovery/business continuity
- ☐ Improved scalability of IT infrastructure
- ☐ Enhanced availability
- ☐ Other, please specify... _____

Why not? (Choose all that apply)

- ☐ Negligible or insufficient financial savings
- ☐ Negligible or insufficient savings in human resources and time
- ☐ Legal/regulatory requirements
- ☐ Lack of trust in cloud service providers

- ☐ Loss of specialist IT skills

- ☐ Transfer of costs from capital to operating budget

- ☐ Other, please specify... _____

Why did you stop?

[   ]

Which cloud service model does/did your organisation use?
- ○ Public

- ○ Private

- ○ Community

- ○ Hybrid (i.e. a combination of more than one of the above)

What factors did your organisation consider in deciding whether or not to use an external third party cloud service(s) for storing some/all of its records? (Choose all that apply)
- ☐ Capital cost (i.e. fixed, one-time investment)

- ☐ Operating costs (i.e. ongoing expenditure)

- ☐ Technology suitability

- ☐ Stakeholder impact

- ☐ Socio-political benefits

- ☐ Risks

- ☐ Responsibilities

- ☐ Other, please specify... _____

- ☐ Don't know

Which departments in your organisation are involved in decision-making about the adoption (or not) of third party external cloud services for storing some/all of its records? (Choose all that apply)
- ☐ Administration

- ☐ Archives/Records Management
- ☐ Audit
- ☐ Finance
- ☐ IT
- ☐ Legal
- ☐ Information governance and/or security
- ☐ Risk management
- ☐ Senior management
- ☐ Other, please specify... _____
- ☐ Don't know

Which department in your organisation plays the lead role in adopting (or choosing not to adopt) third party external cloud services for storing some/all of its records? (Choose only one)

- ○ Admin
- ○ Archives/Records Management
- ○ Audit
- ○ Business users
- ○ Finance
- ○ IT
- ○ Legal
- ○ Information governance and/or security
- ○ Risk management
- ○ Senior management
- ○ A combination of more than one, please specify... _____
- ○ Other, please specify... _____
- ○ Don't know

For which of the following does/did your organisation use a third party cloud service(s)? (Choose all that apply)

- ☐ Short term (i.e. 1-9 years) storage of ALL of its records

- ☐ Short term (i.e. 1-9 years) storage of SOME of its records

- ☐ Longer term (i.e. 10+ years) storage of ALL of its records

- ☐ Longer term (i.e. 10+ years) storage of SOME of its records

- ☐ Other, please specify... _____

- ☐ Don't know

For which of your organisation's functions are/were records stored with a third party cloud service(s)? (Choose all that apply)

- ☐ Administration

- ☐ Finance

- ☐ Personnel

- ☐ Facilities management

- ☐ Core business functions (e.g. manufacturing; sales; research)

- ☐ Other, please specify... _____

- ☐ Don't know

Does your organisation apply a security classification system to its records?

- ○ Yes

- ○ No

- ○ Don't know

What are/were the categories of security classification assigned to records stored with third party cloud services? (Choose all that apply)

- ☐ Public

- ☐ Internal/confidential

- ☐ Restricted/sensitive/secret

- ☐ Highly confidential/top secret

- ☐ Other, please specify... _____

- ☐ Don't know

Does your organisation apply records access restrictions to its personnel?

○ Yes

○ No

○ Don't know

For your organisation, how important are the following issues of trust in adopting (or not adopting) an external third party cloud service(s) for storing some/all of your organisation's records?

Concerns about the service provider's offer of an economically viable service

Concerns about the service provider continuing to deliver an economically viable service

Concerns about the service provider continuing to deliver a sustainable storage service

Vendor lock-in

Unfavourable contractual terms offered by cloud service providers

Negligible or insufficient financial savings

Negligible or insufficient savings in human resources and time

Lack of trust in cloud computing models (e.g. public, private, community, and hybrid models)

Lack of trust in cloud service providers

Concerns about the internal/organisational decision-making process

Answer choices for each of the above:

○ Not (at all) important

○ Slightly important

○ Moderately important

○ Very important

○ Extremely important

○ Don't know

Has your organisation considered other issues of trust not included in the above list?

[   ]

What factors contribute to your organisation's trust in the decision-making process? (Choose all the apply)

- ☐ Service provider/ vendor reputation
- ☐ Robust internal processes
- ☐ Clear problem definition and/or goal
- ☐ Involvement of relevant stakeholders
- ☐ Thorough investigation of situation
- ☐ Analysis of alternatives
- ☐ Taking account of regulatory/legislative requirements
- ☐ Risk management
- ☐ Other, please specify... _____
- ☐ Don't know
- ☐ Trust in the decision-making process has not been considered

How would you characterize the impact of moving from capital (i.e. fixed, one time) cost investment to operating cost (i.e. ongoing expenditure) in storing records with a cloud service provider?

- ○ Very negative
- ○ Somewhat negative
- ○ Neutral
- ○ Somewhat positive
- ○ Very positive
- ○ Don't know

Use of Costing/Economic* Models in Adopting Third Party Cloud Services for Records Storage in Your Organisation

* Any model or calculation for determining the cost of cloud storage; this includes models underpinned by economic, financial or management accounting theories as well as those considering a wider range of costs, e.g. social and environmental costs

For your organisation, how important is cost in deciding whether or not to adopt an external third party cloud service(s) for storing some/all of its records?

○ Not at all important

○ Slightly important

○ Very important

○ Essential

○ Critical

○ Don't know

Does your organisation use any costing/economic model in deciding whether or not to adopt an external third party cloud service(s) for storing some/all of its records?

○ Yes

○ No

○ Don't know

Which of the following models has your organisation used in deciding whether or not to adopt an external third party cloud service(s) for storing some/all of its records? Choose all that apply

☐ Discounted Cash Flow

☐ Net Present Value

☐ Differential Net Present Value

☐ Internal Rate of Return

☐ Monte Carlo models

☐ Kryder's Law

☐ Full Cost Accounting

- ☐ Total Cost of Ownership

- ☐ Acquisition interval (i.e. length of acquisition between purchase of additional storage)

- ☐ Relative cost of operations (i.e. comparison of costs that change between in-house and cloud, including service life of storage, redundancy copies, personnel and infrastructure)

- ☐ Non-financial factors (e.g. technology suitability, stakeholder impact, socio-political benefits, risks, responsibilities)

- ☐ Other, please specify... _____

How does your organisation use/has your organisation used costing/economic models in the context of using external third party cloud service(s) for storing some/all of its records? (Choose all that apply)

- ☐ To estimate costs as part of the adoption decision-making process

- ☐ To estimate costs as part of an adoption business case

- ☐ To use in supplier contract negotiations

- ☐ To use for service level agreements

- ☐ To monitor costs post-adoption (i.e. estimated vs. actual)

- ☐ Other, please specify... _____

- ☐ Don't know

Part 2: About You

What is your area of responsibility in your organisation? (Choose only one)
○ Administration

○ Audit

○ IT

○ Legal

○ Records / Archives (services/practice/advice)

○ Records / Archives (teaching and/or research)

○ Risk Management

○ Finance

○ Other, please specify... _____

How would you describe your level of responsibility in your organisation?
○ Professional level

○ Professional level with management responsibilities

○ Senior management

○ Other, please specify... _____

In which department/service do you work?
○ Legal/Regulatory

○ Finance

○ Research

○ Administration

○ Facilities Management

○ Quality Assurance

○ Audit

○ Communications / Public Relations

- ○ IT

- ○ Records / Archives (services/practice/advice)

- ○ Academic (i.e. teaching and/or research)

- ○ Risk Management

- ○ Other, please specify... _____

If your department/service is located within a larger organisational function, in which function is it located?

- ○ Legal/Regulatory

- ○ Finance

- ○ Research

- ○ Administration

- ○ Facilities Management

- ○ Quality Assurance

- ○ Academic (i.e. teaching and/or research)

- ○ Other, please specify... _____

- ○ Not applicable

Use of Costing/Economic* Models in Adopting Third Party Cloud Services for Records Storage in Your Organisation

* Any model or calculation for determining the cost of cloud storage; this includes models underpinned by economic, financial or management accounting theories as well as those considering a wider range of costs, e.g. social and environmental costs

How involved are you in decision-making about the adoption (or not) of third party external cloud services for storing some/all of your organisation's records?

○ Largely involved

○ Partly involved

○ Not involved

Do you use any costing/economic model in deciding whether or not to adopt an external third party cloud service(s) for storing some/all of your organisation's records?

○ Yes

○ No

Which of the following models have you used in deciding whether or not to adopt an external third party cloud service(s) for storing some/all of its records? (Choose all that apply)

☐ Discounted Cash Flow

☐ Net Present Value

☐ Differential Net Present Value

☐ Internal Rate of Return

☐ Monte Carlo models

☐ Kryder's Law

☐ Full Cost Accounting

☐ Total Cost of Ownership

☐ Acquisition interval (i.e. length of acquisition between purchase of additional storage)

☐ Relative cost of operations (i.e. comparison of costs that change between in-house and cloud,

including service life of storage, redundancy copies, personnel and infrastructure)

☐ Non-financial factors (e.g. technology suitability, stakeholder impact, socio-political benefits, risks, responsibilities)

☐ Other, please specify... _____

How involved are/were you in post-adoption evaluation/monitoring of the cost of third party external cloud services for storing some/all of your organisation's records?

○ Largely involved

○ Partly involved

○ Not involved

How are you using/have you used costing/economic models in the context of using external third party cloud service(s) for storing some/all of your organisation's records? (Choose all that apply)

☐ To estimate costs as part of the adoption decision-making process

☐ To estimate costs as part of an adoption business case

☐ To use in supplier contract negotiations

☐ To use for service level agreements

☐ To monitor costs post-adoption (i.e. estimated vs. actual)

☐ Other, please specify... _____

For you, how important are the following issues of trust in adopting (or not adopting) an external third party cloud service(s) for storing some/all of your organisation's records?

Concerns about the service provider's offer of an economically viable service

Concerns about the service provider continuing to deliver an economically viable service

Concerns about the service provider continuing to deliver a sustainable storage service

Vendor lock-in

Unfavourable contractual terms offered by cloud service providers

Negligible or insufficient financial savings

Negligible or insufficient savings in human resources and time

Lack of trust in cloud computing models (e.g. public, private, community, and hybrid models)

Lack of trust in cloud service providers

Concerns about the internal/organisational decision-making process

Answer choices for each of the above:

- ○ Not (at all) important
- ○ Slightly important
- ○ Moderately important
- ○ Very important
- ○ Extremely important
- ○ Don't know

Have you considered other issues of trust not included in the above list?

[   ]

What factors contribute to your trust in the decision-making process for adopting (or not adopting) an external third party cloud service(s) for storing some/all of your organisation's records? (Choose all that apply)

- ☐ Service provider/vendor reputation
- ☐ Robust internal processes
- ☐ Clear problem definition and/or goal
- ☐ Involvement of relevant stakeholders
- ☐ Thorough investigation of situation
- ☐ Analysis of alternatives
- ☐ Taking account of regulatory/legislative requirements
- ☐ Risk management
- ☐ Other, please specify... _____
- ☐ No factors of trust contribute to the decision making process

Finally…

This survey is anonymous however we would like to identify some case examples of the use and non-use of external third party cloud services for records storage and publish them as part of the research findings. We would draft a case example (~500 words), based on a short discussion, which can be anonmyised or not, and ask you to finalise it prior to publication. Would you be willing to be contacted for a short discussion about why and how you use the cloud for storing any of your organisation's records, or do not use it?

I would be willing to be contacted for an interview.

○ Yes

○ No

Name

Email

Telephone number or skype address

Thank you for completing the survey

Appendix B – Dissemination channels used for the final survey

Archives and Records Association (UK)	listserv
Archives Professionals	LinkedIn group
ARMA	listserv
Association of Canadian Archivists (ACA)	LinkedIn group
Australian Archives	listserv
Canadian Archives	ARCAN-L listserv
Digital Curation Centre	via contact
Digital Preservation Coalition	via contact
International Council on Archives	listserv
IRMS (UK)	listserv
Library and Information Science (UK)	LIS-LINK listserv
Management and Preservation of Electronic Records	ERECS-L listserv
Records Management Program	RECMGMT-L listserv
RIMPAA (Australia)	listserv
Society of American Archivists	Archives & Archivists (A&A) listserv

In addition, professional bodies in other countries were contacted through InterPARES Trust Team directors as well as range of individual contacts in different roles, sectors and countries around the world.

Part 1: About Your Organisation

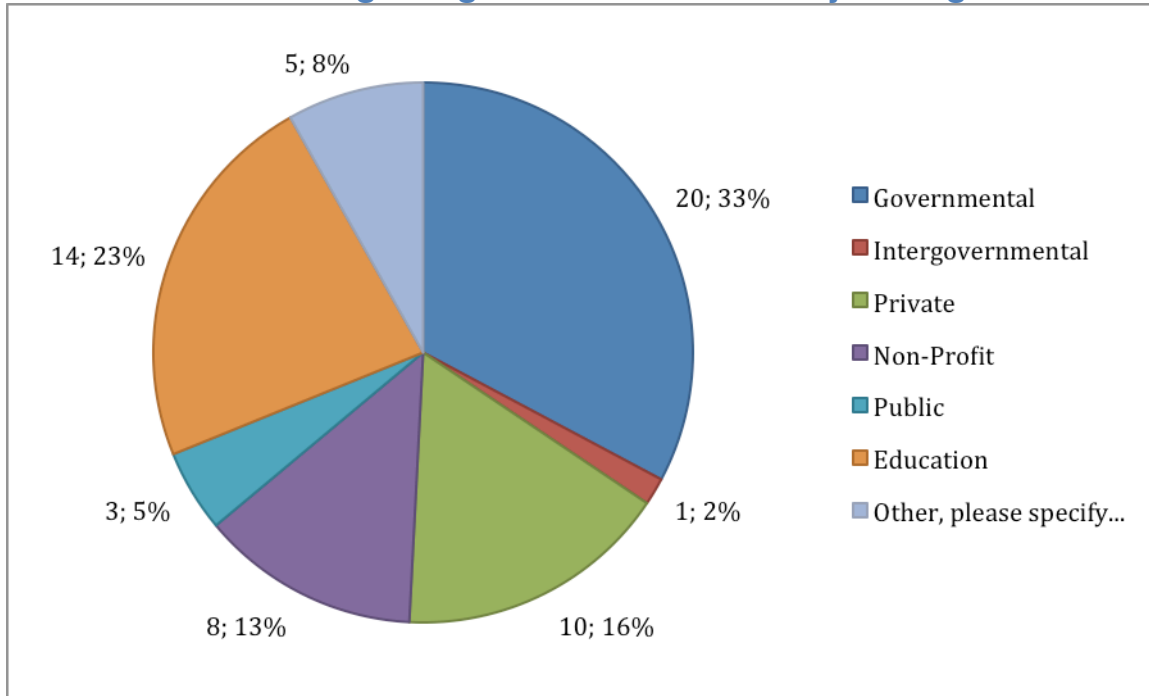### Which of the following categories best describes your organisation?

Figure 1

Of the respondents who chose "Other," three specified work with government records, specifically a contractor to a federal agency and employees of a government corporation and a state-owned enterprise. Another respondent worked at a public research institution and one was retired.

What is the approximate number of persons employed by your organisation? (Please choose only one of the following)
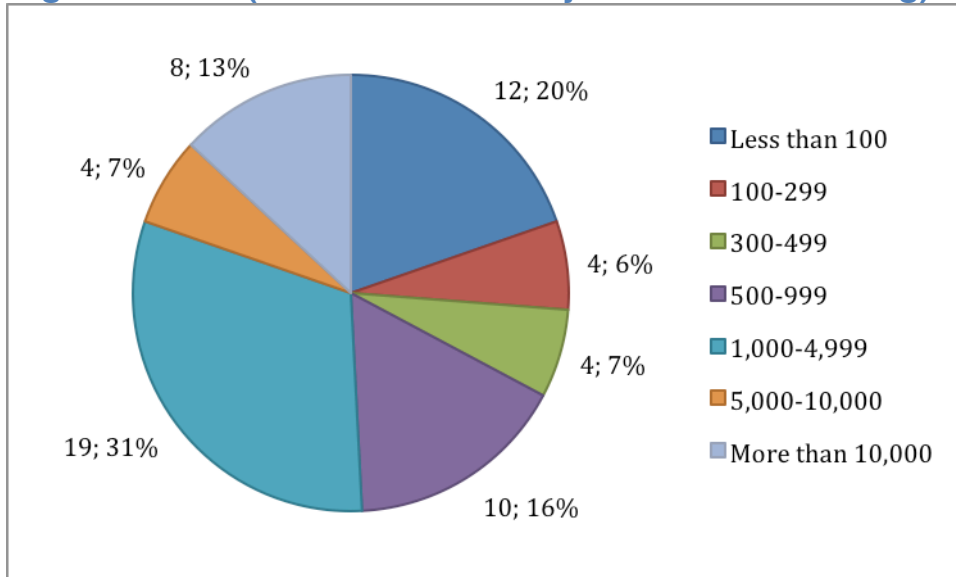

Figure 2

Please state the country where you work. If you work in multiple countries, please state the country where you are based.
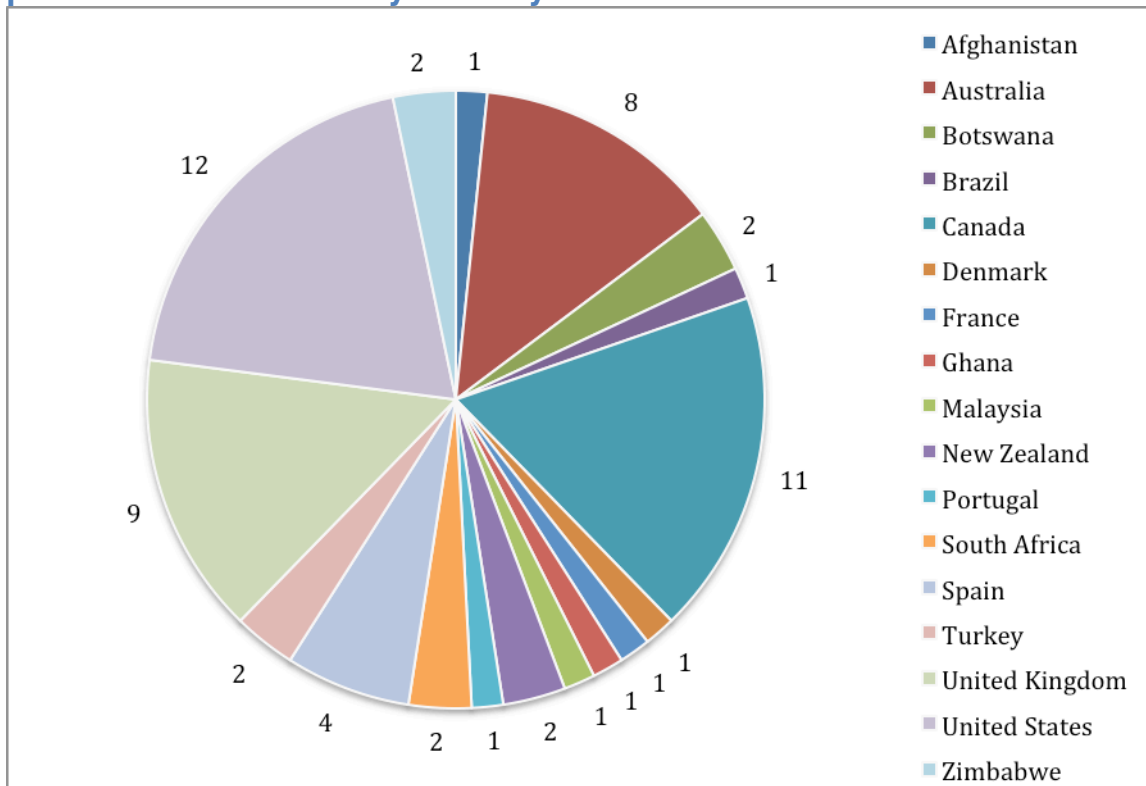

Figure 3

Use of Third Party Cloud Service Providers for Records Storage in Your Organisation

Does your organisation use an external third party cloud service provider for storing any of its records? (Third party cloud services include public cloud, community cloud, or hybrid cloud as well as private clouds managed by a third party.)
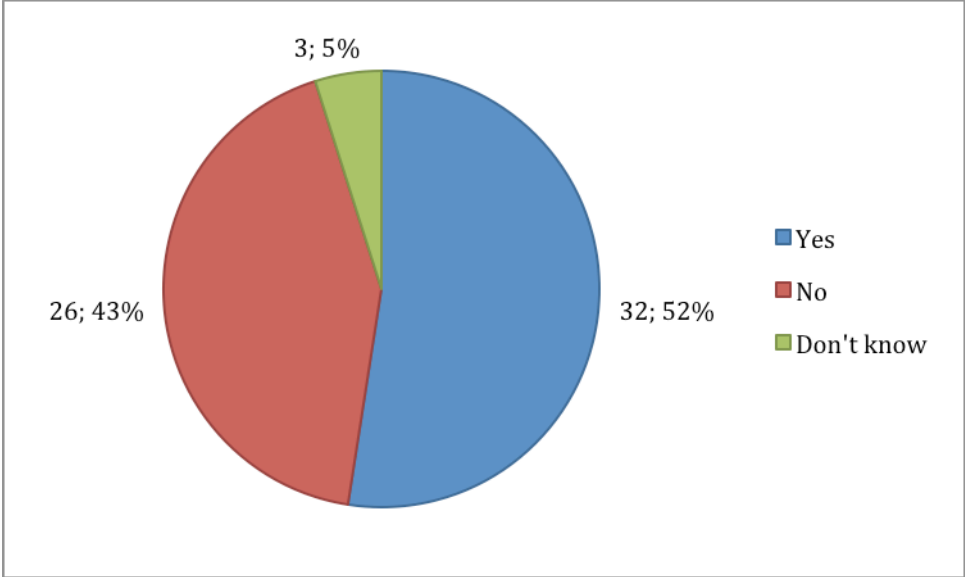

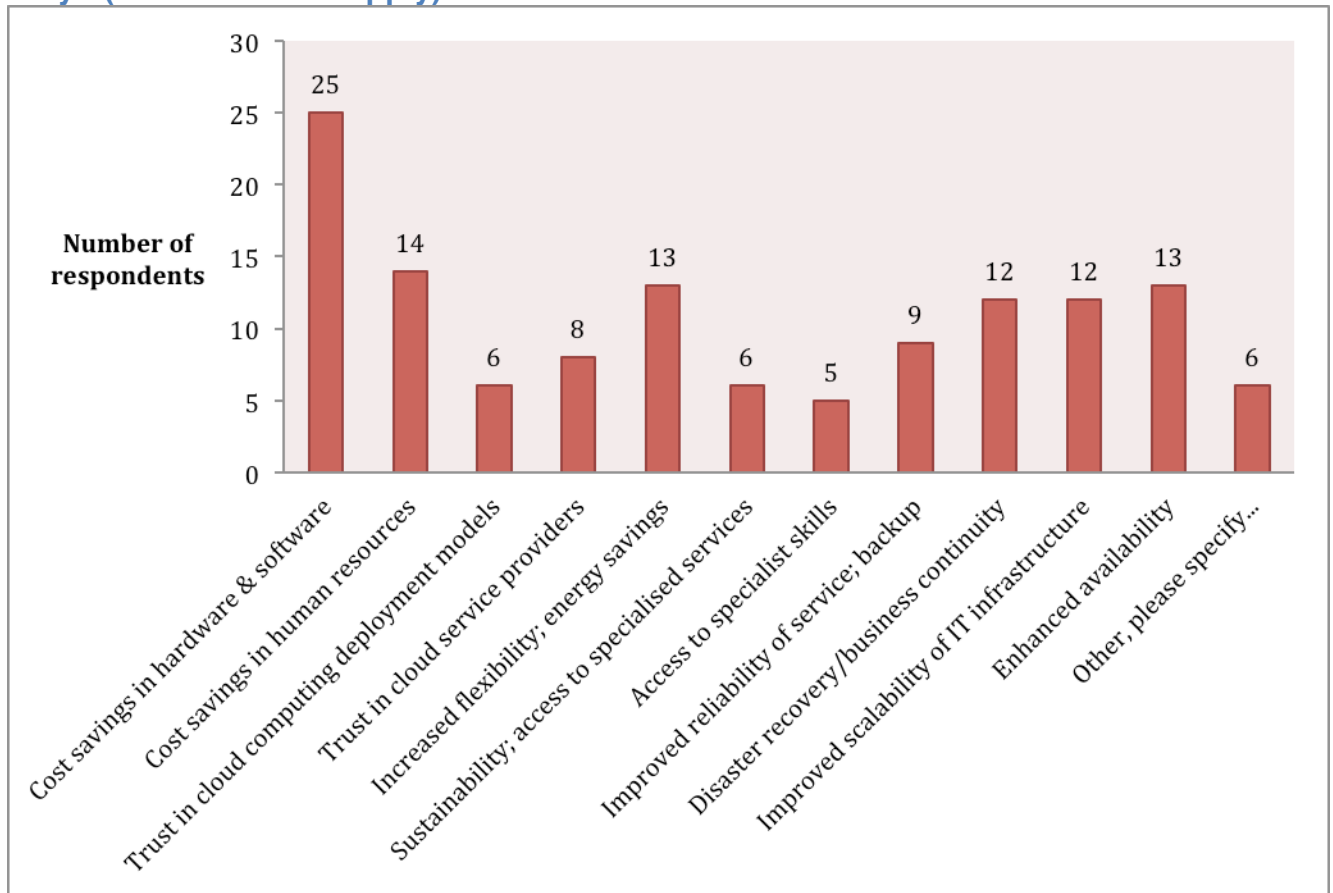**Figure 4**

Why? (choose all that apply)

Figure 5

Respondents who answered "yes" their organisation uses external third party cloud service providers (32 respondents) were asked why they chose cloud services. Two respondents who chose "other" explained that pressure toward cloud storage came from relationships between their organisation and other parties. One respondent from a government context said that the decision was based on relationships with parent administrations. Another respondent explained that the choice was driven by "external business partners" and that cloud capabilities for providing access to information is a large driver for business. Two other respondents stated that they were driven toward cloud services because cloud services were the only option provided by a vendor for a service/software. Finally, one other respondent stated that moving to the cloud came from IT avoiding centralised control, and another said that his/her organisation did not have a records management program.
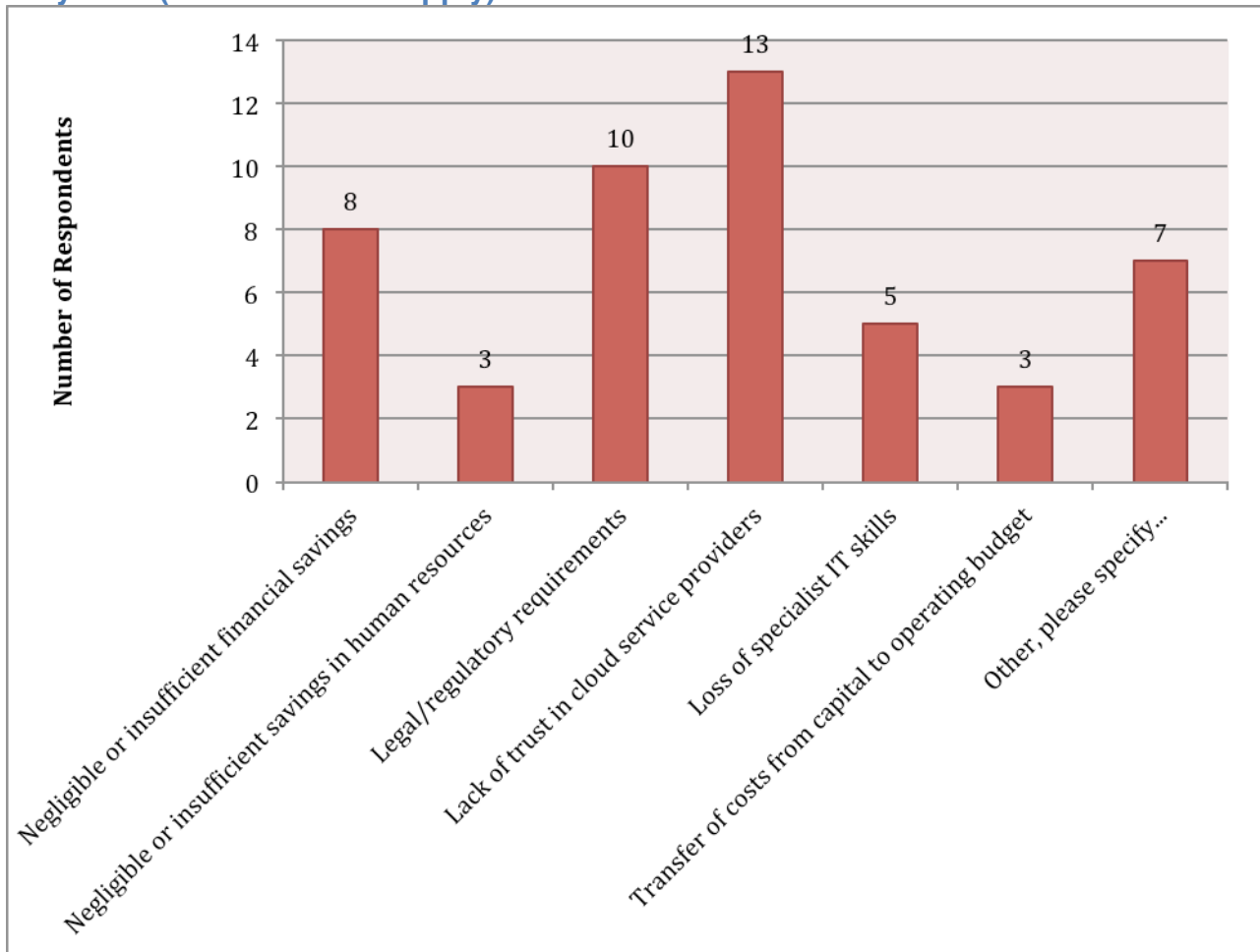
Why not? (Choose all that apply)

Figure 6

Respondents who answered "no" they did not use external third party cloud service (26 respondents) were asked "Why not?" Of the respondents who chose "other," two said that the choice not to use cloud storage was based on security concerns. Three others expressed a lack of organisational support/interest in exploring cloud options. One other respondent was still exploring storage options, and another did not have the budget necessary to migrate records to the cloud.

Why did you stop?

No respondents said that they had used cloud storage "In the past but not now" so no respondents were filtered to this question.

Which cloud service model does/did your organisation use?

5; 16% — Public
10; 31% — Hybrid (i.e. a combination of more than one of the above)
17; 53% — Private

Public

Private

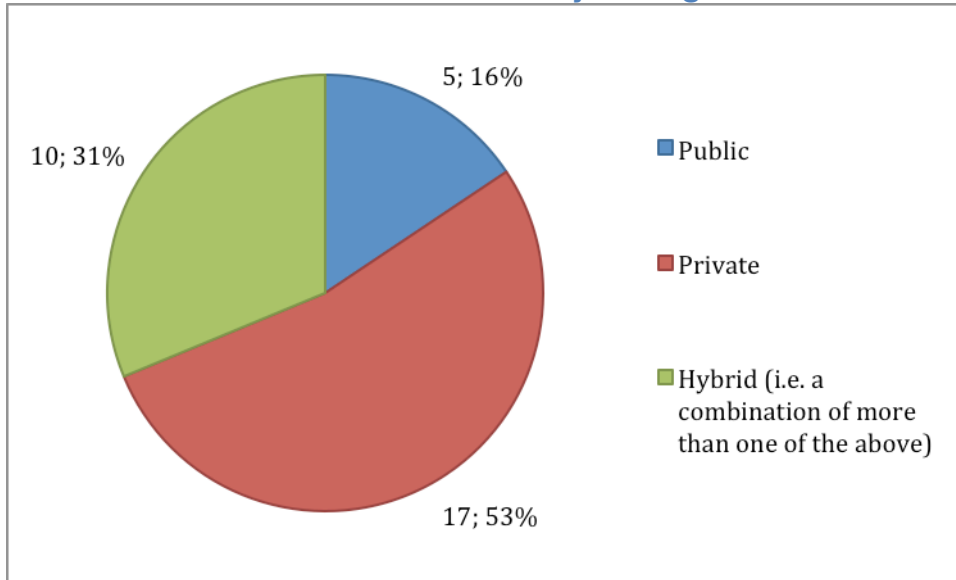Hybrid (i.e. a combination of more than one of the above)

Figure 7

What factors did your organisation consider in deciding whether or not to use an external third party cloud service(s) for storing some/all of its records? (Choose all that apply)

Capital cost (i.e. fixed, one-time investment)

Operating costs (i.e. ongoing expenditure)

Technology suitability

Stakeholder impact

Socio-political benefits

Risks

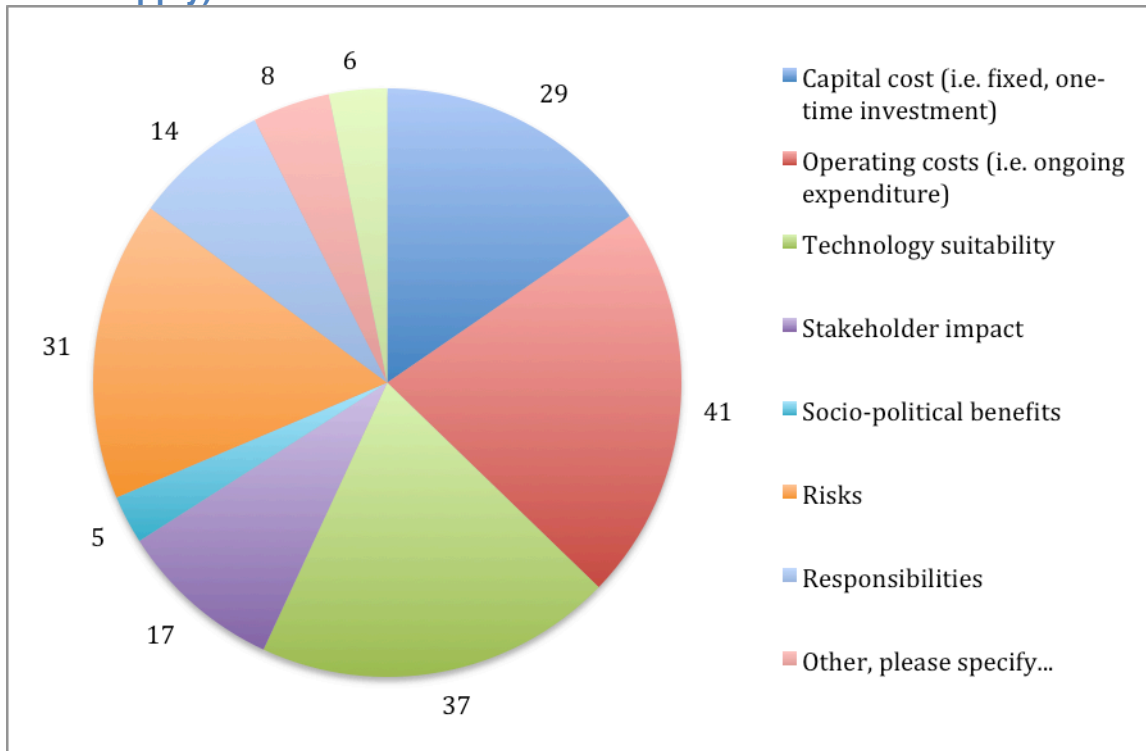Responsibilities

Other, please specify...

Figure 8

Three respondents who answered "other" indicated factors relating to collaboration/sharing with parties internal and external to the organisation over multiple

systems. Another respondent stated that cloud adoption was driven by services only available as a cloud services. Other technical factors included geographic dispersal of data (1 respondent) and data type (1 respondent). Two other respondents indicated human factors, specifically senior management by-in and contract negotiation for grant funding.

Which departments in your organisation are involved in decision-making about the adoption (or not) of third party external cloud services for storing some/all of its records? (Choose all that apply)
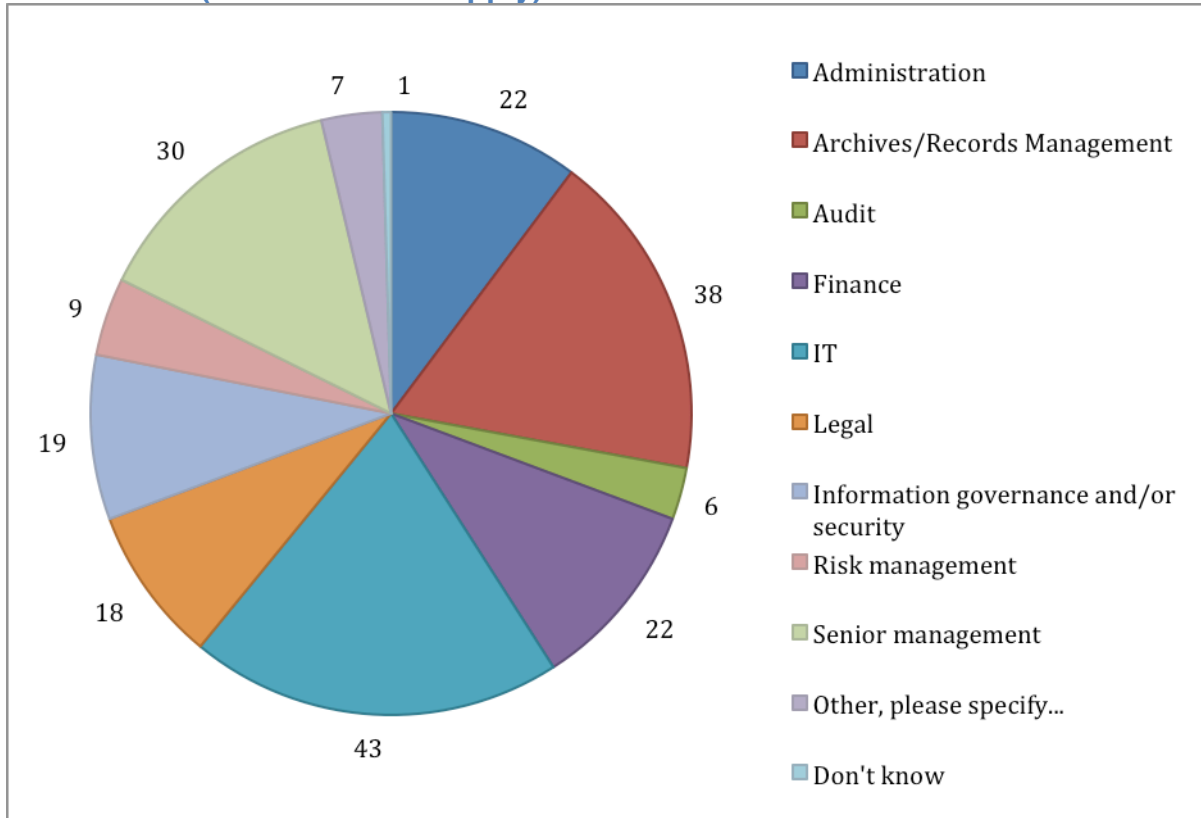
Figure 9

Three of the respondents who chose "other" explained that individual departments were moving to the cloud for their own needs without controls or centralised decision-making. Another respondent indicated that different departments would be involved at different stages of adoption (specifically: records management, risk management, and legal). Three other respondents listed information services, human resources, and library.

Which department in your organisation plays the lead role in adopting (or choosing not to adopt) third party external cloud services for storing some/all of its records? (Choose only one)
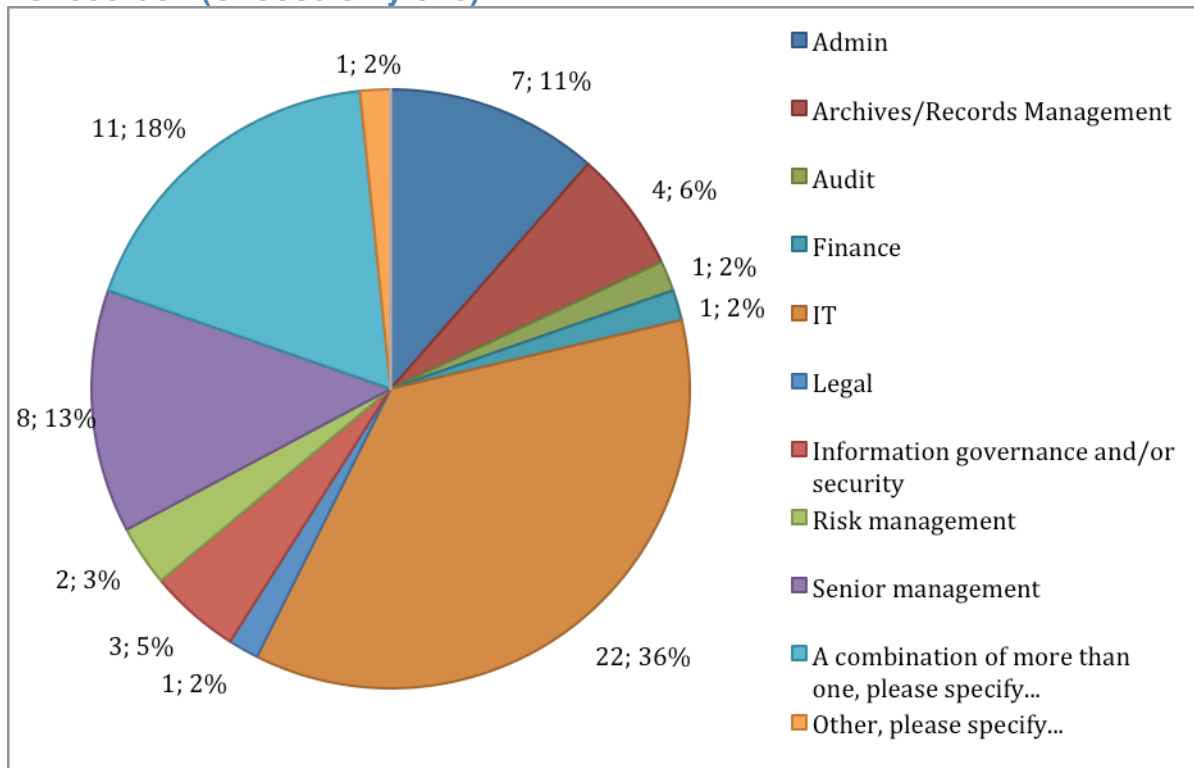

Figure 10

Of the respondents who chose "A combination of more than one," three responded that the lead department was a combination of archives/records management and IT (with one also adding senior management), and another two explained that it was a combination of information governance and IT (with one also adding security). One respondent said that, generally, IT was the led department but that ad hoc adoption was taking place in departments across the organisation, and another said that individual departments were adopting the cloud to meet their specific needs. Three other responses specified senior management in combination with other departments (IT, legal, and users). No respondents chose "Business users" and none said that they didn't know. Respondents who chose "other" indicated other information-related departments (specifically information management and library).

For which of the following does/did your organisation use a third party cloud service(s)? (Choose all that apply)

Figure 11

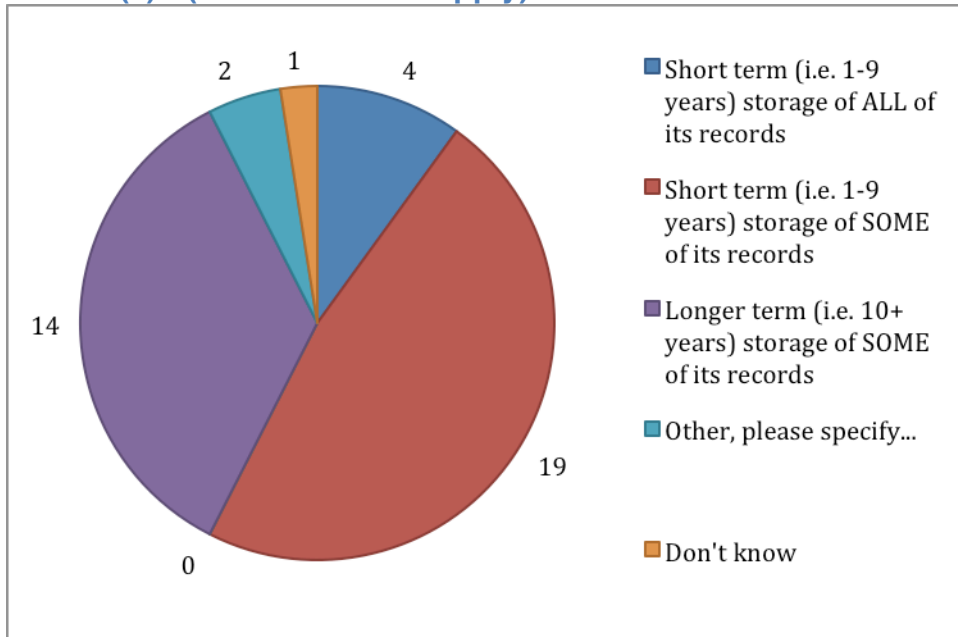Respondents were asked about the term of storage for which their organisation used a third party cloud service provider. They could choose all applicable options. Two respondents answered "Other," one stating that s/he had "limited knowledge" of the situation and the other stating that a vendor had been used for two years so far. No respondents answered "Longer term (i.e. 10+ years) storage of ALL of its records."

For which of your organisation's functions are/were records stored with a third party cloud service(s)? (Choose all that apply)
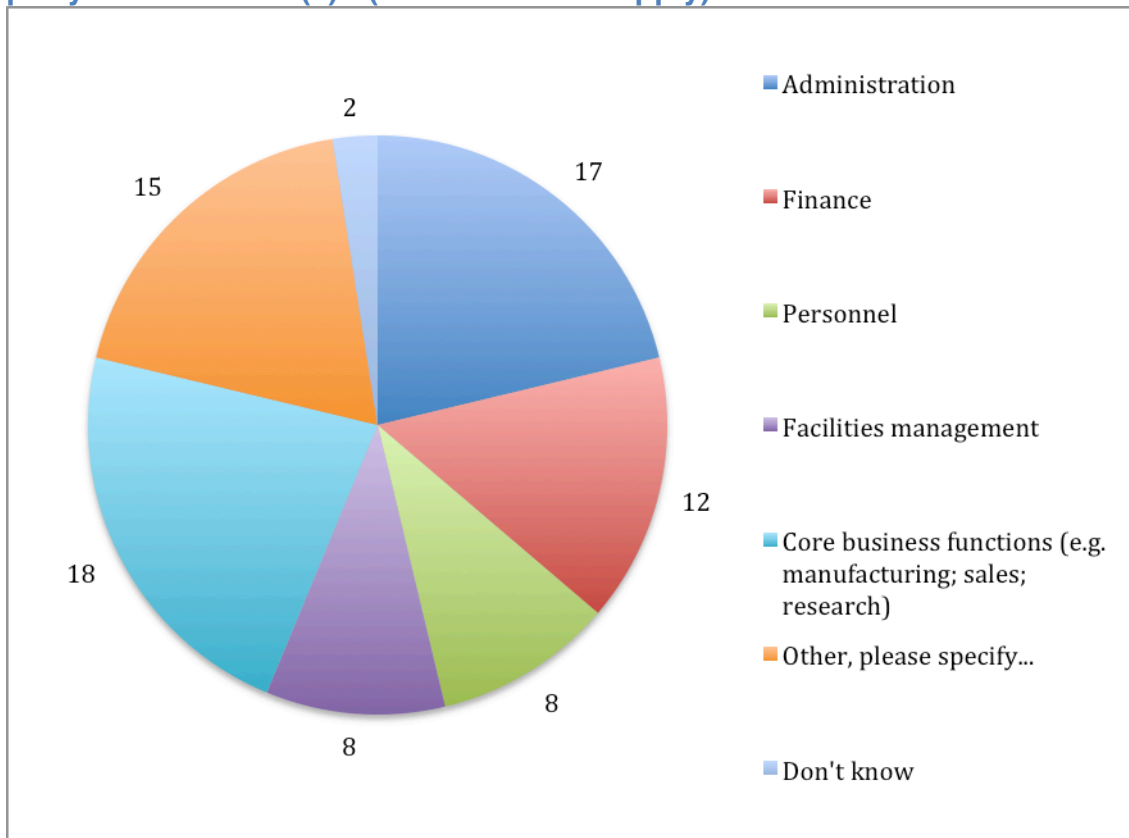
Figure 12

Respondents who selected "other" specified the following categories of records: online information resources, property, public security, historical, faculty records, Geographic Information Systems, mailboxes, research data, digital media, grants from a joint research project, and student records. Three respondents were using cloud storage for research data and two were using it for historical archives, all other categories were indicated by only one respondent. One respondent stated that no archival records are storage in the cloud and that "the archivist was firm on this matter."

Does your organisation apply a security classification system to its records?
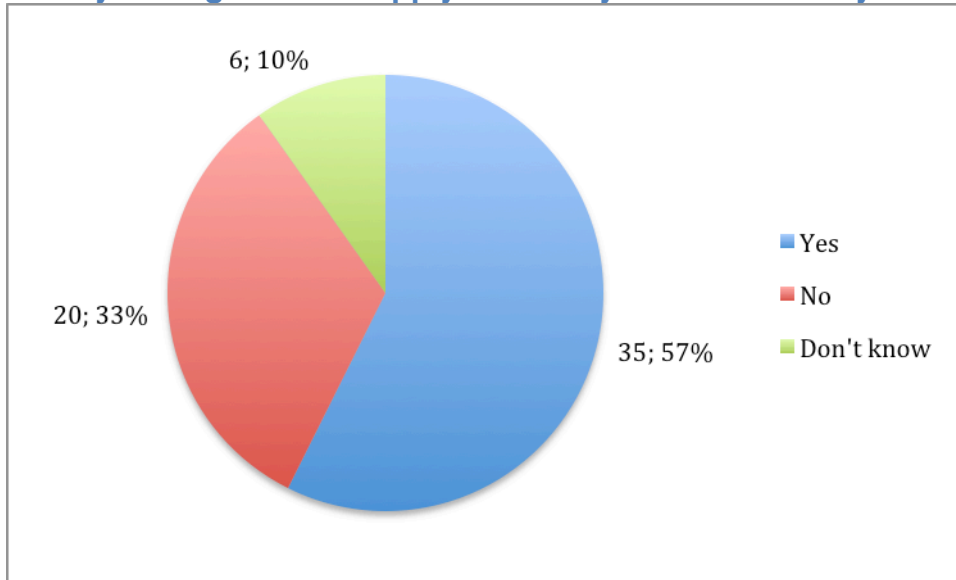
Figure 13

What are/were the categories of security classification assigned to records stored with third party cloud services? (Choose all that apply)
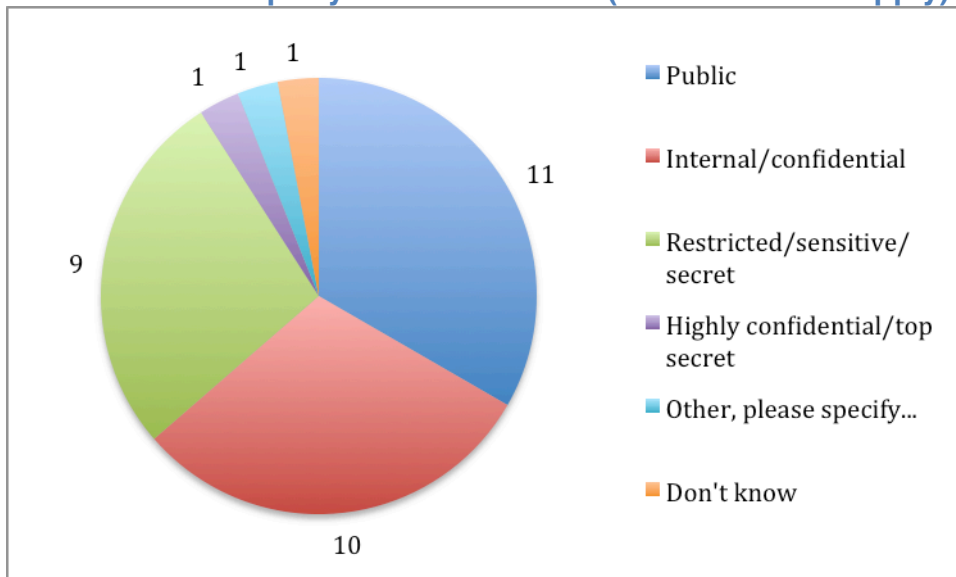
Figure 14

Respondents who answered "yes" they used a cloud service provider at the beginning of the survey were further asked what records were stored in the cloud. They could choose all relevant answers. The one respondent who chose "Other" specified that the categories used were "Non Sensitive, Low Sensitivity, Moderate Sensitivity, High Sensitivity."

Does your organisation apply records access restrictions to its personnel?
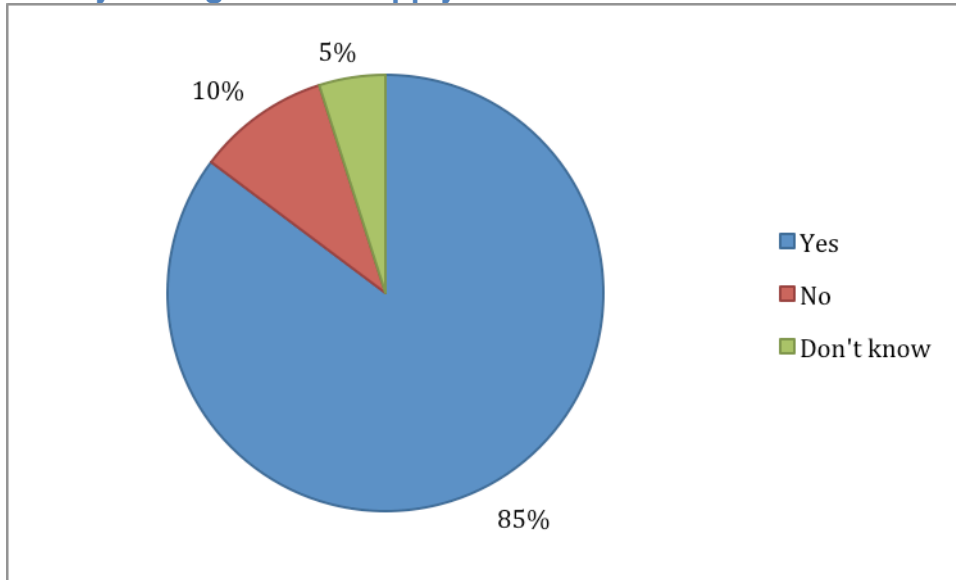
Figure 15

All respondents were asked if their organisation applied records access restrictions to its personnel.

For your organisation, how important are the following issues of trust in adopting (or not adopting) an external third party cloud service(s) for storing some/all of your organisation's records?

All respondents were asked to rank issues of trust in the organisation's decision to adopt or not to adopt external third party cloud storage of some or all records. The following figures show responses to this question from all respondents as well as the responses filtered to show the difference in responses between respondents in organisations using and not using cloud storage.

All Respondents

Concerns about the internal/organisational decision-making process
- Don't know: 8
- Extremely important: 15
- Very important: 9
- Moderately important: 16
- Slightly important: 6
- Not (at all) important: 7

Lack of trust in cloud service providers
- Don't know: 5
- Extremely important: 16
- Very important: 18
- Moderately important: 13
- Slightly important: 4
- Not (at all) important: 5

Lack of trust in cloud computing models (e.g. public, private, community, and hybrid models)
- Don't know: 6
- Extremely important: 16
- Very important: 18
- Moderately important: 9
- Slightly important: 6
- Not (at all) important: 6

Negligible or insufficient savings in human resources and time
- Don't know: 3
- Extremely important: 13
- Very important: 18
- Moderately important: 11
- Slightly important: 9
- Not (at all) important: 7

Negligible or insufficient financial savings
- Don't know: 2
- Extremely important: 16
- Very important: 19
- Moderately important: 9
- Slightly important: 9
- Not (at all) important: 6
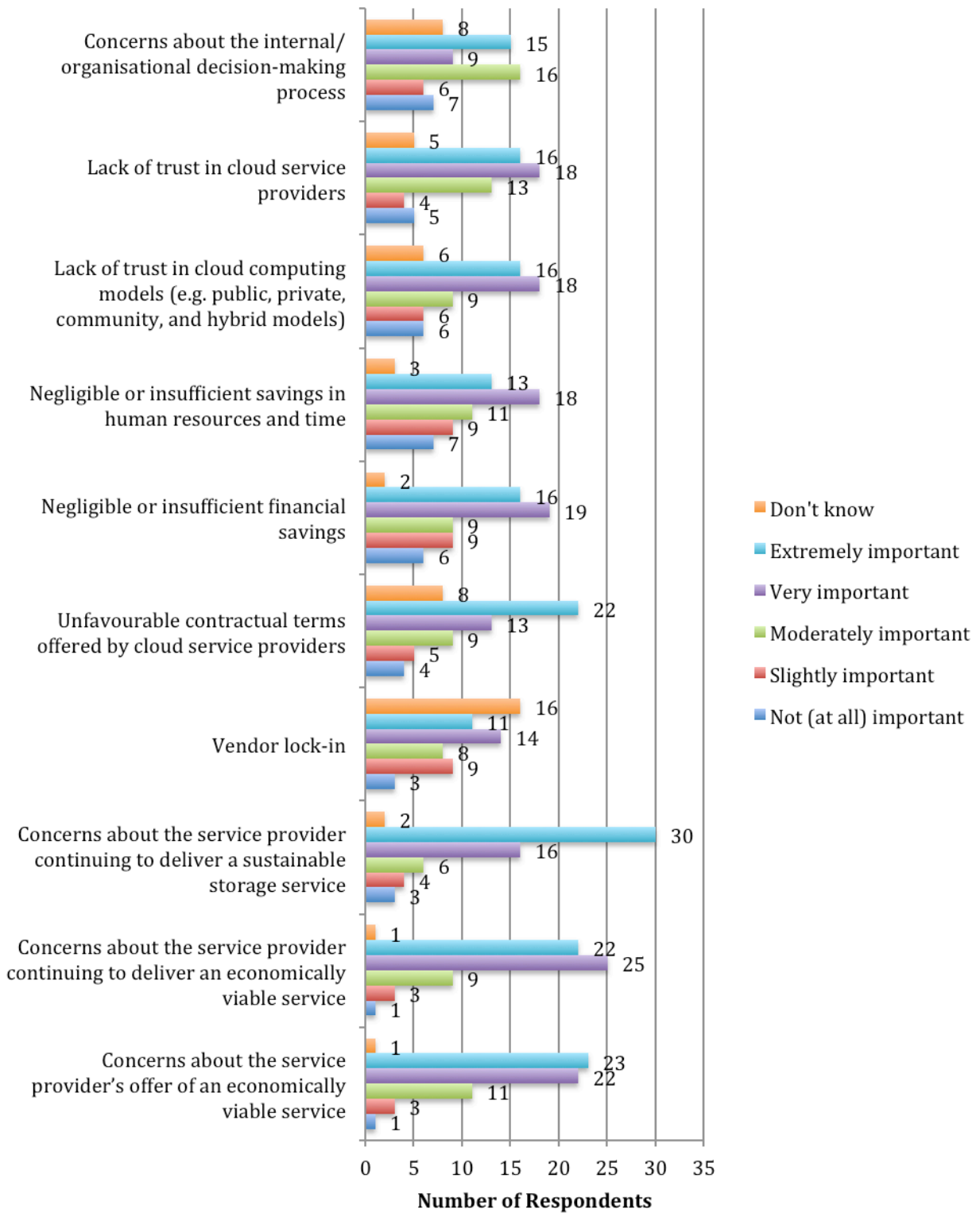
Unfavourable contractual terms offered by cloud service providers
- Don't know: 8
- Extremely important: 22
- Very important: 13
- Moderately important: 9
- Slightly important: 5
- Not (at all) important: 4

Vendor lock-in
- Don't know: 16
- Extremely important: 11
- Very important: 14
- Moderately important: 8
- Slightly important: 9
- Not (at all) important: 3

Concerns about the service provider continuing to deliver a sustainable storage service
- Don't know: 2
- Extremely important: 30
- Very important: 16
- Moderately important: 6
- Slightly important: 4
- Not (at all) important: 3

Concerns about the service provider continuing to deliver an economically viable service
- Don't know: 1
- Extremely important: 22
- Very important: 25
- Moderately important: 9
- Slightly important: 3
- Not (at all) important: 1

Concerns about the service provider's offer of an economically viable service
- Don't know: 1
- Extremely important: 23
- Very important: 22
- Moderately important: 11
- Slightly important: 3
- Not (at all) important: 1

Number of Respondents

Legend:
- Don't know
- Extremely important
- Very important
- Moderately important
- Slightly important
- Not (at all) important

Figure 16

Organizations Using Cloud Storage

Figure 17

Organizations Not Using Cloud Storage

Concerns about the internal/organisational decision-making process
- Don't know: 4
- Extremely important: 7
- Very important: 5
- Moderately important: 4
- Slightly important: 2
- Not (at all) important: 4

Lack of trust in cloud service providers
- Don't know: 1
- Extremely important: 10
- Very important: 8
- Moderately important: 5
- Slightly important: 1
- Not (at all) important: 1

Lack of trust in cloud computing models (e.g. public, private, community, and hybrid models)
- Don't know: 1
- Extremely important: 10
- Very important: 10
- Moderately important: 1
- Slightly important: 3
- Not (at all) important: 1

Negligible or insufficient savings in human resources and time
- Don't know: 2
- Extremely important: 9
- Very important: 7
- Moderately important: 3
- Slightly important: 3
- Not (at all) important: 2

Negligible or insufficient financial savings
- Don't know: 1
- Extremely important: 10
- Very important: 8
- Moderately important: 2
- Slightly important: 3
- Not (at all) important: 2

Unfavourable contractual terms offered by cloud service providers
- Don't know: 3
- Extremely important: 12
- Very important: 7
- Moderately important: 2
- Slightly important: 0
- Not (at all) important: 2

Vendor lock-in
- Don't know: 7
- Extremely important: 8
- Very important: 4
- Moderately important: 3
- Slightly important: 2
- Not (at all) important: 2

Concerns about the service provider continuing to deliver a sustainable storage service
- Don't know: 2
- Extremely important: 13
- Very important: 6
- Moderately important: 2
- Slightly important: 1
- Not (at all) important: 2

Concerns about the service provider continuing to deliver an economically viable service
- Don't know: 1
- Extremely important: 12
- Very important: 9
- Moderately important: 2
- Slightly important: 1
- Not (at all) important: 1

Concerns about the service provider's offer of an economically viable service
- Don't know: 1
- Extremely important: 13
- Very important: 5
- Moderately important: 5
- Slightly important: 1
- Not (at all) important: 1

Number of Respondents

Legend:
- Don't know
- Extremely important
- Very important
- Moderately important
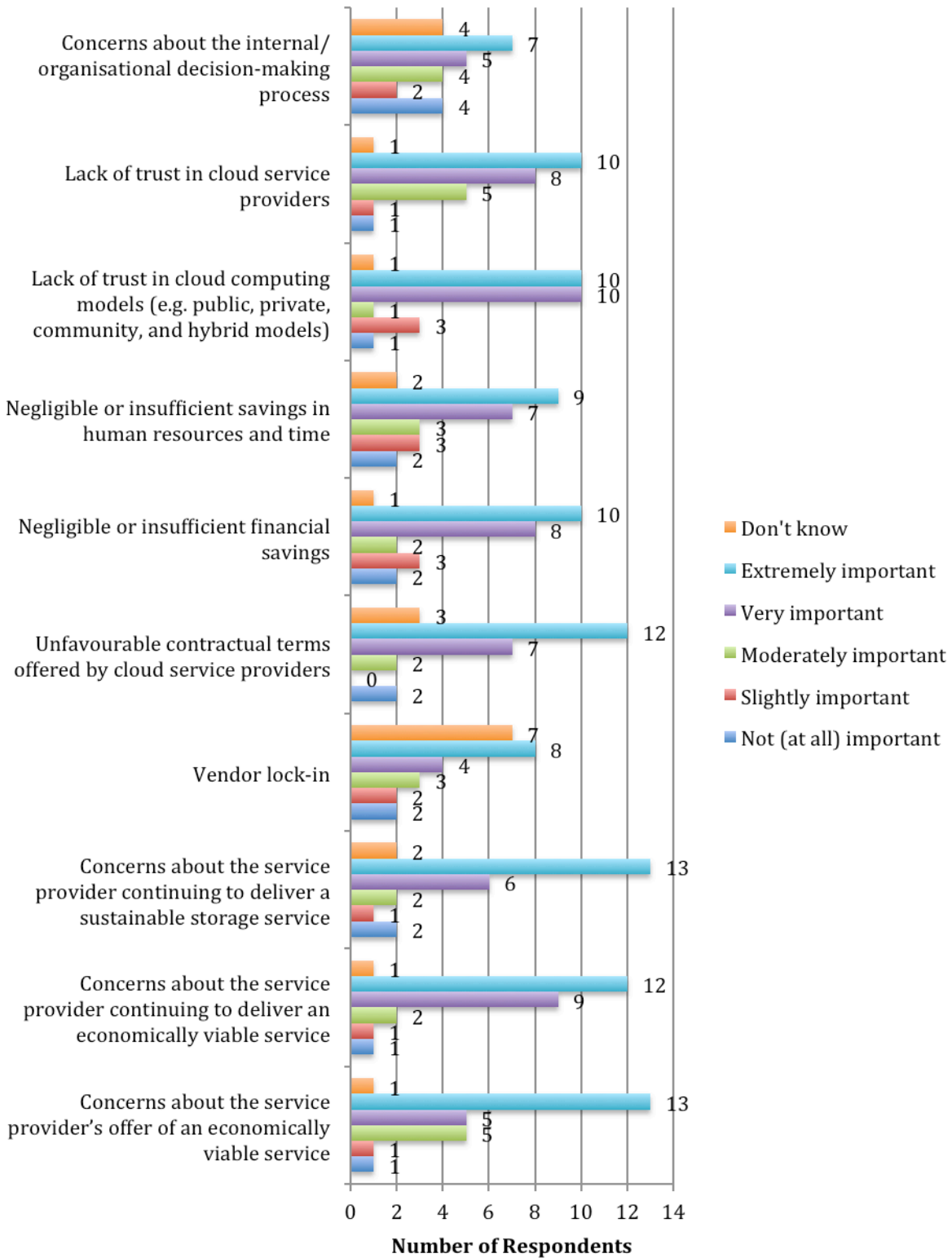- Slightly important
- Not (at all) important

Figure 18

Has your organisation considered other issues of trust not included in the above list?

Respondents were also asked an open question about any other issues of trust their organisation had considered. Key issues listed by respondents in this open question were security issues (4 respondents) and the location of stored records/data sovereignty issues (4 respondents). Related responses expressed concerns about loss of control over records (2 respondents) and legal issues more generally (1 respondent). Two respondents referred to digital preservation concerns, one referring to "conformance with ISO 16363 Trusted Digital Repositories."

Other respondents had concerns about vendor sustainability, availability of records, migrating data out of the system, technical integration with on-premise applications/systems, and space considerations. Finally, one respondent simply stated that issues might be seen differently throughout the organisation.

What factors contribute to your organisation's trust in the decision-making process? (Choose all the apply)
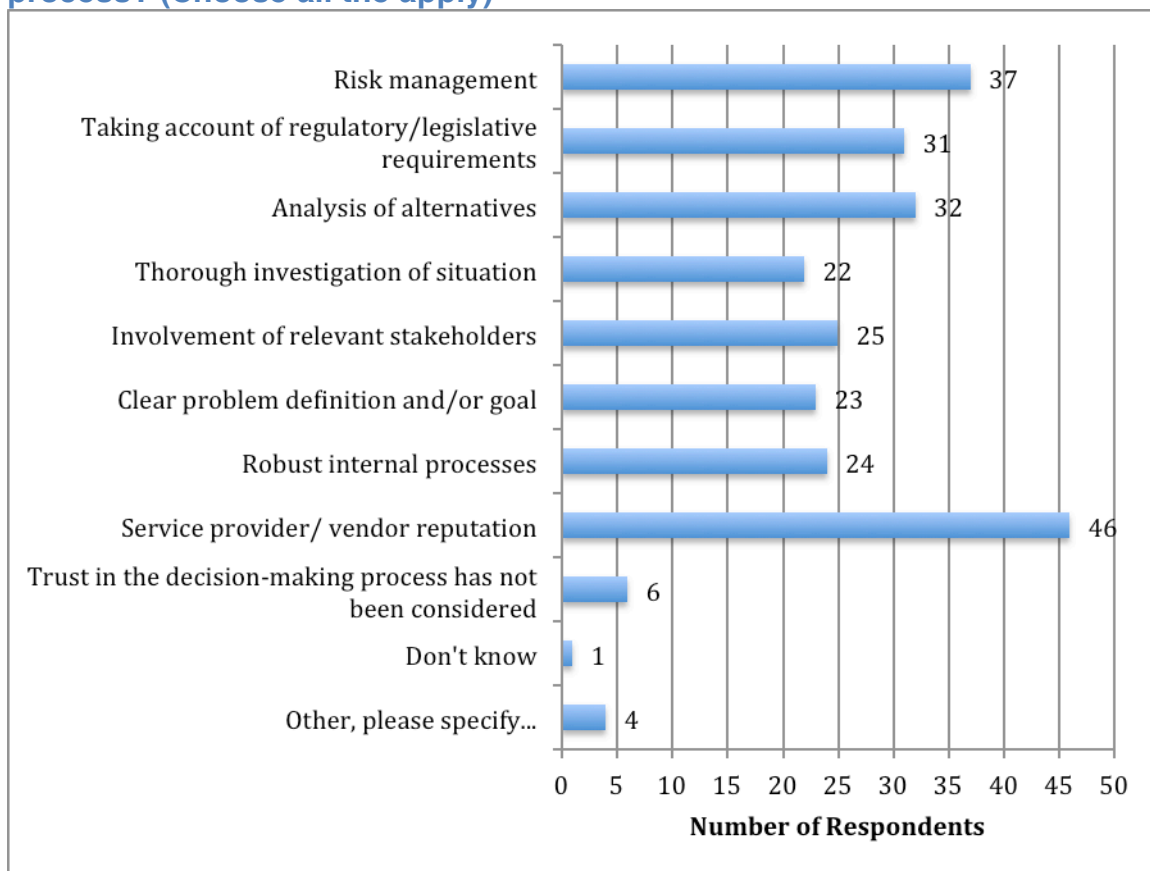
Figure 19

Of the respondents who chose "Other," three answers related to the contract with the cloud service provider, two specifically referring to "delivery" and "durability." The final respondent noted that "solutions often meet business needs"; however, future business

needs are not being adequately considered "contributing potentially to a false sense of trust."

The data was also filtered by organisations using and not using cloud storage for records.

What factors contribute to your organisation's trust in the decision-making process? (Choose all the apply)
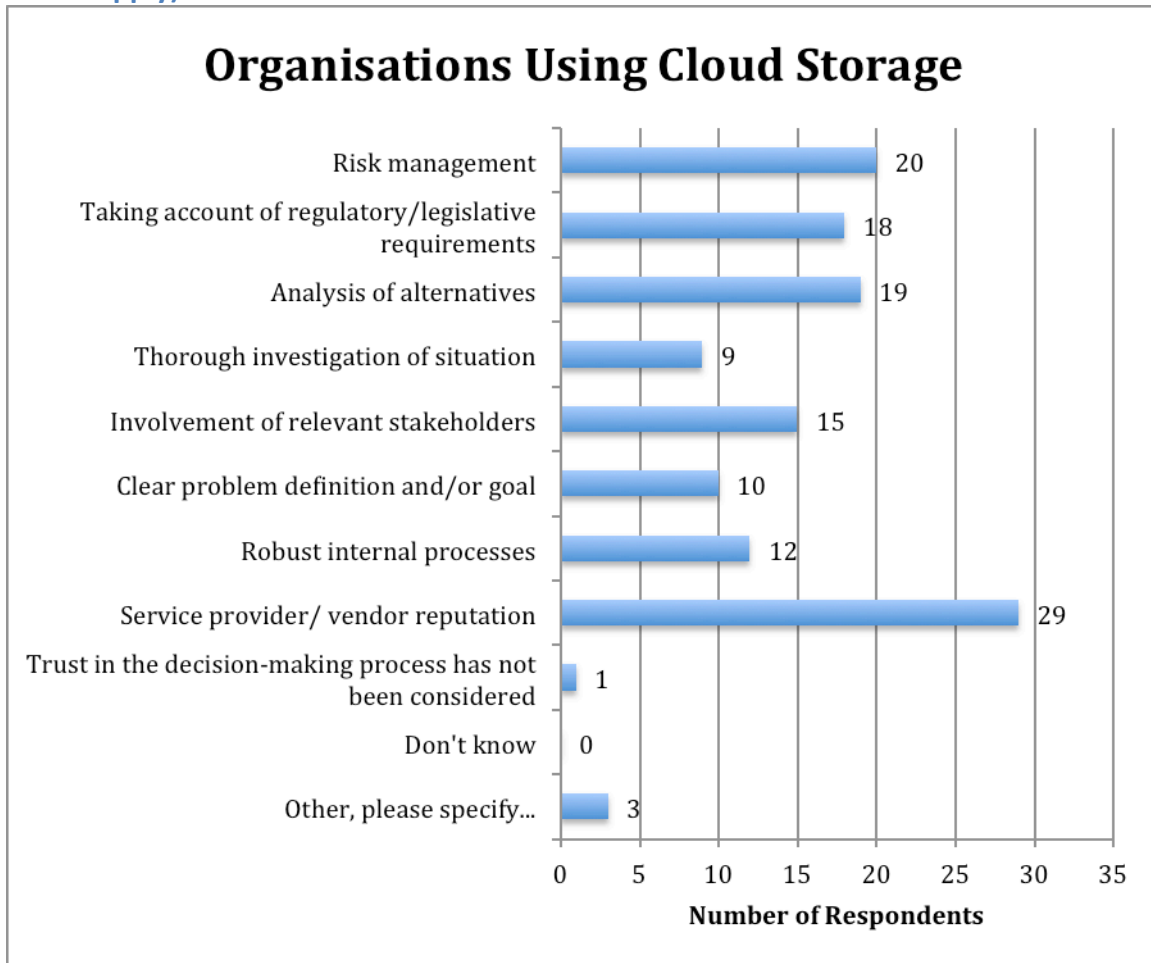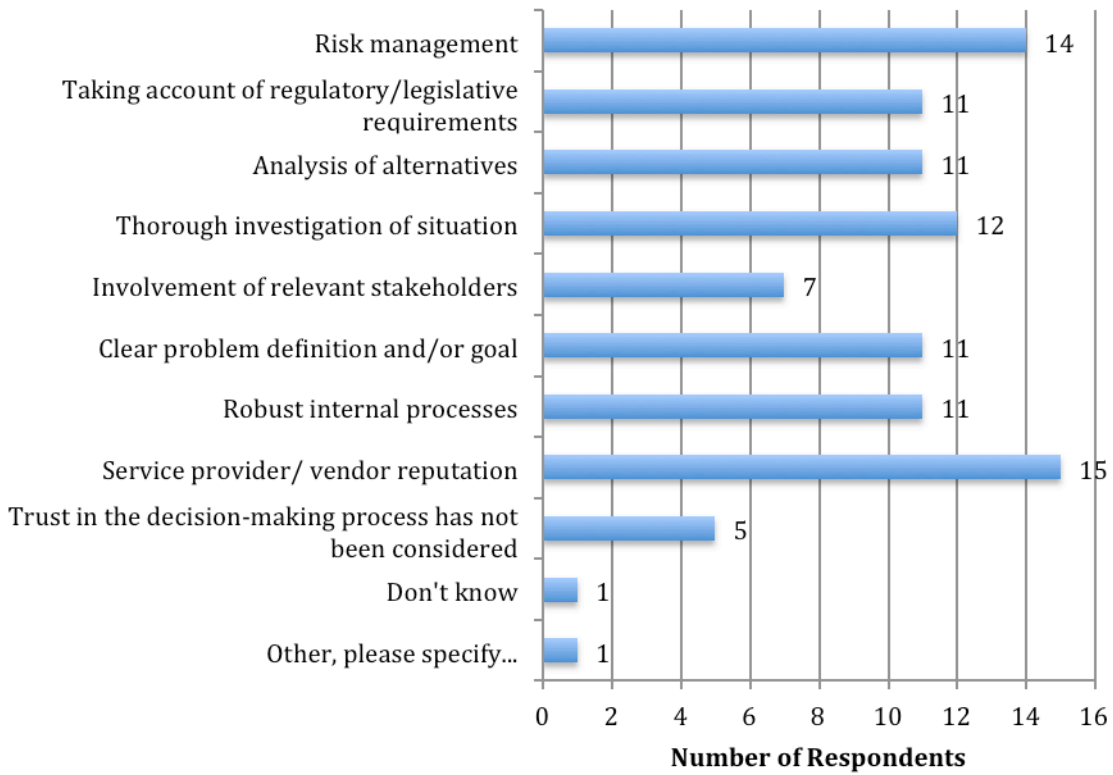

Figure 20

Organisations Not Using Cloud Storage

Category	Number of Respondents
Risk management	14
Taking account of regulatory/legislative requirements	11
Analysis of alternatives	11
Thorough investigation of situation	12
Involvement of relevant stakeholders	7
Clear problem definition and/or goal	11
Robust internal processes	11
Service provider/ vendor reputation	15
Trust in the decision-making process has not been considered	5
Don't know	1
Other, please specify...	1

Figure 21

How would you characterize the impact of moving from capital (i.e. fixed, one time) cost investment to operating cost (i.e. ongoing expenditure) in storing records with a cloud service provider?
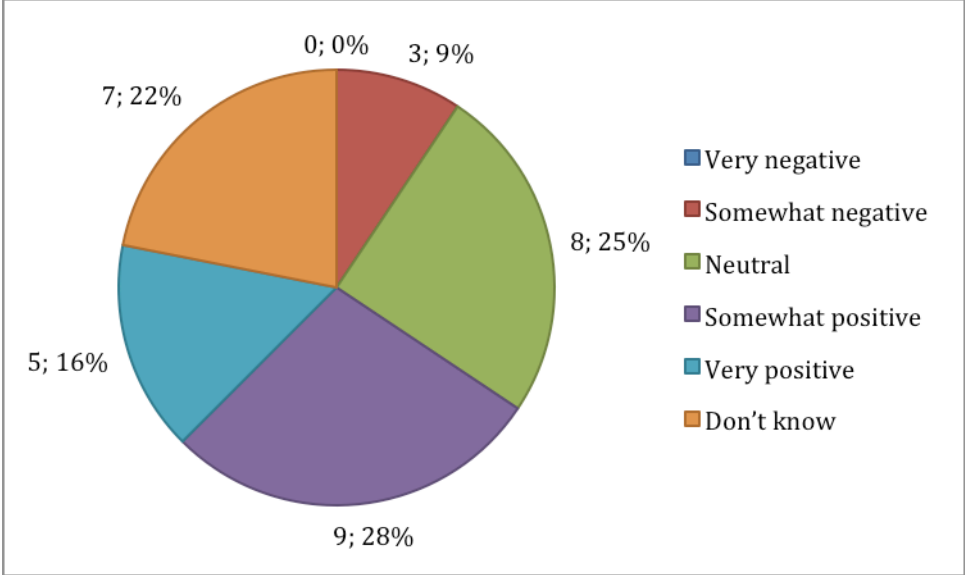
Figure 22

Use of Costing/Economic* Models in Adopting Third Party Cloud Services for Records Storage in Your Organisation

* Any model or calculation for determining the cost of cloud storage; this includes models underpinned by economic, financial or management accounting theories as well as those considering a wider range of costs, e.g. social and environmental costs

For your organisation, how important is cost in deciding whether or not to adopt an external third party cloud service(s) for storing some/all of its records?

Legend:
- Not at all important
- Slightly important
- Very important
- Essential
- Critical
- Don't know

Values shown: 2%, 1%, 11%, 20%, 38%, 28%
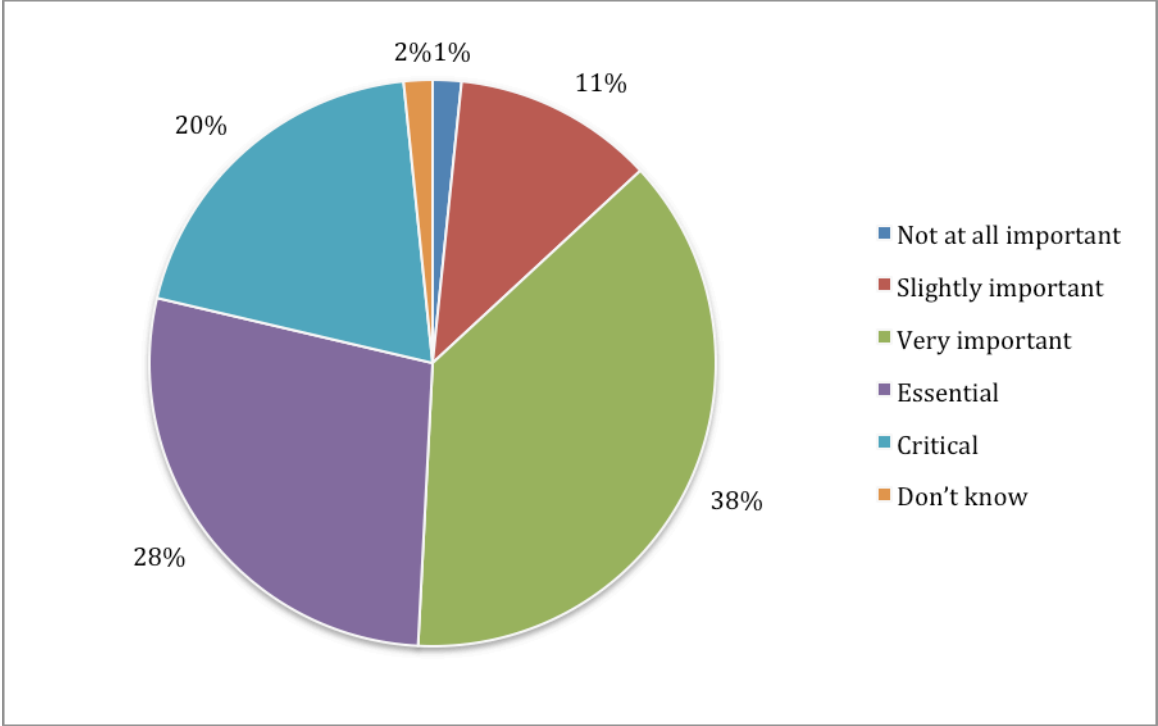
Figure 23

Does your organisation use any costing/economic model in deciding whether or not to adopt an external third party cloud service(s) for storing some/all of its records?
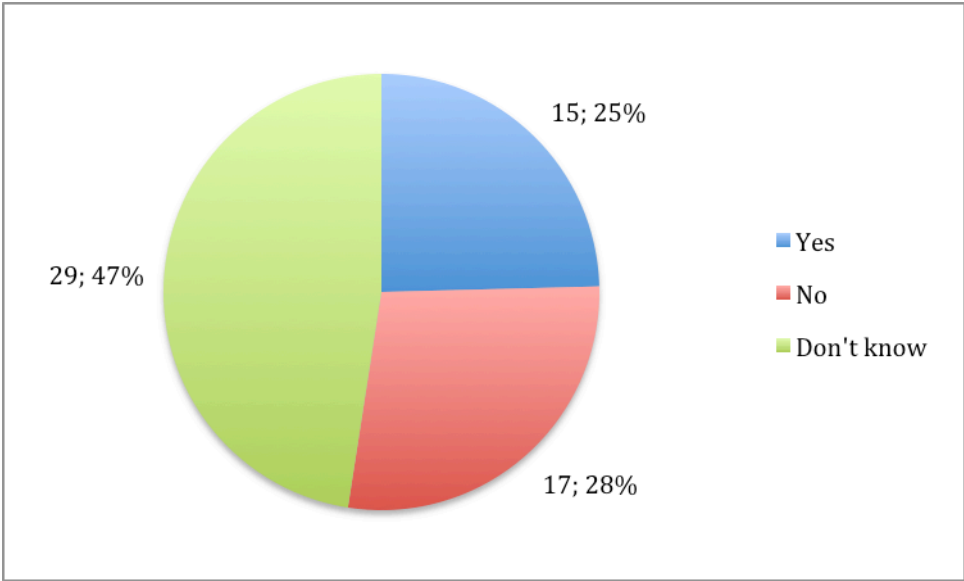
Figure 24

Of the 15 respondents who said "yes" their organisation had used an economic/costing model, 10 were from organisations using cloud storage for records and 5 did not use cloud storage.

Which of the following models has your organisation used in deciding whether or not to adopt an external third party cloud service(s) for storing some/all of its records? Choose all that apply.
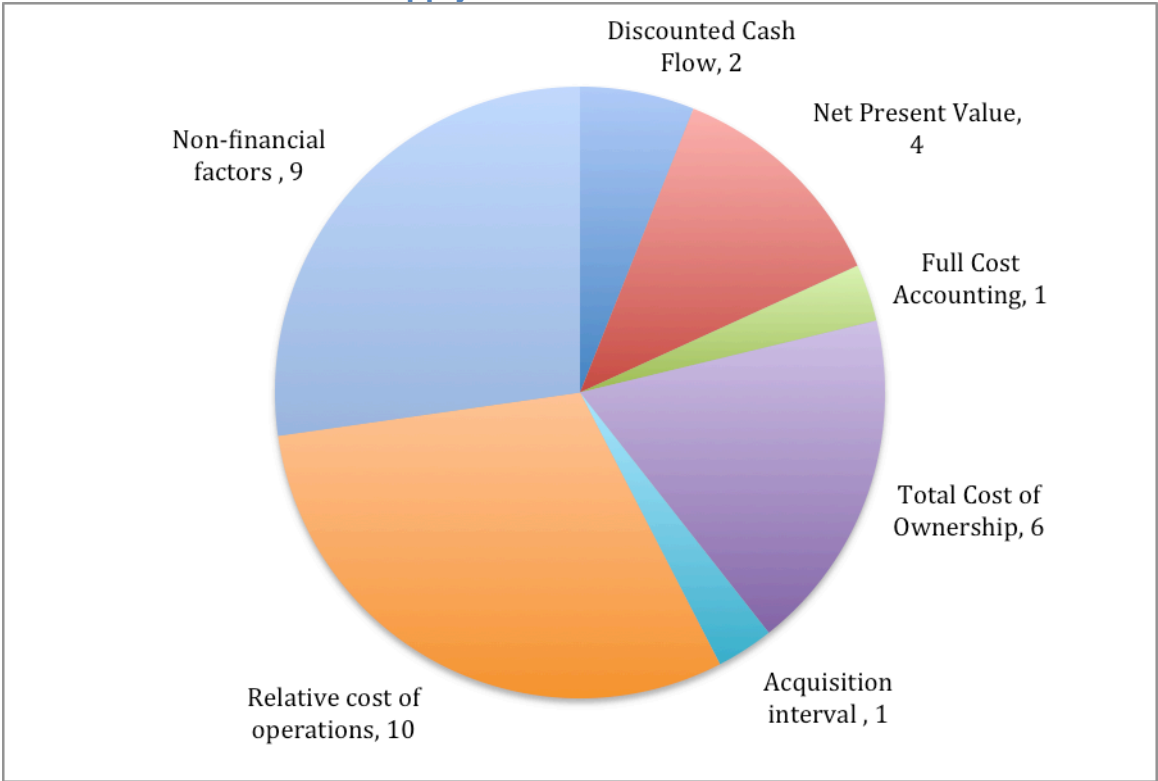
Figure 25

The 15 respondents who answered that their organisation had used an economic model were asked what model(s) they had used. Respondents could select one or more models. Five respondents used one model and the other ten selected two or more models. Answer choices also included Differential Net Present Value, Internal Rate of Return, Monte Carlo models, Kryder's Law, and "Other," but no respondents chose these options.

How does your organisation use/has your organisation used costing/economic models in the context of using external third party cloud service(s) for storing some/all of its records? (Choose all that apply)
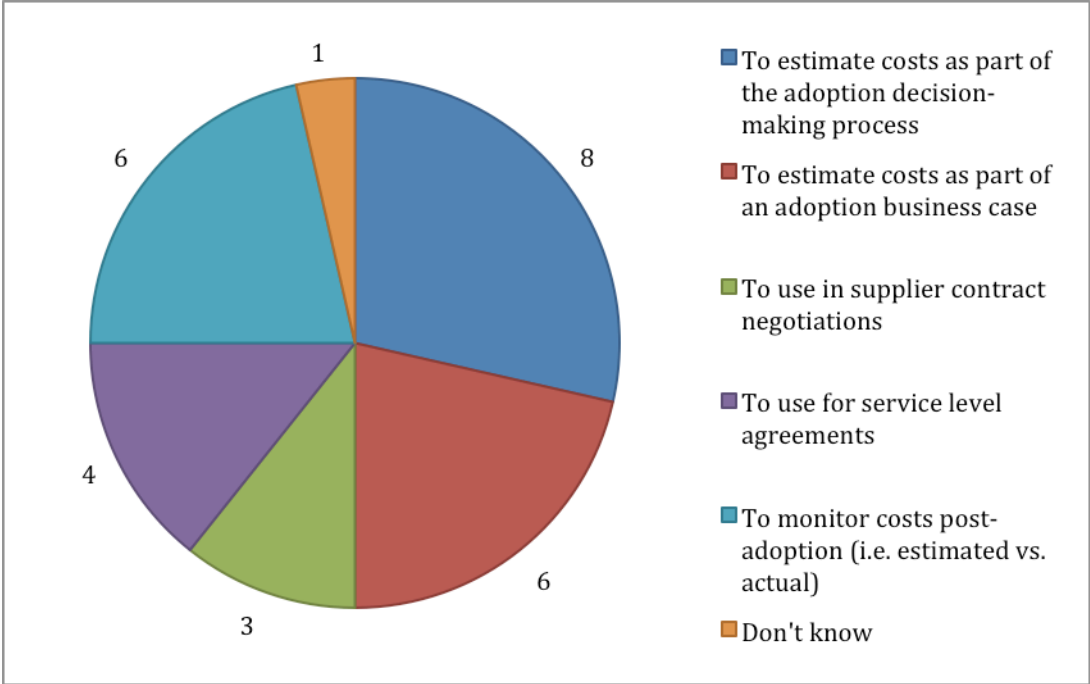
Figure 26

Respondents whose organisation both used an economic model and used cloud storage (10 respondents) were also asked how they used the model in the context of using a third-party service provider. Respondents could select one or more uses of economic models. One respondent selected one reason, four respondents selected two options, and the remaining five respondents selected between three and five reasons. The survey included an "other" option but no respondent selected it.

Part 2: About You

What is your area of responsibility in your organisation? (Choose only one)
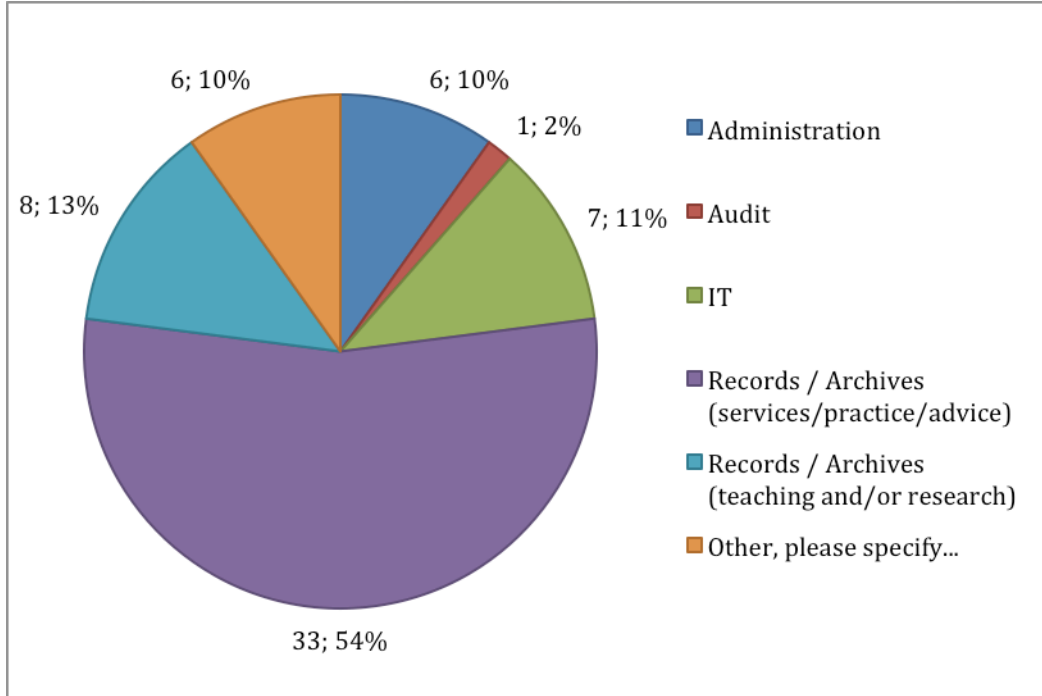
Figure 27

Three of the respondents who chose "other" specified a combination of archives/records management and other areas, such as administration, IT, risk, Freedom of Information, and e-government. The other three respondents stated that they were in faculty, research, and executive roles.

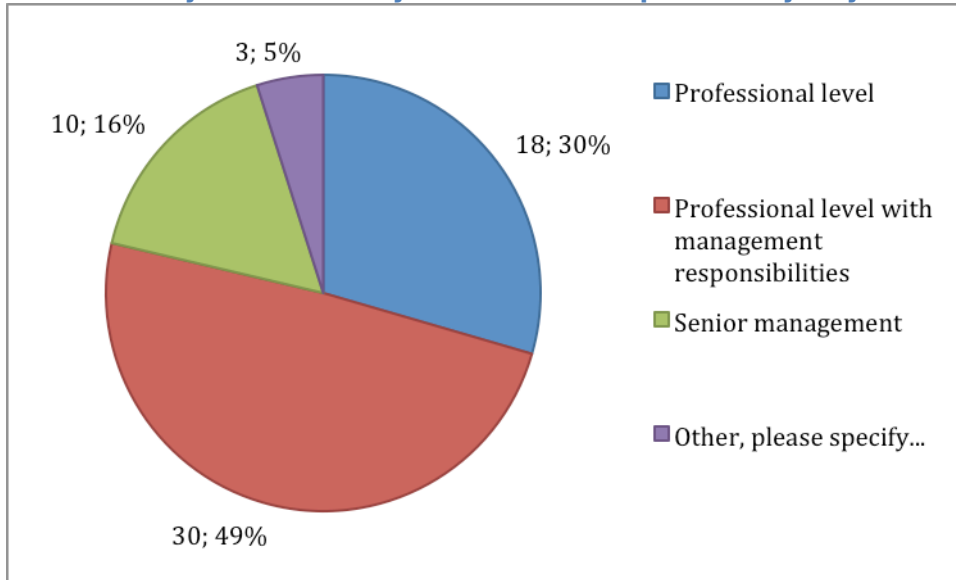## How would you describe your level of responsibility in your organisation?

Figure 28

Two respondents who selected "other" were either above senior management (executive director) or slightly below.

In which department/service do you work?
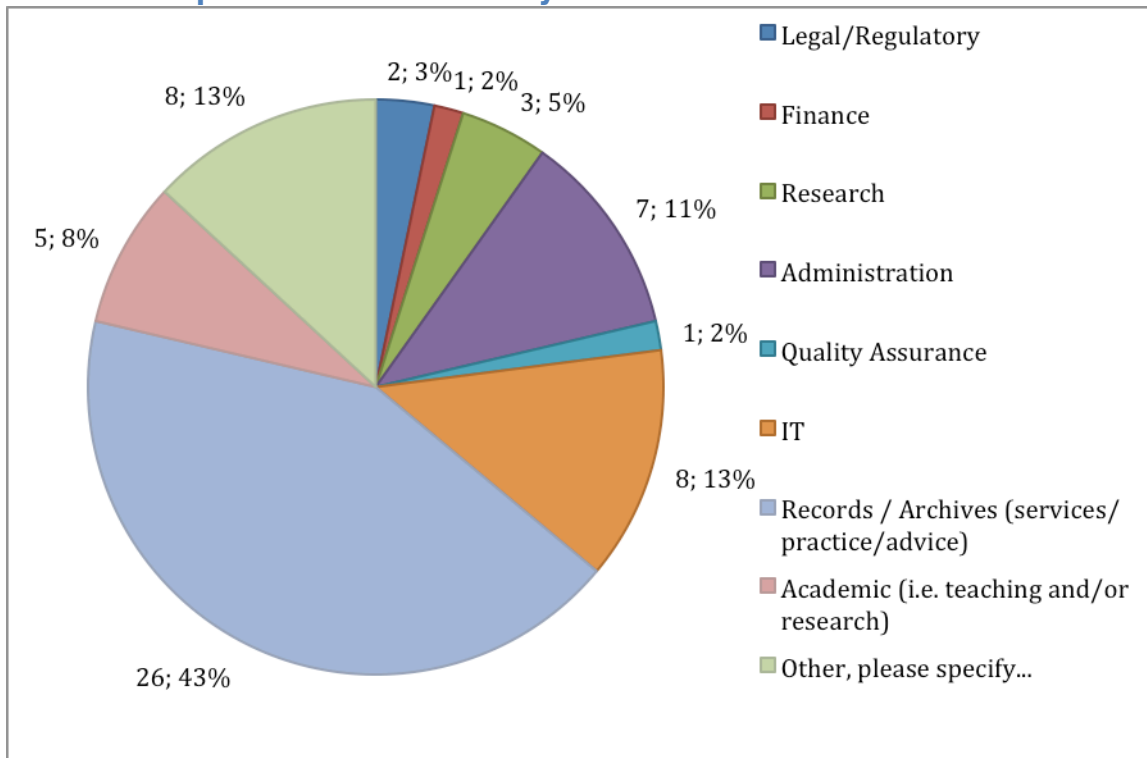
Figure 29

Three respondents who selected "other" worked in another information-related department (responses included information governance and library). Two respondents said they were in a combination of departments. These and other respondents listed the departments: innovation and e-government, global marketing, and executive. No respondents were in Facilities Management, Audit, Communications / Public Relations, or Risk Management.

If your department/service is located within a larger organisational function, in which function is it located?
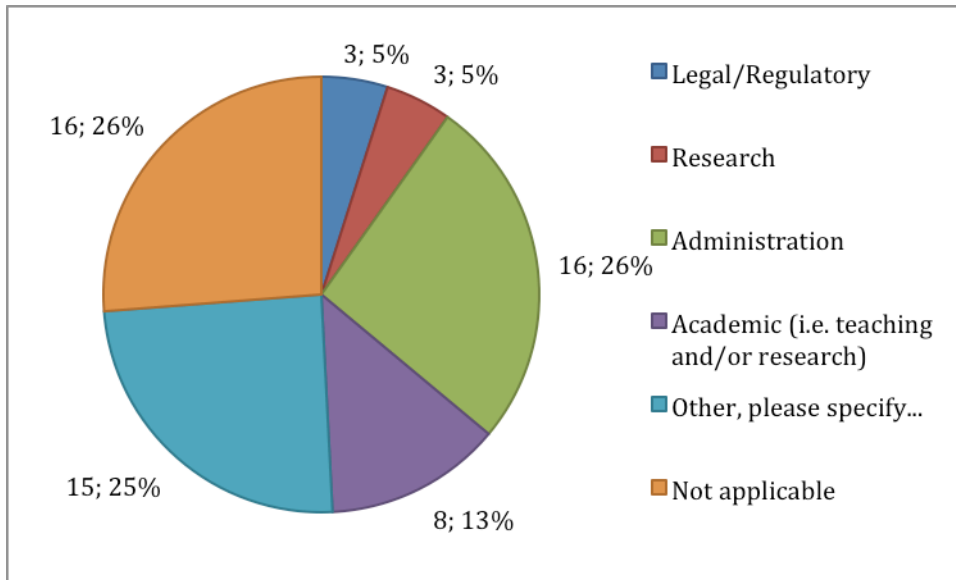
Figure 30

Four respondents who answered "Other" were in an information-related departments (specifically, records, information, and library) and another respondent was in a museum. Three were in marketing. Two were in corporate support/services. Other responses were: technology and improvement, public service, academic support, office of the city clerk, and HR. No respondents were in finance, facilities management, or quality control.

Use of Costing/Economic* Models in Adopting Third Party Cloud Services for Records Storage in Your Organisation

* Any model or calculation for determining the cost of cloud storage; this includes models underpinned by economic, financial or management accounting theories as well as those considering a wider range of costs, e.g. social and environmental costs

How involved are you in decision-making about the adoption (or not) of third party external cloud services for storing some/all of your organisation's records?
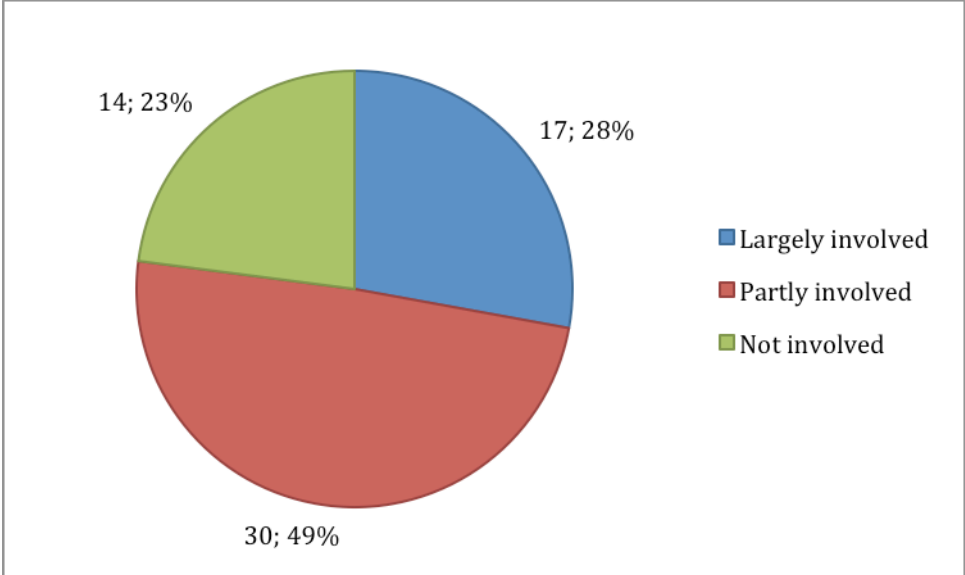

14; 23% — Not involved
17; 28% — Largely involved
30; 49% — Partly involved

Largely involved
Partly involved
Not involved

Figure 31

Do you use any costing/economic model in deciding whether or not to adopt an external third party cloud service(s) for storing some/all of your organisation's records?
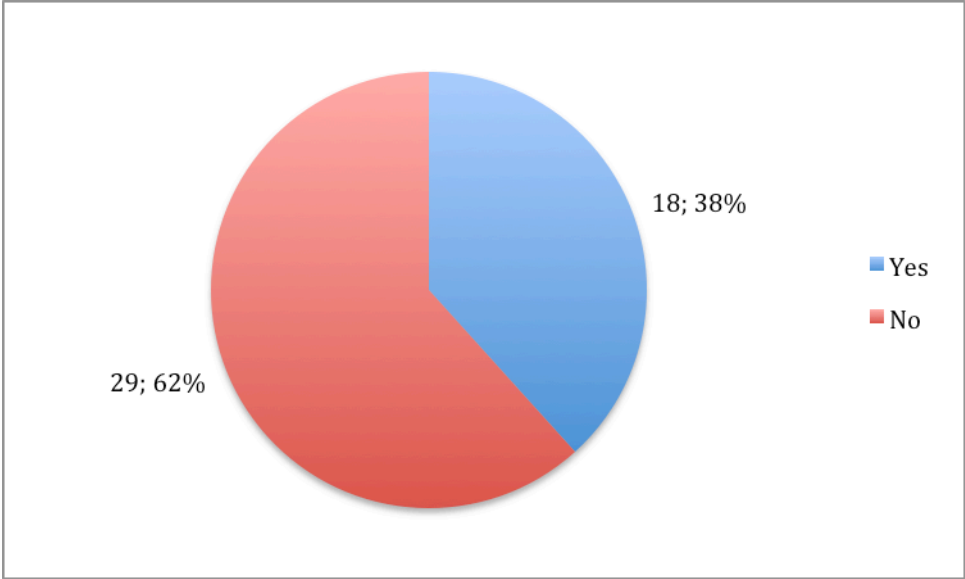

18; 38%

29; 62%

■ Yes
■ No

Figure 32

Respondents who answered "yes" they were involved in decision-making about cloud adoption (47 respondents), either largely or partly, were asked if they used an economic model. Of the 18 respondents who answered "yes" they had used a model, 11 were in organisations using cloud storage for records.

Which of the following models have you used in deciding whether or not to adopt an external third party cloud service(s) for storing some/all of its records? (Choose all that apply)
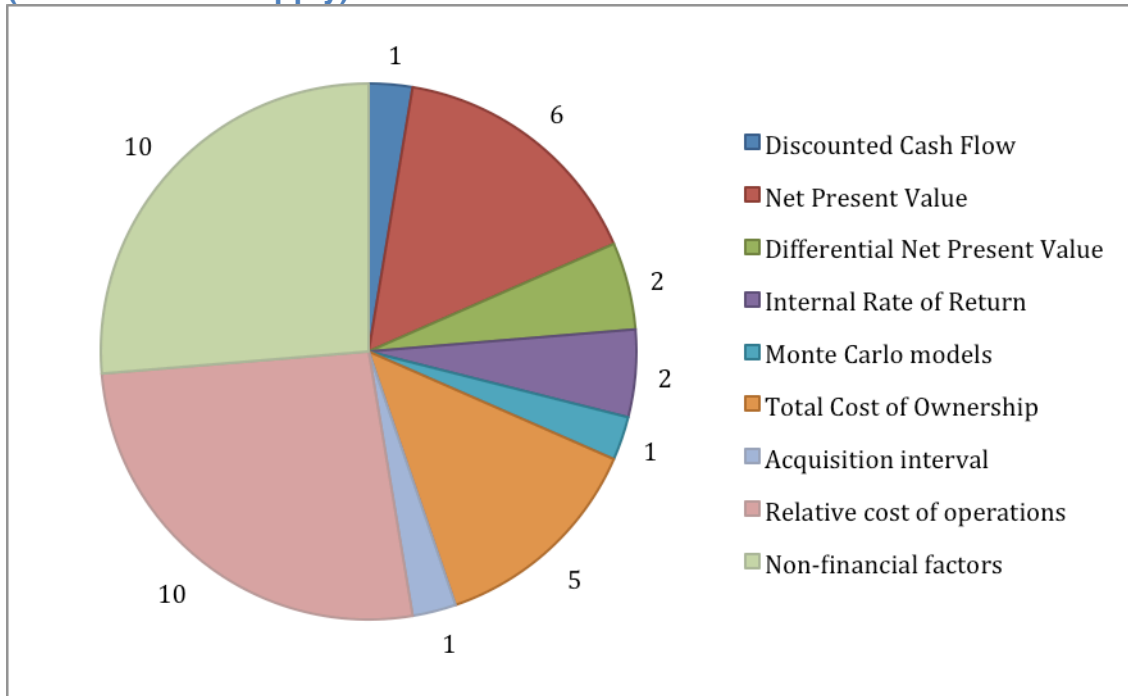

Figure 33

Respondents who answered "yes" they used an economic model (18 respondents) were asked which model(s) they had used. They could select one or more models. Five respondents selected one model, nine used two, and remaining four selected between three and four. Other options were Kryder's Law, Full Cost Accounting, or "other," but no respondents selected these.

How involved are/were you in post-adoption evaluation/monitoring of the cost of third party external cloud services for storing some/all of your organisation's records?
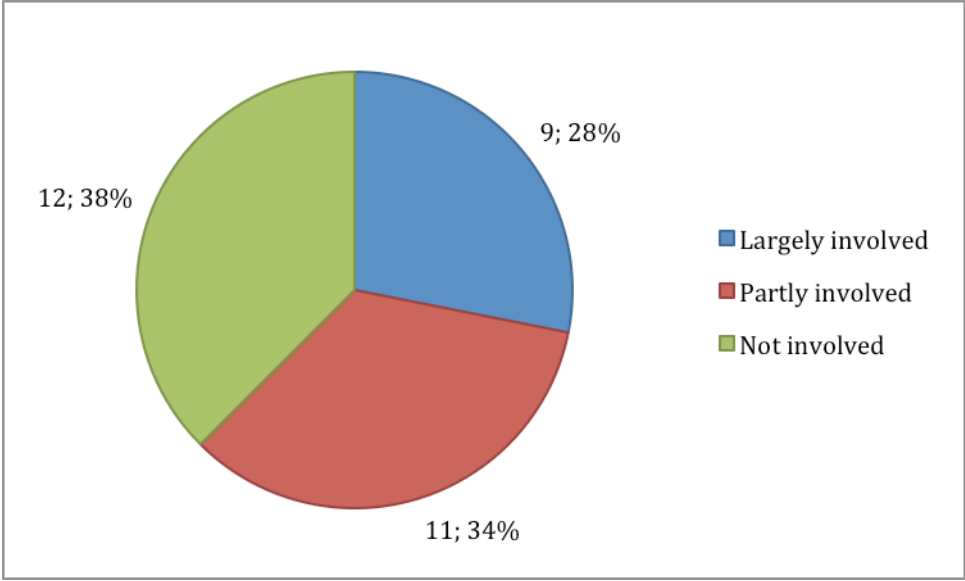

9; 28%

12; 38%

11; 34%

Largely involved

Partly involved

Not involved

Figure 34

Respondents who answered "yes" their organisation used a third-party cloud service provider at the beginning of the survey (32 respondents) were asked about their involvement in post-adoption monitoring.

How are you using/have you used costing/economic models in the context of using external third party cloud service(s) for storing some/all of your organisation's records? (Choose all that apply)
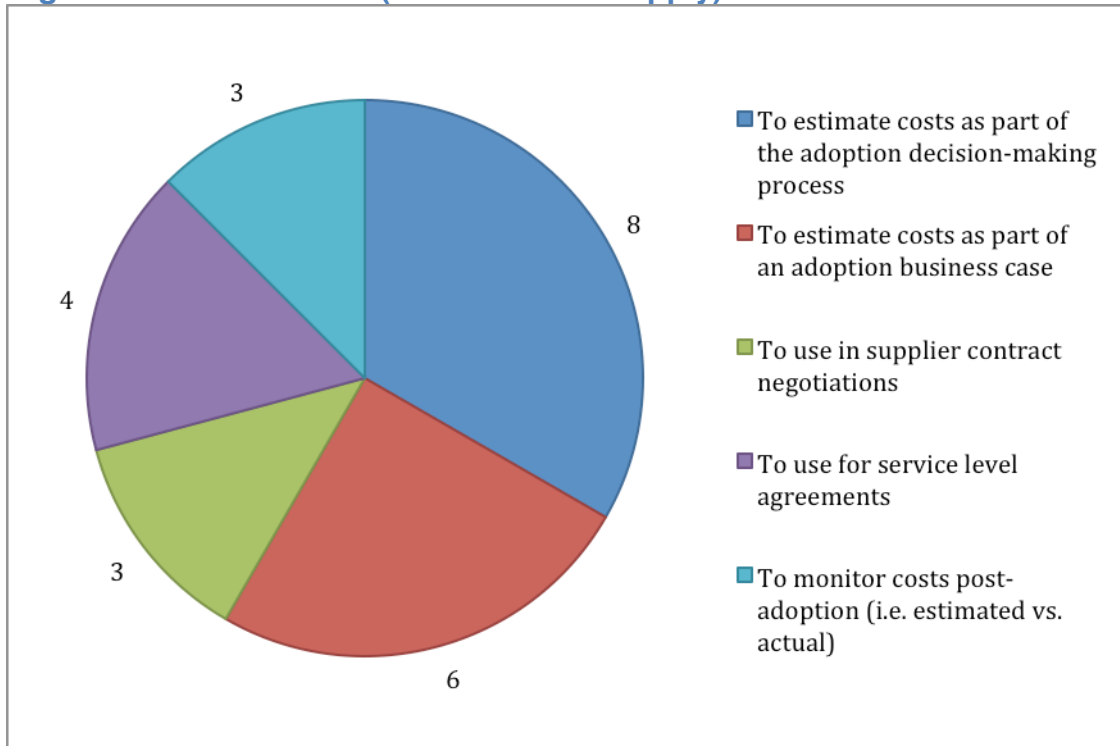

Figure 35

Respondents involved in cloud adoption decision-making or monitoring who had also used an economic model (9 respondents) were asked how they had used an economic model. No respondents chose "other."

The respondents were asked the same question about issues of trust (see next page) directed toward their concerns (as opposed to the concerns of their organisation overall). Responses were further filtered by respondents in organisations using and not using cloud storage.

For you, how important are the following issues of trust in adopting (or not adopting) an external third party cloud service(s) for storing some/all of your organisation's records?
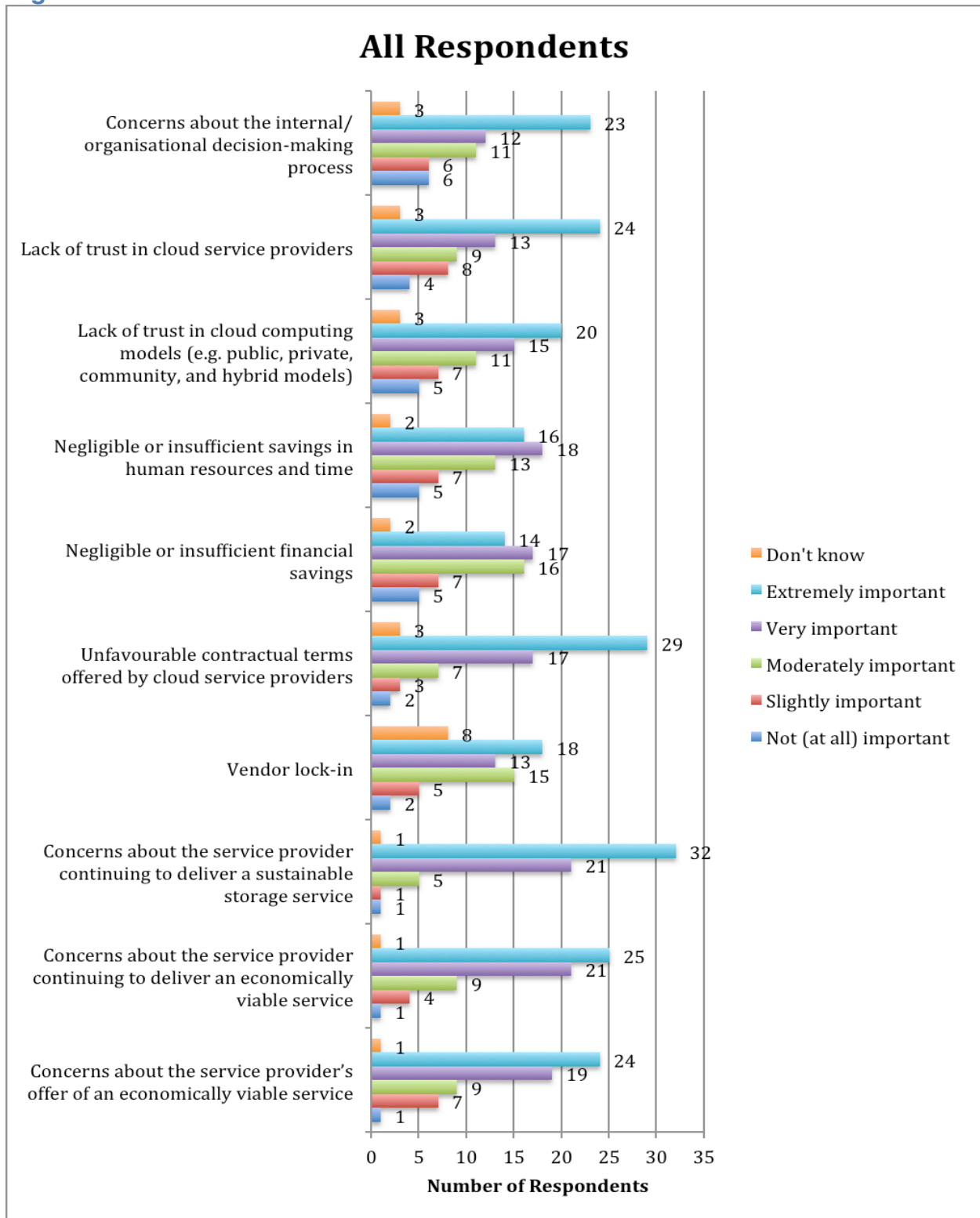

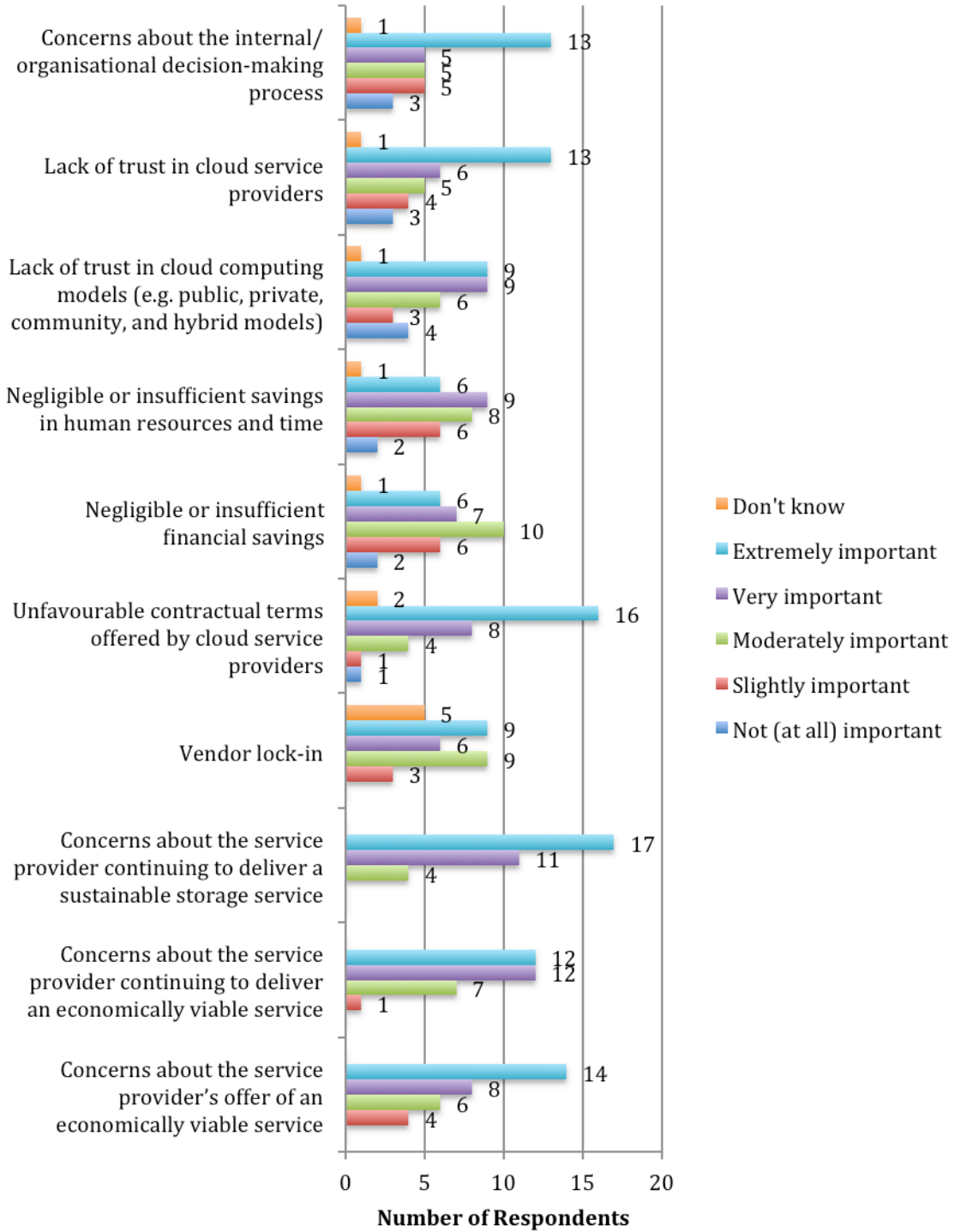Figure 36

Respondents in Organisations Using Cloud Storage

Legend:
- Don't know
- Extremely important
- Very important
- Moderately important
- Slightly important
- Not (at all) important

Concerns about the internal/organisational decision-making process: Don't know 1, Extremely important 13, Very important 5, Moderately important 5, Slightly important 5, Not (at all) important 3

Lack of trust in cloud service providers: Don't know 1, Extremely important 13, Very important 6, Moderately important 5, Slightly important 4, Not (at all) important 3

Lack of trust in cloud computing models (e.g. public, private, community, and hybrid models): Don't know 1, Extremely important 9, Very important 9, Moderately important 6, Slightly important 3, Not (at all) important 4

Negligible or insufficient savings in human resources and time: Don't know 1, Extremely important 6, Very important 9, Moderately important 8, Slightly important 6, Not (at all) important 2

Negligible or insufficient financial savings: Don't know 1, Extremely important 6, Very important 7, Moderately important 10, Slightly important 6, Not (at all) important 2

Unfavourable contractual terms offered by cloud service providers: Don't know 2, Extremely important 16, Very important 8, Moderately important 4, Slightly important 1, Not (at all) important 1

Vendor lock-in: Don't know 5, Extremely important 9, Very important 6, Moderately important 9, Slightly important 3

Concerns about the service provider continuing to deliver a sustainable storage service: Extremely important 17, Very important 11, Moderately important 4

Concerns about the service provider continuing to deliver an economically viable service: Extremely important 12, Very important 12, Moderately important 7, Slightly important 1

Concerns about the service provider's offer of an economically viable service: Extremely important 14, Very important 8, Moderately important 6, Slightly important 4

Number of Respondents

Figure 37

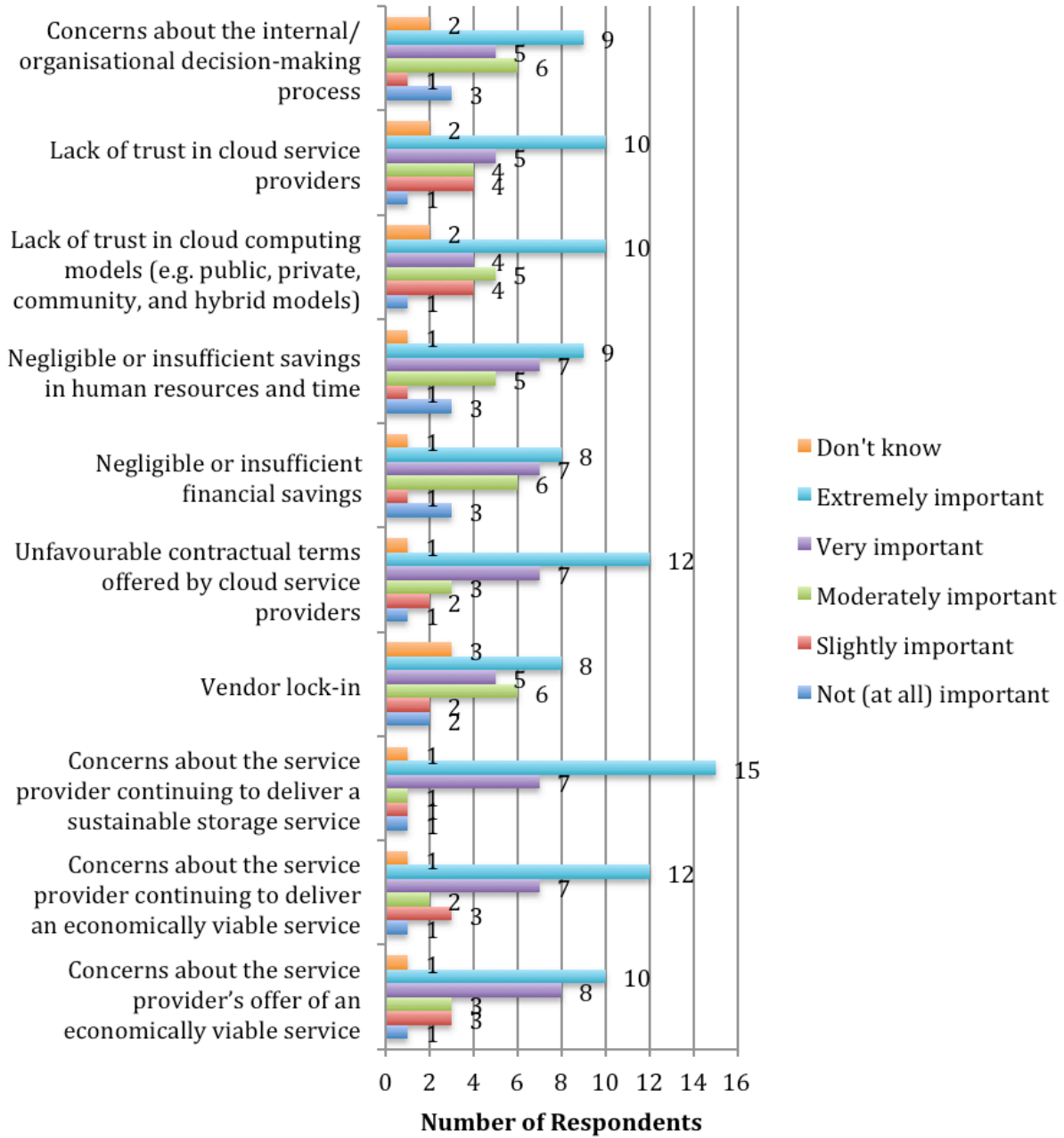**Respondents in Organisations Not Using Cloud Storage**

Figure 38

Have you considered other issues of trust not included in the above list?
Respondents were also given an open question to add any other issues of trust they had considered. Two respondents said that they were concerned about legal issues. Three respondents were concerned about security issues and one said that s/he had considered data sovereignty. Other concerns included sustainability of the service provider, the ability to migrate data out of the system, and information governance/management arrangements. Finally, one respondent noted a lack of trust in staff having the skills to make informed decisions.

What factors contribute to your trust in the decision-making process for adopting (or not adopting) an external third party cloud service(s) for storing some/all of your organisation's records? (Choose all that apply)
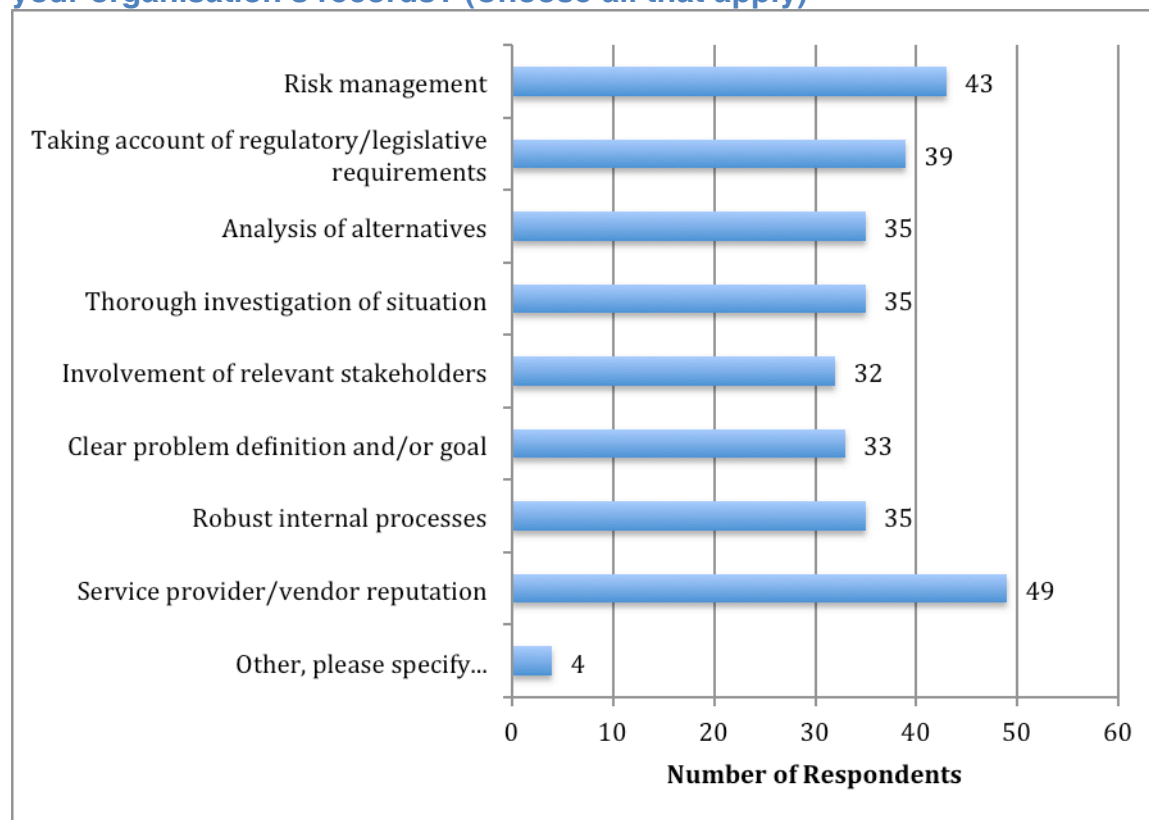
The respondents were also asked to identify factors contributing to their trust in the decision-making process for themselves (as opposed to the organisation as a whole). Two respondents who answered "other" were concerned with complying with legal requirements. Two others were concerned with security issues. Other factors listed include user experience and audit trails.

Filtering the responses by respondents in organisations using and not using cloud storage produced the data below.

Respondents in Organisations Using Cloud Storage

Category	Number of Respondents
Risk management	24
Taking account of regulatory/legislative requirements	26
Analysis of alternatives	18
Thorough investigation of situation	19
Involvement of relevant stakeholders	18
Clear problem definition and/or goal	19
Robust internal processes	20
Service provider/vendor reputation	27
No factors of trust contribute to the decision making process	0
Other, please specify...	2

Figure 40

Respondents in Organisations Not Using Cloud Storage

Category	Number of Respondents
Risk management	16
Taking account of regulatory/legislative requirements	11
Analysis of alternatives	14
Thorough investigation of situation	15
Involvement of relevant stakeholders	12
Clear problem definition and/or goal	12
Robust internal processes	14
Service provider/vendor reputation	20
No factors of trust contribute to the decision making process	0
Other, please specify…	2

Figure 41

Appendix D: Case examples

Case Example 1 – Uses the cloud and economic models

The Organisation

The organisation is a UK public sector body with 3000 employees. Its Archives Department developed its first digital repository in 2013, which makes use of cloud services for storing low usage archival records which have no security classification and are open to the public. Dating from post 2000, these include records of some core business functions but are primarily archived websites and digitised archival records (public access is to other copies). The present volume is approximately 17 TB. Archival records with security classifications are stored on in-house storage.

Use of Cloud Services and the Decision-Making Process

The decision to use cloud services was motivated by the organisation's adoption of a 'cloud first' IT strategy at the time of the digital repository's development, in alignment with the UK Government's 'Cloud First' policy. Other reasons for using the cloud for records storage were: trust in cloud computing deployment models and in cloud service providers; increased flexibility; enhanced availability; improved reliability of service; improved scalability of IT infrastructure, and backup, disaster recovery/business continuity. However, having evaluated the costs of in-house vs cloud storage the economics of using the cloud and alignment with the IT strategy were the deciding factors. The economics related to the overall cost to the organisation over time, rather than moving from capital to operating budgetary costs, and the potential, in the context of a new 'cloud first' strategy, that there would be no or few in-house data centre services in the future. It was anticipated that, in such a scenario, an in-house digital repository storage centre would have borne a disproportionate level of inherent overheads, thereby substantially increasing the cost.

Other factors considered as part of the decision-making process were technology suitability, although there were no particular constraints as the software used for the digital repository was agnostic as to storage infrastructure, and stakeholder impact although this was not a major issue as the digital repository was a back-office master storage system used only by archives staff. The organisation is quite risk averse. Since the records selected for cloud storage were open (no security classification) it was not necessary to complete the security accreditation process. However, the Archives Department did examine risks, articulating the archival requirements of security and durability of service, i.e. the ability of the service provider to retain and return the data with its integrity intact at any point.

Two re-sellers of cloud services are used, one based on EMC Atmos and the other on Amazon S3. All content is duplicated to both. The service providers were identified using the UK Government G-Cloud store[6] (now the Digital Marketplace) and its standard procurement process. Starting with one provider, a second provider was added for resilience. This proved to be a cost-effective approach as the level of resilience provided by each individual service provider could be reduced, meaning procurement of a cheaper service from each one and a lower overall cost.

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[6] UK Government Digital Marketplace supports easier procurement of information technology and expertise for digital projects in the public sector, by providing a list of cloud service providers who have been evaluated against an initial set of criteria by the Crown Commercial Services https://www.digitalmarketplace.service.gov.uk/

Case Example 1 – Uses the cloud and economic models

Roles and Responsibilities

The Information and Communications Technology (ICT) and Archives Departments played the lead role in the decision-making process. A cost modelling exercise was led by the ICT Department with the Archives Department feeding in the requirements (data volumes, usage, durability etc). Finance Directors approved the business case, IT security approved the security arrangements, and the cloud-first IT strategy had previously been approved at management board level. It was important that the responsibilities of the organisation and the service provider were clear in the contract. Costs are monitored in a budgetary sense by the contract manager in the ICT Department as the budget-holder. The Archives Department provides forecasts of future growth to help them with budget forecasting and will themselves keep an eye on overall costs.

Economic Considerations and Use of Costing Models in the Decision-Making

The organisation used a number of economic models as part of the decision-making process, viz. Discounted Cash Flow (DCF), Net Present Value (NPV), relative cost of operations, and non-financial factors. The organisation requires the use of DCF and NPV as part of the business case. The ICT Department used the relative cost of operations model to compare the cost of in-house vs cloud storage and more generally in considering how in-house storage services might develop and affect the cost of that option. The Archives Department also considered non-financial factors, in particular the archival requirements, risks and responsibilities. This helped to ensure the organisation understood the decision was not just about procuring storage and its cost, it was about a particular type of storage with particular requirements. Whilst the Archives Department was aware of all the models prior to the exercise, it did learn more about NPV.

Being their first digital repository there was no existing collection to use as the basis for modelling costs. However, data for volume, rate of acquisition and usage of records that were a priority was available. The figures for usage were robust since this was a back-office (master archival storage) repository used by the Archives Department not serving the needs of the public. There was also good data for in-house storage costs and commissioned consultancy helped estimate the cost of other storage options not just the cloud.

The modelling showed that, over the 8 year period modelled, the cloud was the most economic option and by some distance. This sealed the decision, though the Archives Department had separately assured themselves that cloud services could meet the non-financial (archival) requirements. As yet there has been no formal review of the original modelling against current reality, but costs are in line with what was expected. The economics make sense in the short-medium term but there is an open question about how they compare in the long term, since the archives will only increase in volume. It would be interesting to return to it and see how reality matched up to the cost modelling exercise. Cloud contracts run for two years and each contract re-procurement provides an opportunity for evaluation. The other question is about the portability from one technology/service to another, particularly for much larger collections (e.g. audio-visual ones of several Petabytes).

It is difficult to assess the impact of moving from capital cost investment to ongoing operating cost partly because this is the Archives Department's only experience and there is no previous in-house system to benchmark against. However, the experience has been positive because they have been able to ingest material and they have met the objective of having

an operational digital repository.

Issues of Trust

In adopting public cloud services for records storage the organisation saw it as being the Archives Department's responsibility to consider and be satisfied about issues of trust. The following issues were very important: concerns about the service provider's offer of an economically viable service, vendor lock-in, and lack of trust in both cloud computing models and cloud service providers. Other moderately important issues were concerns about the service provider continuing to deliver an economically viable and sustainable storage service, unfavourable contractual terms, negligible or insufficient savings, and the internal/organisational decision-making process.

Trust in the internal decision-making process was based on it being a robust process which ensured the goal was clear, relevant stakeholders (Archives and ICT Departments) were involved, the situation was thoroughly investigated and alternatives analysed, regulatory / legislative requirements were taken into account, and risks were assessed and managed. Two other factors contributed to trust in the decision-making process viz. the reputation of the service providers, and clarity about durability levels (i.e. the ability of the service provider to retain and return data with its integrity intact at any point).

Lessons Learned and Points to Consider

One should not get too hung up on the cloud as being wholly distinctive from other IT solutions used by organisations. The Archives Department began with some reservations about adopting cloud services for records storage, a leap into the unknown, but discovered that, in many respects, it is not so different to other storage options and can offer things that in-house services cannot (e.g. greater degree of resilience because of the providers' scale of operations). Focus on a clear understanding of requirements and expectations, roles and responsibilities to be confident of getting the service that you need. *"Be very clear of your requirements and make sure the IT Department understands those requirements and why those requirements are important to you"*.

Economic modelling needs to be considered on a case-by-case basis, with a full understanding of the particular scenario and not too many assumptions or preconceptions. Context and usage are critical. In this case the expectation was that the organisation would be moving more, if not all, of its wider storage into the cloud which changes the economics of the in-house option. It would look different if in-house services were continuing to be used. Similarly, this scenario concerned a lot of content but not much usage; the economics would be different if it were supporting public access and heavy usage demand.

The organisation has demonstrated that the cloud is a viable option for this type of long term digital repository storage scenario. Cloud services can also offer an avenue for smaller organisations for whom the conventional route, with big up-front capital costs, would be unrealistic. *"The cloud provides a viable means of entry to start to do digital preservation for real for organisations that might find it difficult to follow the more traditional commercial in-house do-it-all-yourself scenario"*.

Acknowledgement

Case Example 1 – Uses the cloud and economic models

Based on the survey response and follow-up interview with the Director of Archives.

Case Example 2 – Uses the cloud and economic models

The Organisation
The organisation is a 100 year old Canadian technical college with 2900 employees and satellite campuses in different locations around the world. It collaborates closely with industry, for example for student placements. The college has a records management team and an archives unit. The latter is part of the library whereas the records management team was part of information governance and then the Information Management Department along with IT. It is no longer part of Information Management.

Use of Cloud Services and the Decision-Making Process
The college began to use a cloud service to store some of its records in 2015 through an introductory offer (Apple's iCloud) for a limited time. After the offer ended the IT team was keen to continue to use a cloud service. With no formal records management programme until 2015, many hard copy records stored with the commercial service provider Iron Mountain, and a large percentage of born-digital records being created and stored in digital form only (on the college main frame computer and elsewhere), the organisation looked at the cloud for digital records storage and cost savings in human resources. As the programme was in its very early stages, the college did not want to commit to any cloud service without trying it out first. Due to its close links with industry the college is influenced by industry rather than education sector developments and trends, one of which was the use of iCloud. Although the records management team was not consulted about the choice several members, who had previously worked in the private sector, agreed with it, feeling that using the same service would make it easier to store records and share information with industrial collaborators and colleagues at the other campuses. The cloud is not a solution to the lack of a fully developed records management programme but, in conjunction with a new retention schedule and development of records classification, it would be a storage solution for inactive digital records that avoids using an offsite commercial storage provider. However, senior management took the decision not to move to the cloud and the proposal is currently on hold. This is despite the fact the college uses iCloud for teaching purposes, enabling students to develop their knowledge and skills of the latest technologies and supporting them in gaining employment after graduation.

Roles and Responsibilities
The cloud adoption decision-making process was informal and based on the organisation's past experience. IT, now part of the Information Management Department, played the lead role in the process; since they would be providing in-house support it was very important they were comfortable about the choice of provider. The Finance Department was also involved and senior management made the final decision. The records management team and archives unit were not involved in the process.

Economic Considerations and Use of Costing Models in the Decision-Making
Reducing both capital and operating costs is critical in deciding to use a cloud service for records storage and, given the current state of the country's economy (recession), cost has become the main consideration. However, the college's senior management have not yet

recognised any value in retaining records, even when there is a legal requirement to do so, and are prepared to take the risk of being fined or worse. They also think that human costs can be saved by not having records/archives professionals 'process' digital records when they are created and captured in the cloud, but of course professionals are needed to facilitate the management of these records.

When IT proposed that the college should continue to use a cloud service at the end of the introductory iCloud offer they compared a number of services in terms of cost and functionality/features. Although cost was very important in the proposal, and ultimately probably the main factor in the decision-making process, IT's main concern was whether or not, moving forward, the cloud service could scale and meet future needs. Rather than using an economic model they evaluated non-financial factors, particularly technology suitability (industry/collaborator trends), stakeholder impact, risks and responsibilities.

Issues of Trust

In adopting a cloud service for records storage the over-riding issues of trust for the college related to access – who could access information, that only those with rights of access could do so, the risk of information leaks, and continuity of access from the perspective of technology obsolescence. Also very important were concerns about cost - the service provider's offer and continuing delivery of an economically viable service, and negligible or insufficient financial, human resources and time savings – which the records management team and archives unit shared. Based on past experience for the records management team and archives unit lack of trust in cloud service providers and in cloud computing models were very important, as were unfavourable contractual terms offered by the service provider. The latter was only slightly important to the college and vendor lock-in not at all important. However, the college is careful with all of its vendors and, because it is closely tied to industry and the donations they make, it tends to acquire products from suppliers with whom it already has a relationship. It is important not to upset potential donors by acquiring products from their competitors. These various concerns have been acknowledged but neither addressed nor resolved.

The one factor that contributed to the college's trust in the decision-making process was the involvement of relevant stakeholders. Initially this was only the international planning and analysis team but then department heads and administrators, who are responsible for their departmental records, were consulted about the types of records they used and their views on using a cloud service. These staff have a lot of digital records on hard drives, can be very protective of information, and distrusted what would happen in moving to the cloud ('turning them over to the records management/archives teams'). Students were not consulted but, given that some of the records relate to them, perhaps should have been.

For the records management team and archives unit additional factors contributing to trust in the decision-making process included service provider/vendor reputation, analysis of alternatives (although none were considered in this case), regulatory/legislative requirements (in particular the Freedom of Information and Protection of Privacy Act - FIPPA) and associated risk management.

Case Example 2 – Uses the cloud and economic models

Lessons Learned and Points to Consider
From an organisational perspective cloud adoption has not yet been fully implemented and it is too early to say what change its use has had on access to records. However, it is clear that organisations need a good records management team, which the college has, who understand e-records issues; but it is also crucial that senior management are 'on board'. They need to understand the value of the records management team and the value of records management, including appropriate digital storage.   The most important lesson is that organisations need to be proactive about managing their e-records and choose systems that ensure they remain accessible. However, in Canadian post-secondary education colleges the archives unit is often attached to the library service, which functions very differently and has little understanding about the need to manage e-records in order to implement a good information system. Archives containing institutional records should be linked to the records management function as the archives is the repository for records at the end of their life cycle. Unfortunately, libraries do not understand this therefore, in this sector, as long as archives are tied to libraries managing e-records, including possible use of cloud services, may not happen.   *"Don't be afraid of the cloud" and find ways of getting all stakeholders involved so that "they too see this as the way to go".*

Acknowledgement
Based on the survey response and follow-up interview with a professional level member of staff in the Library.

Case Example 3 – Uses the cloud and economic models

The Organisation

The organisation is a New Zealand state owned enterprise with 500-999 employees and many more contractors. It has a well-established records management service and is one of Microsoft's early adopters, anywhere in the world.

Use of Cloud Services and the Decision-Making Process

The organisation decided to move to an evergreen platform when Microsoft approached them with an offer of a big discount if they moved to the new Microsoft cloud platform with its suite of services, including Office 365, Windows 10 and Office 16. Microsoft often uses New Zealand as a product test bed and was looking to trial its new platform. The organisation was in a good position in terms of IT lifecycle management and already planning a migration from SharePoint 2010 to 2013. A review of the IT lifecycle budget for the next 3-5 years showed a substantial monetary advantage in taking up the offer though the organisation recognised there would be risks. Cost, however, was not the only driver for moving to the cloud. The cloud offered increased flexibility, access to specialised services, evergreen technical support and the opportunity to avoid shadow IT in the sense of individual staff or business units 'doing their own thing' and signing up for off-the-shelf services or separate document management, client relationship management systems etc. without central input or corporate governance. Using a centralised cloud server means staff must go through a process to uptake services, which is important not only for control of organisational content but also for managing reputational risk (e.g. avoiding use of services that 'own' the organisational content).

Two other important factors were the ability to work collaboratively with third parties and the socio-political benefits. The organisation is in the process of business transformation, one aim of which is to better support remote and home working and the use of portable devices to meet changes in expectations brought about by the digital world – i.e. access to information anywhere, anytime, from any device, which means also moving to the cloud. So, whilst the decision to move to the cloud was taken for strategic organisational benefit, rather than for records management purposes, it provides an excellent opportunity to move its records management to the cutting edge (e.g. implementing ontology driven records management with more front end auto-classification).

The planned move to the cloud, which begins in spring 2016, has received a positive response. It is a journey that starts not with moving content and using the technology but with change management, winning the hearts and minds of staff, and promoting a desire to work in a different way. Instead of staff setting up their own SharePoint libraries, using shared drives and structuring their own folders, the aim is to take a drag and drop approach with auto-classification and minimal addition of metadata yet easy retrieval. This is alien in the organisational context even though it is how systems operate that are commonly used in personal life. It will be a cultural shift; hearts and minds will need to be won over.

Roles and Responsibilities

The Head of the IT Department, who is a member of the Executive Committee, played the

lead role in the decision-making process by presenting the Committee with the opportunity to save money using the Microsoft cloud. The whole organisation was consulted, including the person responsible for records management, in order to identify any parts of the business (the critical services) that could not move to the cloud because content had to be kept on-premise for control purposes. These business units were then exempted from using the cloud. The IT Department will be largely responsible for post-adoption monitoring of cloud costs.

Economic Considerations and Use of Costing Models in the Decision-Making

Despite the prospect of big savings in software licences, cost was only slightly important in the decision-making process. Overall, the cloud may be a more or less expensive. Hardware costs may be less, uptake of software services will need to be from the central provider, and very good security and access controls will be needed. Sub-optimal controls are less risky with on-premise systems but when access is federated to others, including third party partners, the risks are greater and consequently controls must be tight. The investment will be in different things such as greater security and access controls. The organisation is still investigating the cost but thinks it may be higher.

The IT Department, in which the records management function sits, uses economic models in their decision-making, in particular: relative cost of operations and total cost of ownership (TCO). TCO for on-premise solutions has often not factored in the hidden or 'unconscious' costs, such as someone's time helping to get something done. The organisation bears these, hidden as operational costs. TCO in the cloud environment is proving to be challenging. The IT Department considers the cost of applications but TCO needs to include the cost of the people component in providing a service. Behind-the-scenes people costs (including policies, maintaining security and access models, the ontological structure, the business classification model and its implementation, metadata, administration, training etc.) are a significant proportion of the whole, and may amount to more than is saved on the technical costs. Additionally non-financial factors (e.g. stakeholder impact, socio-political benefits, risks, responsibilities) are being considered.

The IT Department will monitor costs, such as periodic subscriptions and volume, in a budgetary sense. If costs increase and the increase cannot be borne they are likely to approach individual business units to discuss how to reduce them. A likely approach is to reduce storage costs by cutting content but without considering what content to cut. This is the disconnect between IT and records management but, as both functions are in the same department, the hope is that there will be discussions about what content to delete by shortening retention periods, for example, or being more aggressive in their application.

Issues of Trust

The only very important trust issue for the organisation was concern about the service provider's offer of an economically viable service. Vendor lock-in is not important as it is only the SharePoint platform that has to be used.

The importance of trust in the cloud as a platform and for software will be lowered by what an organisation chooses to put into it. Only administrative records and records of some core business functions (e.g. manufacturing, sales, research), and only those records classified as 'public' or internal/confidential, will be stored in the cloud. By exempting its critical

services from moving their content to the cloud, the organisation has effectively lowered its trust threshold. The IT Department would say that the risks of using the cloud are not significantly different to those faced on premises; however the magnitude of the consequences should a risk materialise are likely to be significantly greater, depending, of course, on the risk. Cloud breaches are often reported in the press.

Factors contributing to trust in the internal decision-making process were Microsoft's reputation, the involvement of relevant stakeholders (particularly to highlight content that could not be moved to the cloud), taking account of regulatory/legislative requirements, and risk management.

Lessons Learned and Points to Consider

There are two key lessons to learn from the organisation's experience. First, it is essential to quantify the current state and not a nominal future state because the risks of using the cloud may not be any different to the risks currently being faced. Second, the current state assessment must identify the hidden costs, not just the technical costs, otherwise there will be no money to provide the records management service, only the platform.

Acknowledgement

Based on the survey response and follow-up interview with a Senior Manager in the IT Department who was partly involved in the decision-making process.

Case Example 4 – Uses the cloud, does not use economic models

The Organisation

The organisation is a government sector City Council in Spain, the lowest level of public administration, with 1000 employees. Under municipal legislation it is responsible for governing the city, providing public services to its 100,000 inhabitants, general and financial administration, and fostering the socio-economic development of the area, with a budget of €110 million. It has well-established archives and records management departments and its records management processes/requirements are well integrated within its management and business systems. Spain is moving towards e-government i.e. completely digital public administration.

Use of Cloud Services and the Decision-Making Process

The City Council uses cloud type platforms for business purposes to provide and manage public services and projects. Since the early 1990s it has used various IT platforms to exchange data with regional and national government (e.g. social security data). In these cases, the Council is an end-user, entering and consulting data but not able to download the record. Normally, the internal evidence is (still) a screen print. It first used an external (public administration) cloud service in 2003 to exchange information with the regional government. It is now legally obliged to exchange some information with higher level regional, provincial and national government bodies via cloud type platforms (e.g. grants, social security, tax). In 2005 the Council started to use a cloud service to manage its own records. The first services involving external sector organisations were financial ones (online banking); extending back almost 20 years they are now cloud based. More recent services use cloud based Software as a Service (SaaS) to support the maintenance of public street lighting and to manage incidents in the city in collaboration with the Police Service. In the latter case it is a cheap and almost complete solution.

The Council's use of cloud services for a platform and/or software means that records are created, used and therefore implicitly stored within those systems. Records include those related to administration, finance and public security records (e.g. police, terrorism intelligence), and amount to approximately 2Tb. There are effective access management and user control processes. Public cloud services can only be used for non-official records and only if the information does not contain personal data subject to data protection legislation. For example, Mailchimp is used for mailing list management but only the email address is stored, no personal data.

The Council has a central records management system (RMS) which is designed to manage transversal, cross-Council, workflow decision-making processes. It is well integrated with its business systems and key to managing a complete and secure system for its official records (e.g. government decisions, those with legal evidentiary value). However, current cloud-type platforms are creating problems for the control of some records. These platforms do not address records management requirements; in fact records are only available on the platforms for two years. The upload or download of records is not an automatic process and the integration of these platforms with the Council's RMS is not easy; for example, the Council has different strategies for digital signatures (attached or detached). Any new proposal to use a cloud service is now analysed by the Records Management Department to ensure that its use will not adversely affect those transversal processes and the management of official records. In principle, the Council does not use the cloud for storing its 60Tb of digital archival records, instead access to and dissemination of these records are

managed in its own system. Initially this was to enable intellectual property rights management but this should no longer be an issue as most of the records are openly available via Creative Commons licences. Whilst there is insufficient trust in some public cloud services the main reason for not using the cloud for archival records is the lack of any driver. If a cloud provider were to offer software that was of interest for this collection then using the cloud in the future could be an option. Currently it is not on the agenda.

Roles and Responsibilities

The IT Department and, in part, the Records Management Department have been involved in the decision-making process to use cloud based systems. Some important departments with specific needs played the lead role; for example, the Urban Planning Department to manage the projects process, the Finance Department in relation to banks. When the use of a cloud based service is proposed the Records Management Department assesses it from a records management perspective and a data privacy perspective, insisting that the provider can assure appropriate security controls. Security is discussed with the IT Department who require any provider to have ISO 27000 certification if data need specific access protection, for example in the case of Police management. The fact that the Head of Records Management is also the data privacy manager and a member of their security commission has led to their involvement.

Economic Considerations and Use of Costing Models in the Decision-Making

The main drivers for using any cloud based system are more effective provision and management of public services and more efficient business systems and administration. Therefore, although cost savings in hardware and software are also important, it is the solution that is critical and this may require a combination of more than one system. The organisation has not used any economic models as part of the decision-making process. This is partly due to the Records Management Department not knowing the models and partly due to the IT Department placing greatest importance on software sustainability when contracting any provider. An interesting factor here is the comparative cost of designing and developing software versus contracting an external software service provider. Currently the cost of storage is not the problem; the key concern is data portability. If that is assured and a contracted service is cheaper, it is easier to decide to contract the service. Decisions are based on the short-term (2-3 years).

The Council is now starting to consider the different kinds of software services it uses and the types of contract and information requirements needed. One type of service relates to financial matters; a second relates to the control of public services (e.g. traffic light and public lighting systems). The latter provide a lot of data, not records per se but big data that can be exploited. These different types of services require different types of contracts and different levels of information/records requirements including security. The Council did not plan this in advance; it is a real situation that is developing.

The cost of using cloud services is not actively monitored although the IT Department could look at costs and propose to change a service if an alternative or in-house one would be cheaper. Similarly a user department could monitor their budget and, if costs were more than planned, re-consider a service. However, change of provider is more usually linked to the solution – if the solution continues to be satisfactory and the cost is reasonable there is no

reason to change. This means that the cost of implicitly storing records (that are not in the archives) in the cloud is not known.

Issues of Trust

Issues of trust that were extremely important both to the organisation and the Records Management Department in using cloud services were concerns about the service provider continuing to deliver a sustainable service and offering unfavourable contractual terms, a lack of trust in them, and vendor lock-in which can be summarised as "being careful". There are a lot of new companies offering products; the market is still developing and not yet considered "safe". With over two decades of experience of records management and archives software systems, some of which managed physical rather digital records, the Head of Records Management is in agreement with the IT Department that the security of digital information/records and its portability at any time are very important. Therefore factors contributing to trust in adopting cloud services are the provider's reputation and the organisation's management of risk through, for example, the development of requirements and assessment of the systems. The IT Department is only really concerned about the technology and not aware of the risks and confidentiality issues of using the cloud. The Records Management Department is the main actor in making the organisation aware of the latter. It has used poor experiences with some cloud providers to convince the organisation of the need to be careful and in raising staff awareness of risks through training; for example around data privacy management and being careful about storing personal data in the cloud. The organisation listens to them and respects their contribution.

Lessons Learned and Points to Consider

Organisations cannot avoid working in the cloud and therefore it is very important for records management professionals to distinguish clearly the different kinds of cloud services. In addition records professionals need to determine what services or business processes could be managed (or not) in the each kind of cloud service offered, according to their risk and level of criticality. The City Council's Records Management Department is currently completing a set of records requirements, which is scaleable, for contracting cloud services i.e. not all requirements will be necessary depending on the kind of service. Depending on the risk and criticality of the content and the business actions, and access restrictions some cloud services could be used (or not) under specific requirements. For example, if a service concerns records and information relating to legal matters such as public security or if it handles personal data needing a high level of protection, then more requirements must be met. These sets of different requirements for different kinds of information within a given cloud service will form a base for departments when procuring services and managing contracts. They will also be very useful for training about the specific records requirements for particular services. An organisation should have such a list of records requirements, which cloud service providers should meet, that vary according to the type of service.

Acknowledgement

Based on the survey response and follow-up interview with the Head of the Records Management Department.

Case Example 6 – Does not use the cloud or economic models

The Organisation
The organisation is a Canadian religious one with approximately 250 employees spread across four different geographical locations. Staff include administrative and other support service staff, and a senior management team that handles the day-to-day management decisions on finance, human resources and facilities operation. The latter was only established in 2012, following an amalgamation of four related organisations, and comprises people from four different geographical sites. Final decision-making rests with the religious leaders as the overall governing body.

Use of Cloud Services and the Decision-Making Process
The organisation does not have a records management programme in place but has used public cloud services to store some of its records since 2014. The main driver for using the cloud was the organisational amalgamation. The aims were to solve the problems of file sharing between different geographical locations, provide access to files and email for leadership members and staff travelling on business, and connect everyone as quickly as possible. There was a desire for the different organisational sites to be united in terms of information technology. Anticipated benefits of adopting the cloud for Software as a Service (SaaS) and records storage were: 24/7 access to files and email; the ability to use a variety of devices including laptops, desktops and mobile phones to access files and email; the ability for quick setup of software and storage across scattered geographical locations; eliminating the need to invest in new software and hardware and technical support for each different geographical location to ensure all sites were using the same software versions and had server storage capacity; the provision of more data storage space; the availability of off-site back-up; and data security because of the good reputation of the cloud provider, Microsoft.

A cloud broker was used to select Microsoft as the provider. Generic software (e.g. Microsoft Office 365, Squarespace cloud CMS, Omeka for web publishing, various social media platforms) and a professional association archives catalogue database are used via the cloud platform. Records relating to administration, finance, personnel and facilities management functions are stored in the cloud but "no archives records are in the cloud. The archivist was firm on this matter". Records are not security classified but access restrictions are applied. Access is restricted to the record creators who uploaded the records to the cloud server, and those to whom they have provided access through file sharing. The IT Administrator also has access rights which they did not have prior to the move to the cloud. However, no risk assessment appears to have been undertaken to determine which records are sensitive, private or confidential. |

Roles and Responsibilities
The IT department and senior management (members of the Management Circle who include the Human Resources, Finance and Investment, and Facilities and Operations managers) played the lead role in the cloud adoption decision-making process. The archivist and administrative assistant, who are part of Administration and each report directly to a designated religious leader, were not involved in the planning or decision-making processes. They wish they had been involved as they had a lot of knowledge and expertise to

contribute. The reason for their non-involvement was the culture of the IT lead person who came from a different part of the organisation and had a different way of working – 'not to consult' but to take the responsibility. Each of the four organisations, which were amalgamated, has a different culture.

Economic Considerations and Use of Costing Models in the Decision-Making

No economic models were used in the decision-making process and it is believed that no cost benefit analysis was done. Costs are not being formally monitored and the cost impact of cloud adoption is not yet known. The archivist and administrative assistant have concerns about the difficulty in predicting future storage and usage costs.

Issues of Trust

Already trusting in the internal decision-making process, in cloud computing models, and the service provider's reputation, the only very important trust issue was concern about the service provider's offer of an economically viable service. Issues of trust that were slightly important were concerns about the service provider continuing to deliver an economically viable service and a sustainable storage service; unfavourable contractual terms offered by cloud service providers; and negligible or insufficient financial, human resources and time savings.

The archivist and administrative assistant, however, had serious concerns which they voiced in meetings and in two briefing papers to the religious leaders. These ranged from concerns about cloud computing models and providers; the economics, viability and sustainability of their services; contractual terms; negligible cost savings, and issues of privacy, copyright and security. In addition they were concerned about the internal decision-making process. Contributing factors were the lack of involvement of all relevant stakeholders, lack of a thorough investigation of the situation, not taking account of regulatory/legislative requirements, not conducting any form of risk management and failure to consider other cloud options (e.g. private or community).

The archivist's concerns around maintaining the records' authenticity, reliability and integrity led to the decision not to store born digital or digitised analogue records that had been transferred to the archives, on the cloud server. These concerns included multiple back-ups of records on different cloud servers (potentially in different geographical locations and therefore subject to the laws governing records in those locations), making disposal more difficult, and their being subject to discovery even though Microsoft states it is able to place holds on records for discovery:

"It may be difficult to prove records have not been accessed or modified in cloud storage, which may affect their evidentiary value. It would be necessary to run checksums before upload, on records in storage, and after download to ensure data integrity. In fact, Microsoft states it can access data to improve service or to troubleshoot. Records may be lost or deleted, surveilled, or hacked. Microsoft does have good security and encrypts data in transit and storage, and does not mine data, however, states that it may disclose data without prior consent. The inability to do an external audit with a large corporate provider like Microsoft is a concern."

Ownership of records uploaded to the cloud was a concern, particularly in the case of social

media platforms. "Although Microsoft states it will delete data once a contract is finished it is not clear if the data is zeroed out." Portability of records (i.e. ability to download records from the cloud in the original formats), migration or refreshing to ensure long term preservation, the retention of embedded metadata and the potential addition of metadata by the cloud provider, and security were other concerns. The use of cloud computing encourages mobile computing and with this, the potential loss of devices holding active records, and the use of unsafe networks to gain internet access.

> *"As we don't have a records management program, and are using the cloud to create and store records, we have given up control of our records in some ways. I think we would be better using a private cloud, or a cloud based enterprise management system such as Open Text, or a community cloud shared with other religious organisations."*

Provider compliance with Canadian legislation was a big concern given that Microsoft servers were not located in Canada when the service contract was signed[7]. Even though as a religious organisation the archives is not subject to federal or provincial privacy laws, the archivist wanted to follow best practice and comply with existing legislation[8]. So, for now, archival records are backed-up on a local server and external hard drives, not in the cloud.

Lessons Learned and Points to Consider

Before taking the decision to move to the cloud, wide-spread consultation with staff throughout the organisation is recommended - the records creators and users, and in particular records managers and archivists. A needs assessment to identify the "real needs" of staff is a good first step; risk assessment, cost-benefit analysis and consideration of the most appropriate cloud model to use (e.g. private, community or public) are all important. A records management policy should be in place before adopting cloud services. In this case, limited IT/cloud knowledge and experience resulted in dependence on a knowledgeable broker/company for assistance. In retrospect, it would have been better to hire a knowledgeable records management consultant.

Has the aim of bringing together staff across the locations by connecting them through cloud technology adoption been achieved? Not yet since not everyone is using, or fully using, the services. This is either because of the learning curve to adopt new technology (particularly for the ageing religious order), service limitations (e.g. loss of access due to need for software updates) or concerns relating to the management of the organisation's records. These highlight the importance of involving staff, understanding their needs and educating them.

The solution seems to be costly in relation to the number of people in the organisation and it has not made any real improvements from the records/archives perspective. Problems with software updates have resulted in some files being moved from the cloud back to a local server, response times can be slow, especially when working with graphics, and annual cloud based subscriptions are causing concern that costs will rise. However, anytime access

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[7] Microsoft later announced they would open two data centres in Canada in 2016 https://www.microsoft.com/en-ca/web/datacentre/default.aspx

[8] For example, Freedom of Information and Protection of Privacy Act (FIPPA); Personal Health Information Protection Act (PHIPA); Personal Information Protection and Electronic Documents Act (PIPEDA); Canadian Copyright Act, 2012.

to email, and the records therein, has been an advantage.

Acknowledgement
Based on the survey response and follow-up interview with the administrative assistant and archivist who have been on staff for 26 years and 2 years respectively.