CAELIS INTERNATIONAL
2206 – 5885 OLIVE AVENUE
BURNABY BRITISH COLUMBIA
CANADA V5H 4N8
TEL: 1-514-739-8547
WWW.CAELIS.CA
EMAIL: adiez@caelis.ca

ADVISORY SERVICES ON BASELINE SURVEYS AND AWARENESS CAMPAIGNS

FINAL REPORT

PRESENTED TO THE

OFFICE OF THE REGULATOR (OOTR)

IN COMPLIANCE WITH
DELIVERABLE 4 OF
CONTRACT NO. OOTR-C3

MONTREAL, CANADA
3RD. OCTOBER, 2018

Table of Contents

Table of Figures

List of Tables

Acronyms

Acronym	Meaning
ADB	Asian Development Bank
A4AI	Alliance for Affordable Internet
ANZ	Australia New Zealand Bank
APT	Asia Pacific Telecommunications
ASH	American Samoa Hawaii (cable)
CSL	Computer Services Limited
DBS	Development Bank of Samoa
EGDI	E-Government Development Index
GB	Gigabytes
GNP	Gross National Product
GNI	Gross National Income
GoS	Government of Samoa
HHI	Herfindahl-Hirschman Index (HHI)
ICT	Information and Communications Technology
IMF	International Monetary Fund
ITU	International Telecommunications Union
MAF	Ministry of Agriculture and Fisheries
MB	Megabyte
Mbps	Megabits per second
MCIL	Ministry of Commerce Industry and Labor
MCIT	Ministry of Communications and Information Technology
MESC	Ministry of Education Sports and Culture
MFAT	Ministry of Foreign Affairs and Trade
MfR	Ministry for Revenue
MJCA	Ministry of Justice Court Administration
MNRE	Ministry of Natural Resource and Environment
MOH	Ministry of Health
MOF	Ministry of Finance
MOP	Ministry of Police
MPE	Ministry of Public Enterprise
MWCSD	Ministry Women Community Social Development
MWTI	Ministry of Works Transport and Infrastructure
OOTR	Office of the Regulator
PMU	Project Management Unit
PSC	Public Service Commission
SBS	Samoa Bureau of Statistics
SMS	Short Message Service
SSC	Samoa Submarine Cable
SSCC	Samoa Submarine Cable Company
Tbps	Terabits per second (1000 Gbps)
UAF	Universal Access Fund
UNDP	United Nations Development Program
WST	Samoan Tala

1. Introduction

The completion of the Tui-Samoa undersea fibre optic cable in April 2018 brings an expectation of much improved Internet connectivity through vastly greater transmission speeds and heightened reliability. This infrastructure development presents a generational opportunity for Samoa. However, further planning and implementation work is required to ensure the benefits of broadband are available to all Samoans and that they in turn are ready to explore and exploit new digital possibilities.

The benefits of high speed Internet are numerous and deep, and generally deliver great benefits through GDP growth. Furthermore, studies conducted by the World Bank and McKinsey & Company, among others, confirm a relationship between increased broadband Internet penetration and economic growth. Specifically, for every 10-percentage-point increase in broadband penetration in low- and middle-income countries, economic growth increases by 1.38 to 1.5 percentage points[1].

In anticipation of this great opportunity, the OOTR sought to better understand the current state of ICT services and perceptions of usage in Samoan society. This was to be achieved through four surveys aimed at the general public, businesses, government entities and educational institutions. A related objective was to set benchmarks from which future surveys may detect changes in ICT behaviour and expectation.

The terms of reference for this undertaking required that the surveys measure:

"The impact of Information and Communications Technology ("ICT") services to the social and economic development and how it impacts the lives of the Samoan people".

Results from the surveys have now been collected, collated and analyzed. They are presented to OOTR and its stakeholders through this document in Section 4 below. In addition, key results were provided to stakeholders through a series of presentations made in Samoa during June 2018.

In support of these surveys a series of focus group meetings were conducted in Samoa in order to validate the results with key stakeholder groups. Further desk research was conducted to provide supporting international best practice.

The culmination of survey results, stakeholder engagements, and accompanying desk research provide core recommendations for future ICT work and these are put forward in section 6 below. These recommendations are provided to OOTR so that it may pursue its mandate and the overarching goal of increasing ICT availability and use. It is important to reiterate that this report represents the result of several components including the surveys, the group discussions held with representatives of the four groups and interviews held with relevant stakeholders. It is therefore a research report, whose recommendations may not necessarily be based exclusively on the statistical figures obtained but on the global picture of consultations.

It is clear that certain recommendations will rely upon close coordination with Government ministries (such as Women, Communication, Health, Education),

[1] World Bank (2010). Building broadband: Strategies and policies for the developing world, p. 2. http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1208273252769/Building_broadband.pdf .

industry partners, and educational institutions. Indeed, these stakeholders must be the champions of effective implementation.

Background and Objectives

Samoa, Fiji, Wallis and Futuna and Vanua Levu islands are now inter-connected with a submarine optical fiber system spanning 1,470 km and providing an advanced broadband highway. Underpinning Samoa's domestic and international connectivity, the Tui-Samoa submarine cable system can deliver a capacity of at least 8 Terabits-per-second (Tbit/s) while at the moment it is using 100 Gbit/s transmission technology. This substantially improves broadband capability and provides enough transfer capacity for the foreseeable future. However there remains technical work to be completed to connect "the last mile" and to ensure truly universal access.

The Samoa Submarine Cable Company (SSCC) was established to operate a "Cooperative Sustainable Wholesale Model (CSWM)" with a mandate to deliver fast, reliable and affordable internet services to stimulate ICT innovation and development. The price and availability of wholesale capacity will be regulated by the OOTR which will ensure that pricing and access to services is cost-based and available on an equitable basis to any existing and future licensed service providers.

OOTR Vision and Mission

This project feeds into the Vision for the OOTR which is: "A society where all consumers and participants experience the benefits of well-regulated ICT, postal and electricity services." Likewise, its mission statement is: "To facilitate and promote the best interests of consumers and participants in the ICT, postal and electricity sectors through the best combination of competition and effective regulation."

Government View

The Government of Samoa has developed policies with a view to harnessing these new broadband opportunities. It has stated: "Only with a higher adoption rate of broadband services will Samoans be able to truly integrate themselves into globalised trade, commerce and society of the 21st century."

The Government has a vision of "ICT for all" along with a mission, which is:

"To ensure all sectors of the community and Government have access to high quality, affordable, and safe ICTs to help reduce hardship and poverty and ultimately achieve and sustain a high standard of living."

The recommendations put forward in this document are meant to complement those put forward in the recent Communications Sector Plan 2017/18 to 2021/22, published by Ministry Information Communication Technology MICT, and on behalf of OOTR, and Samoa Post Company Limited (SPCL).

2. Executive Summary

Samoa is a small country in the middle of the Pacific Ocean. Its isolation, like with so many island countries, offers Internet connectivity challenges far greater than larger countries. Expensive satellite connections have been the only viable telecommunications alternative until recently. The American Samoa Hawaii fiber cable has provided a certain relief, but it was not until April 2018 that a powerful and durable solution was made available to Samoa. The Tui-Samoa fiber cable, capable of broadband speed up to 8.5 Tbps is the answer to a long quest for proper connectivity, thanks to the efforts of the Samoan government and the support from organizations such as ADB and the World Bank.

Caelis International has been commissioned by the Office of the Regulator (OOTR) to identify the Needs of Samoans in ICTs and their willingness to embrace the changes that are happening in the world of Internet. As the capacity to access Internet at reduced prices is now available, the OOTR commissioned a survey across the country to create a baseline of ICT Needs and Readiness in the country.

The survey, designed by Caelis and conducted by Samoa Bureau of Statistics in March 2018, in fact consists of four cross related surveys: Government, Businesses, General Public and Educational Institutions.

The results of the survey reveal that Samoans are facing difficulties with Internet affordability and reliability. While 40% of the population have no skills on ICT, a large majority of Internet users (55% of the population) access Internet very seldomly and rarely at home. Yet Samoans are well-educated and 97% of the population are literate. Most Samoans know English as a working language, which is a great advantage in utilizing the Internet as a friendly tool. Therefore it is plausible that Samoans, properly trained, will be able to actively participate by using their ICT skills with the world, therefore bypassing the logistic isolation of the country. Furthermore, if the will of Samoans is as strong as we foresee, the country could be well positioned to be at the forefront of certain ICT developments in the Pacific.

The ICT survey results alongside stakeholder inputs proves that, to bring Samoa to that new level of expertise, a first step is to raise the bar of ICT knowledge at all levels of society. This could be done jointly at rural communities, Primary schools, Secondary Schools and also at the highest level of ICT skills through the National University of Samoa.

The difficult yet critical aspect of reducing the cost of Broadband Internet access (therefore increasing affordability for the general public) relies on a few premises as follows:

1. ISPs and Telecom operators face financial challenges in building towers and other infrastructures to connect their base stations. Sharing existing towers is an option but not an easy one, as the owner of the towers tends to make onerous demands.

2. In order to improve the cost of Internet in years to come, it is recommended that interconnection tariffs be relaxed to a minimum by the Regulator so that existing towers and fiber cable may be shared at lower costs.

3. In order to promote the use of smart phones, tablets and laptops, it is recommended to remove custom duties on those items for at least five years.

In order to promote knowledge on ICT, it is recommended that:

4. A substantial Capacity Building plan be established to teach the benefits of computers, smart phones and Internet to rural communities.

5. A plan be adopted to provide a major boost in terms of Wi-Fi Internet access for students at Secondary Schools and NUS as well as increasing the number of computer labs and courses .

6. Primary Schools should adopt a new curriculum where students are taught the basics of computers and Internet.

7. NUS should upgrade its internal resources towards the goal of developing a B.Sc in Computer Science that will be an incubator for ICT experts in the country.

Other recommendations are as follows:

8. OOTR to play a major role in boosting Internet resources and lowering the cost of sharing infrastructures.

9. Banks should promote e-banking and help businesses to develop e-payment interfaces (API) that link their web portals to the bank's payment systems.

10. Update MCIT Broadband Internet and IT plans and re-set realistic targets for implementation with measurable achievements.

4. Methodology

With a view to guiding ICT innovation and development, the OOTR sought to develop and conduct a series of baseline surveys with analyses. Generally, these user surveys aimed to measure:

(i) the impact of ICT services on social and economic development and how it impacts the lives of Samoans;

(ii) the capacity of the community to take advantage of and benefit from the opportunities provided by ICT services; and,

(iii) the extent to which end users/consumers are aware of OOTR and its work in strengthening the ICT sector.

Further objectives were to:

- provide OOTR with data and analysis in terms of ICT services provided and what impact this has on users;
- establish the use of relevant ICT resources in classrooms, public hospitals and private health systems;
- establish the efficiency of connectivity in rural areas; and,
- provide the basis for selecting indicators and strategies to monitor school performance, public awareness, and progress on the use of ICT services.

In addition, the surveys were designed to collect data and information for assessing the cost effectiveness and efficiency of using ICTs in education, Government Ministries and Government Agencies, Businesses and the Private Sector, and for professional development. The surveys were also designed to provide insight on ICT access in schools, households, and in local communities.

This survey project remains a part of the Samoa Submarine Cable (SSC) program. The surveys were conducted in the context of undertaking regulatory functions that are required to guarantee – amongst other criteria - open and universal access, fair and non-discriminatory pricing and quality of wholesale telecommunications services as they will be provided by SSC.

With the establishment of a baseline for ICT-related results, OOTR can maintain better information on the current ICT climate in Samoa. The survey results provide essential data from different segments of Samoan society that can assist OOTR in delivering effective public services while fulfilling its regulatory mandate. For this baseline work, the quantitative data presented is supplemented by a qualitative analysis of the findings.

Carrying out future measurements through mostly similar surveys will enable OOTR to gauge the impact of planned ICT interventions on the lives of Samoan residents – mainly associated with the expected new services made technically possible by the undersea fibre-optic cable. To reach its objectives, the follow-up survey should largely repeat the same assessment of the ICT environment, which was developed through consultations and study of statistics and research documents, the results of which were presented in this project's Inception Report.

The recommendations that follow the survey results – and stakeholder engagements, further research - provide for potential strategies to maximize benefits in ICT development in Samoa. As with most other reports of this nature, it will be essential for decision-makers to consider internal capacities to effect change and so an exercise in prioritizing and evaluating likely impacts will be necessary.

An implementation program for much of the work that remains to be done cannot and should not be done by one agency in isolation. It is expected that Government Ministries will be better placed to execute many of the ICT policy recommendation "packages" with OOTR offering assistance in certain circumstances.

The Methodology used in this project is summarized below:

1. The Survey Results have been tabulated and verified for errors.
2. The Survey Results have been discussed with five groups in workshops organized both in Upolu and Savaii using people and institutions that responded to the survey.
3. The Survey Results have been discussed in consultations with stakeholders particularly ISPs and Telecom operators as well as representatives from MESC, MCIT, DBS, ANZ, MWSCD, SBEC, NUS, OOTR.
4. A detailed analysis of the best opportunities has been carried out.
5. Those opportunities have been compared with similar situations in countries with characteristics similar to Samoa.
6. Final Recommendations and an Action Plan have been created.

Figure 1. summarizes the process followed.

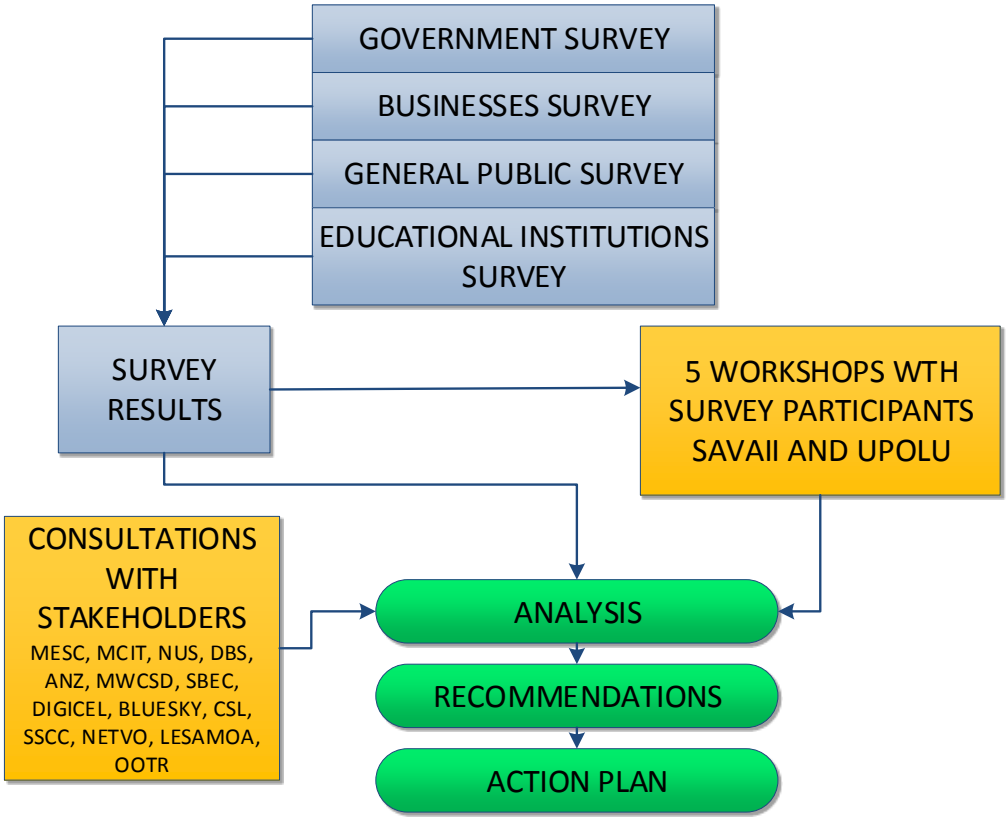


Figure 1. Methodology

4. Survey Results

Survey Methodology Summary

Four frames were defined as follows.

Government Ministries and Corporations: The total number of civil servants is estimated at 7,000 people. We obtained that a 176 sample provides an indicative margin of error of **7.2%.** We would have to increase the sample size to 300 to obtain a margin of error of 5.5%, while a sample of 100 respondents would provide a margin of error of 9.5%. We are confident that the sample size of 176 was adequate and appropriate.

Businesses: The total number of businesses registered with the Ministry of Revenue is approximately 4,000. We obtained that a sample of 180 businesses provided a margin of error of **7.2%,** about the same as for Government Ministries.

Educational Institutions: The total number of secondary students is currently 15,200 and of university students it is approximately 3,000 (2018). Teaching staff at colleges and secondary schools is approximately 813, while faculty and professors at NUS are approximately 300. The total population of Educational Institutions is therefore 19,313.

Under these circumstances with a sample size of 229 we obtained an indicative margin of error of **7.0%**, almost the same as for the previous surveys.

Villages and General Public: Assuming that our frame is the Working Age Population, SBS statistics for 2012 provided a total number of 117,487, with 3,300 unemployed and 34,530 employed. Deducting the overlapping frames of Government, Educational Institutions and Businesses, we obtained a total frame size of 87,174.

When we used the 176 sample size and a productive population of 87,174 we obtained an indicative Margin of error of **7.4%.**

Conclusion: The selection of a sample size of between 156 and 176 was deemed reasonable as the margin of error introduced by a simple random sampling process would be less than +/- 7.2% of the average value of every statistic sought. In order to obtain a margin of error of 5.5% we would have needed to increase the sample size of each survey to 300, which would have increased (double) the cost of completing the surveys.

The methods proposed resulted in the following numbers of respondents:

Table 1 Allocation of Respondents

Survey Component	Target Respondents	Preferred interview method	Remarks	Indicative Margin of Error[2]
Ministries and Government Corporations	176	Face-to-face	The list of respondent groups can be found in Annex 6	7.2%
Businesses	180	Face-to-face	The list of respondent groups can be found in Annex 6	7,2%
Communities and General Public	176	Face-to-face	The list of respondent groups can be found in Annex 6	7.4%
Educational Institutions	229	Face-to-face	The list of respondent groups can be found in Annex 6	7.0%
Total	**761**			**7.2%**

For the purpose of analysing the results across the four surveys and using the analysis for the production of the final report, these percentages will not play a defining role. This project was designed to produce an assessment of certain aspects of the entire telecommunications sector combining different sources of data and information and a number of different survey methods.

Government Ministries and Corporations Survey

Overview of Key Findings

Responses were gathered from a wide collection of employees representing different government departments and agencies. Responses came from smaller (i.e. less than ten) agencies as well as larger ministries such as Health, Revenue, and Finance.

- When planning ICT services 93% of government offices consider that Data Security is the first priority with 50% believing that proper backup is second.

[2]Assuming a confidence level of 95% (calculated with the "Margin of Error Calculator" https://www.survata.com/margin-of-error/ and http://americanresearchgroup.com/moe.html No Margin of Error can be calculated for non-probability sampling.

- 55% of respondents believe that their departments are not satisfied with either speed or reliability of Internet Access services.
- 52% are with Bluesky while 25% are with CSL, 19% with Digicel and 2% for Lesamoa.
- 45% of respondents indicated that Electronic filing is not used within their departments.
- 33% of respondents indicated that their departments do not deliver services electronically.
- 41% of respondents believe that Internet increases their work efficiency by more than 75% while 24% believe that efficiency is higher than 100%
- On average 88% of government employees are well trained in basic computer software and operating systems. Many use a variety of specialised software suitable to their operations.

For this survey:

(i) A total of 37 questions were asked face-to face to government employees in Apia during March 2018.

(ii) A sample of 176 respondents was targeted. This represents a margin of +/- 7.2 % error for all responses, with a confidence level of 95%.

(ii) A total of 46 (out of 50) ministries and government corporations were represented in the survey.

Connection and Quality

For government agencies, just over one in two respondents (52%) were an ISP customer of Bluesky with one in four (25%) indicating Computer Services. Less than one in five (19%) were customers of Digicel. NetVo and Lesa's Telephone Services had 1% and 2% shares respectively.

There are effectively three suppliers of Internet services to government agencies and this is not unusual given the limited customer base. However, OOTR must be more aware of the potential for anti-competitive practices where there are limited suppliers.

A total of 40% indicated that they were linked to the Samoa National Broadband Highway (SNBH), with one in four not knowing if they were connected.

Coverage and Service

For government agencies 55% were not satisfied with their Internet service in general, with slow Internet speed being the main reason and service interruption being second.

Willingness to Pay

A total of 2.79 million WST was paid by all government respondents for accessing the Internet over the past year, with an average of 20,217 WST paid. The highest single payment was 195,000 WST.

A large portion (39%) of users are not willing to pay any more money for better service, while 38% of government users are willing to pay up to 10% more for a better

and faster Internet. A further19% are willing to pay up to 50% more for improved services.

Purpose and Frequency of Use

Four in ten (41%) believed using the Internet created work efficiency increases of between 75-100%, while nearly a quarter (24%) believed that efficiency gains were over 100%. Less than 2% felt that the gains were less than 20%.

E-Service Delivery and Communication

For government entities, one in three (33%) indicated they did not deliver services electronically.

Of the e-services provided, 59% indicated "Government Forms" and this was the most common type of service delivery. This was followed by 37% indicating a "List of Services Offered".

Technical support

Most respondents (74%) provided technical support (phone number, email, etc.) to resolve citizen's issues related to completing forms and other e-government services online.

One in four (25%) believed that the number of staff and hours of operation of the technical support center was inadequate, while the majority felt that it was enough; a sizeable portion (16%) did not know.

52% indicated that they have a measure in place to judge user satisfaction with their technical support unit. This represents an opportunity to not only measure the positive aspects of technical support, but to divert resources appropriately.

Electronic Filing

For government entities, only 52% stated that their office had an electronic filing system – a figure that might be a target for improvement.

Software Used

Microsoft Word (88%), Excel (83%) and Powerpoint (86%) were very well known. Adobe products less so, but there was a base understanding with a majority having at least an "average" familiarity. In terms of government's use and familiarity with other types of software, Microsoft operating systems were noted as "other software" with high familiarity.

In general government employees are well trained in basic business software.

Cybercrime

For government, less than one in four (24%) responded "Yes" to having experienced a cybercrime, while 14% were unsure. Receiving viruses was the most common issue, either through an e-mail (58%) or from interaction with another device (47%).

Security

Most respondents (87%) indicated that they do have a firewall in place while 3% said "No" and the remainder were unsure.

There appeared to be no centralized or common system of best practice for securing data and information. This situation would be problematic for victims of a malevolent digital attack or from a Force Majeure.

Awareness of OOTR

In government, two out of three (68%) indicated that they knew about OOTR and were aware of its function. Less than 5% were unaware entirely and 27% were familiar but did not know its function.

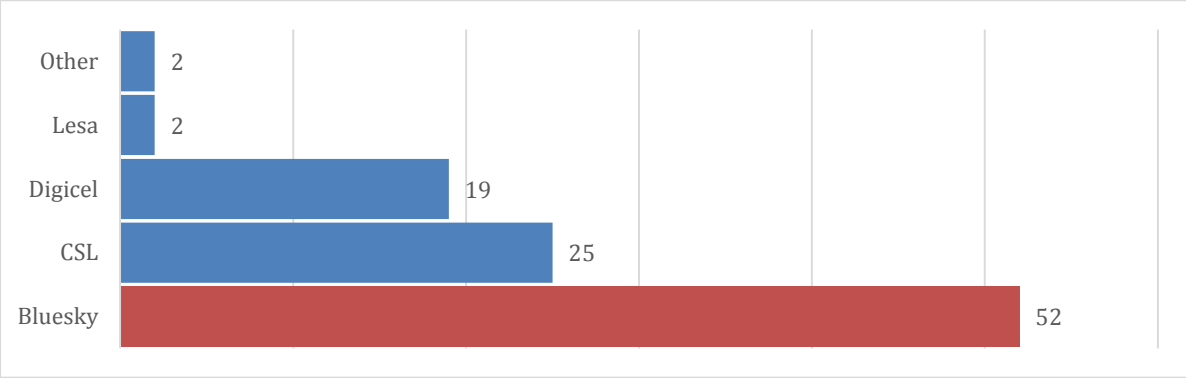
IT Plans

In terms of IT planning priorities, data security was easily the most important item, noted as being the top priority 93% of the time. This was followed by Effective Backups at 50% and Data Access Speed at 40%. Sharing of Departmental Data was easily of lowest importance with nearly half of respondents believing this to be the least important.

GOVERNMENT SURVEY.- THE STATISTICS

THE RESULTS

SERVICE PROVIDER %

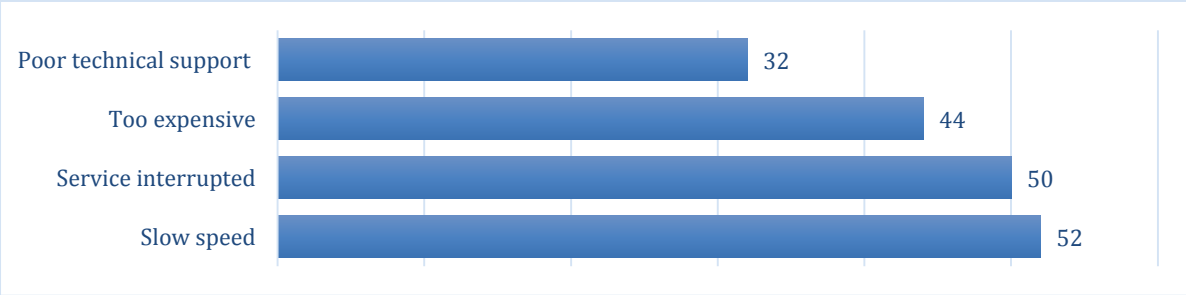


52% of government institutions use Bluesky.

GENERAL SATISFACTION

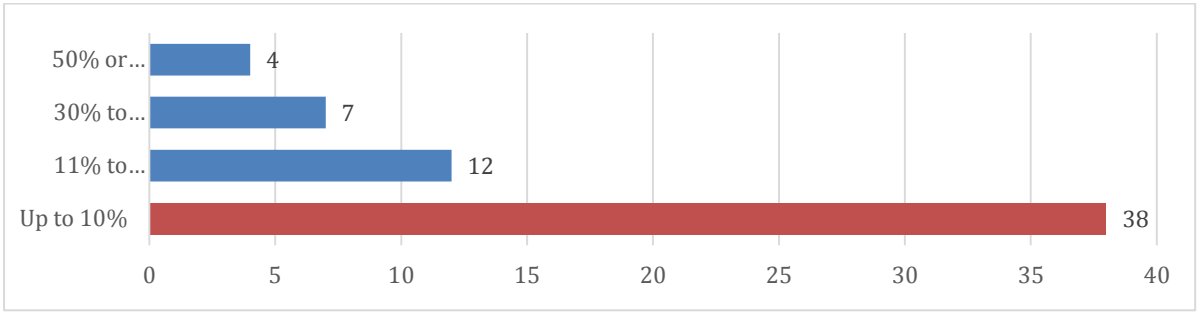
55% were not satisfied with Internet access service.

REASONS FOR DISSATISFACTION (% indicated)



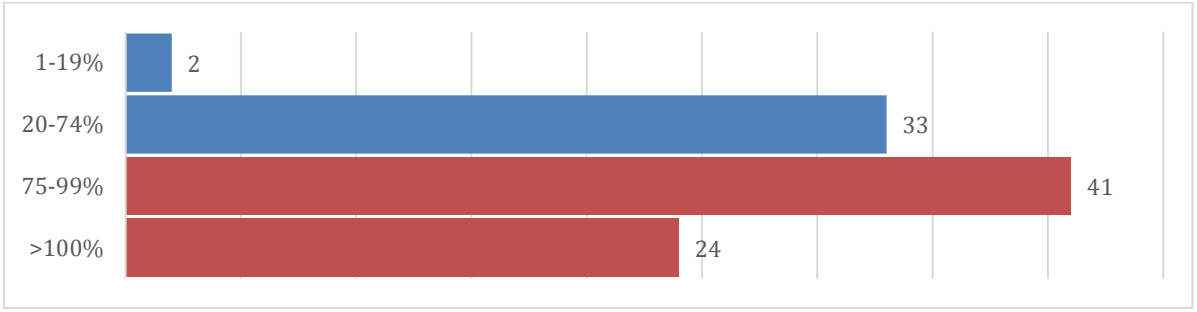
WILLINGNESS TO PAY MORE FOR BETTER SERVICE

IF YES, HOW MUCH MORE?



39% are not willing to pay any more, while 38% are willing to pay not more than 10%.

PERCEIVED EFFICIENCY GAINS USING INTERNET

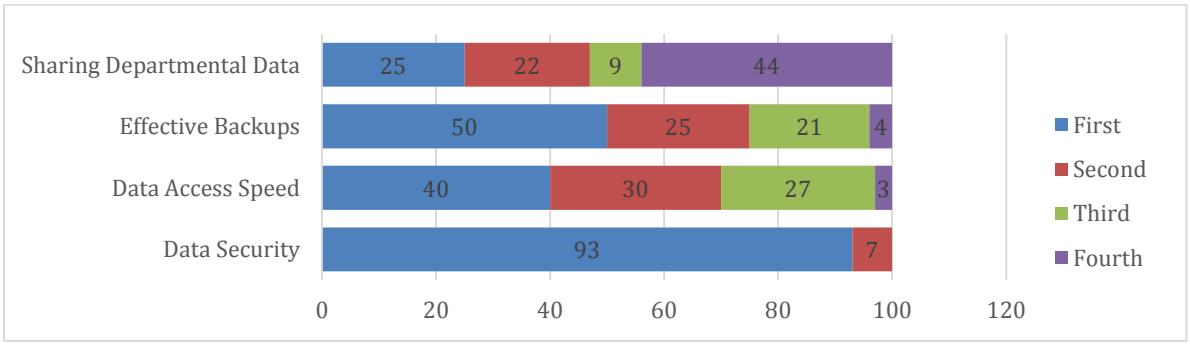


65% believe they're at least 75% more efficient at their work using Internet.

PREVALENCE OF IT PLANS

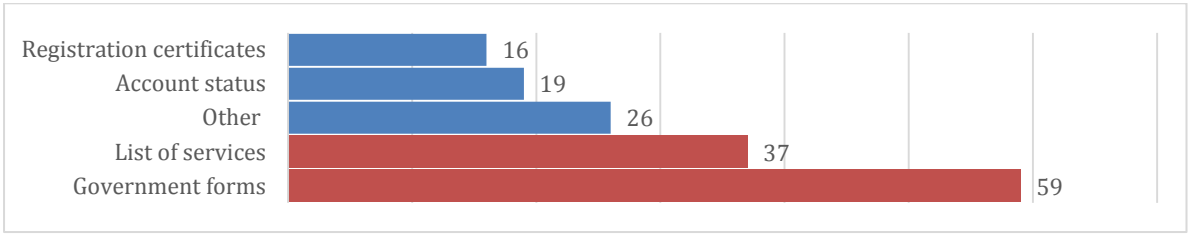
No plan	Plan	Developing
26%	37%	28%

IT PLAN PRIORITIES



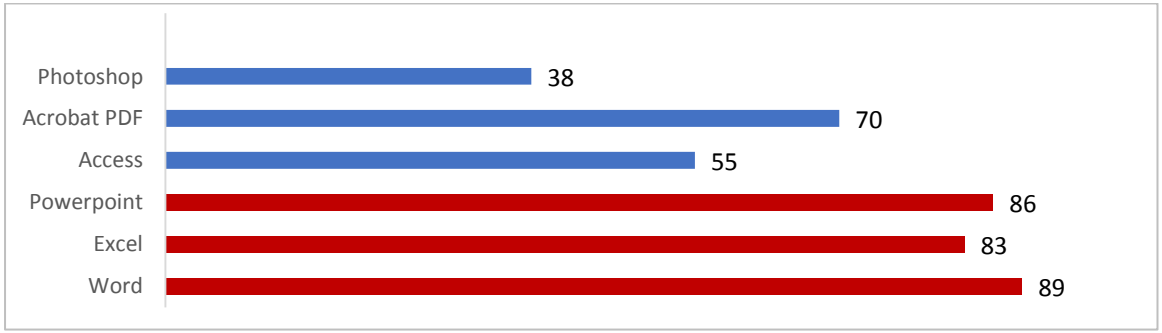
65% of entities have an IT Plan or are developing one. Data security is a priority 93% of the time.

WHICH SERVICES ARE OFFERED (% indicated)



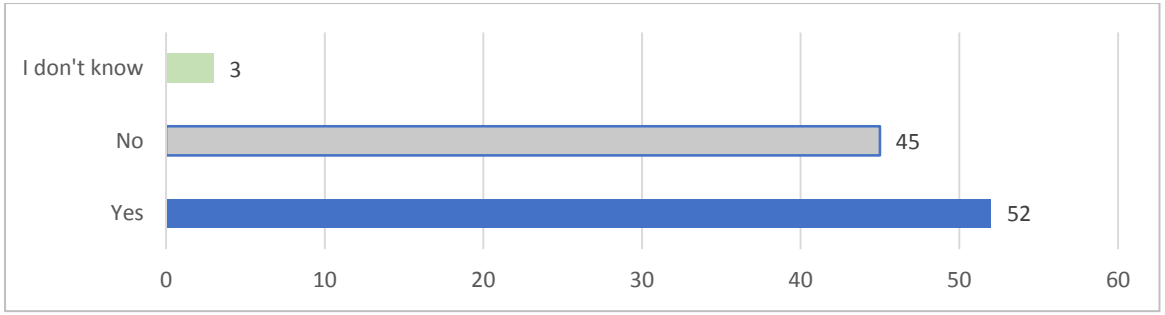
Forms (59%) and lists of services (37%) are the most prevalent online services offered.

VERY GOOD KNOWLEDGE OF OFFICE SOFTWARE (% INDICATING FAMILIARITY)



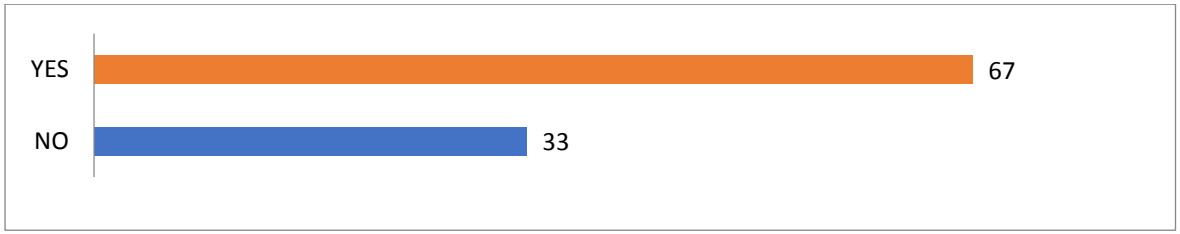
There is a particularly high knowledge and use of word processing, spreadsheet and presentation software applications.

OFFICES WITH E-DOCUMENTS FILING SYSTEM %



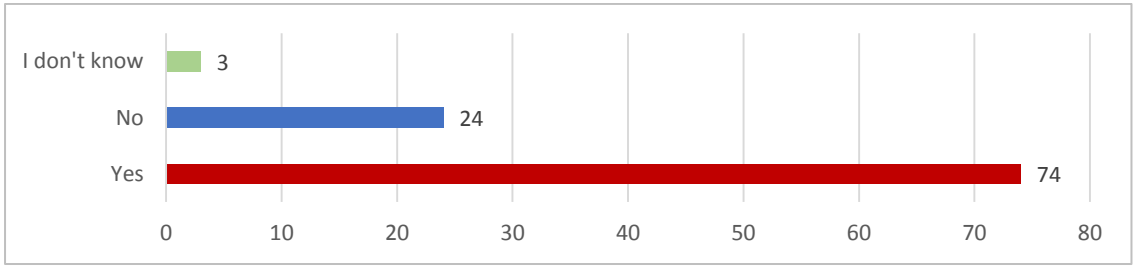
Most offices are paperless with 52% indicating that their office has an electronic filing system in place.

OFFICES WITH SERVICES DELIVERED ELECTRNOCALLY %



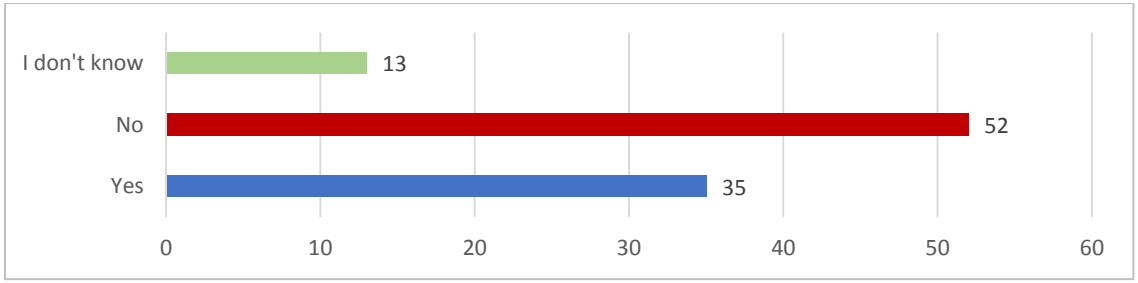
Two out of three indicated that they do provide services through electronic means.

AGENCIES (%) PROVIDING TECHNICAL SUPPORT TO RESOLVE CITIZEN'S ISSUES RELATED TO ONLINE INFORMATION.



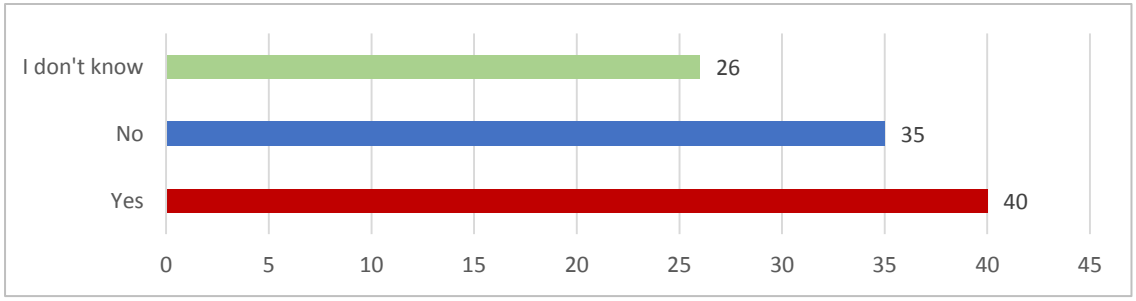
Three out of four indicated that they do provide technical support

AGENCIES WITH A SYSTEM TO MEASURE USER SATISFACTION WITH TECHNICAL SUPPORT %



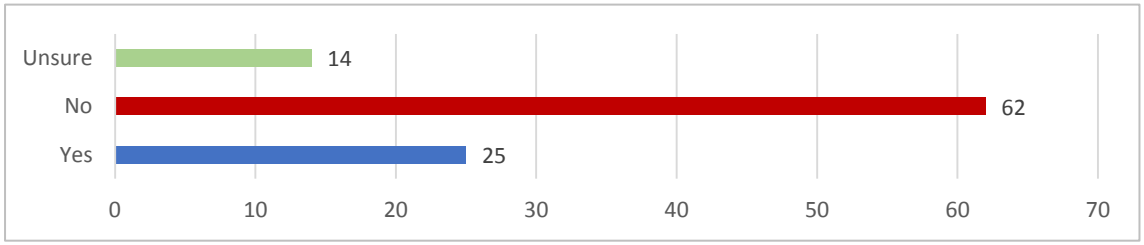
Over one in three indicated that they have a system in place to measure user satisfaction.

AGENCIES LINKED TO THE SAMOA NATIONAL BROADBAND HIGHWAY (SNBH) %



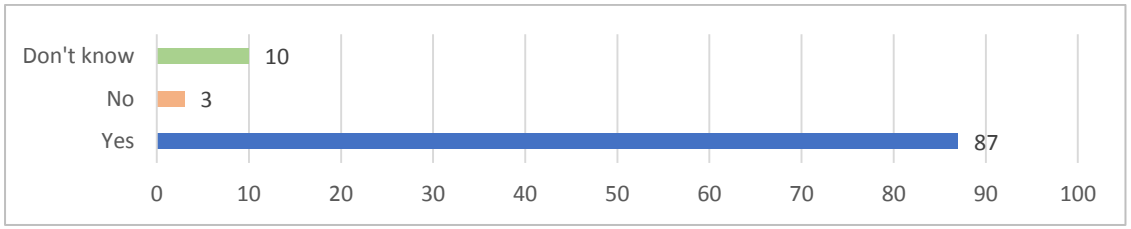
40 % are connected to the SNBH while a further 26% were uncertain.

AGENCIES EXPERIENCING HACKING OR CYBER-CRIME WITHING LAST 12 MONTHS %



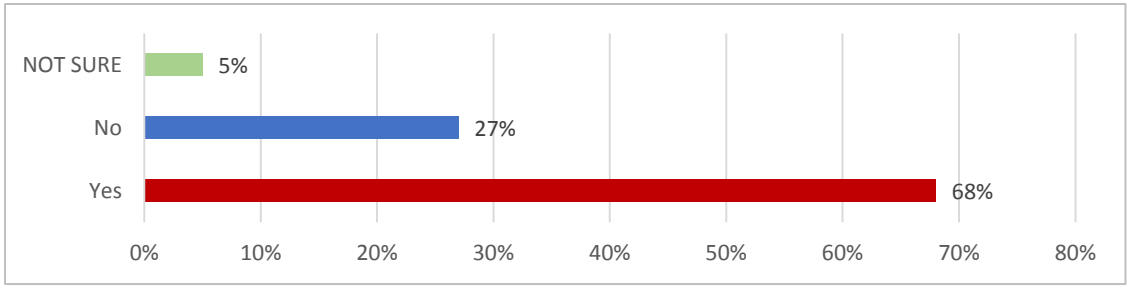
A majority did not experience a cyber-crime within the past 12 months. One in four were certain that they had experienced such a crime.

AGENCIES USING A FIREWALL %



A large majority utilize a firewall.

KNOWLEDGE OF THE FUNCTIONS OF THE OOTR %



Over two out of three indicate that they know of the OOTR and its function.

Businesses Survey

Overview of Key Findings

There was a wide capture of responses from a variety of businesses located around the country. Those from the accommodations and small services sector were predominant; there were also professional services listed frequently. Those identifying as being ICT-related businesses were far fewer in numbers.

The results reflected a persistent dissatisfaction of a sizeable portion of businesses with the ICT services on offer. Consequently, it is recommended that greater competition in all ICT subsectors should be pursued by harnessing the new high-speed connectivity that can now better address some of the speed, quality, and affordability issues. There will likely be a corresponding rise in consumer demand which may support new entrants.

In terms of government delivery of services to businesses, a strong demand for electronic forms, information and payment options was quite clear.

The results of this survey show areas where improvements in the use and take-up of ICTs can be made by businesses. Training may be another area where Government could provide assistance – particularly to small businesses.

Who is your internet service provider?

Two operators dominated this market with Digicel (35%) and Bluesky (41%). CSL and NetVo Samoa have 7% and 8% shares respectively. During consultations with CSL, NetVo and Lesamoa it was indicated that the cost of developing new infrastructures and the high cost of sharing is a major impediment to competing with the two main players (see Section 5).

Coverage and Service

For businesses, 56% were "unsatisfied" with the service, with slow data speed being the major factor.

For those unsatisfied, "slow speed" (46%), "service is often interrupted" (42%) and "service is too expensive" (41%) were the top complaints for businesses.

Generally, there were moderate levels of satisfaction with all three service aspects, but with much room to improve. Just over one in four (28%) businesses believed their ISP's plan did not fit their needs. This suggests a fundamental problem exists – commonly seen with capacity issues and lower competition.

Willingness to Pay

For businesses, 59% were not willing to pay any more for better and faster Internet service. Of those willing to pay more, 42% were willing to pay up to 10% more if the speed or reliability of the data services were substantially improved, while another 26% were willing to pay up to 30%.

Purpose and Frequency of Use

The average number of persons in each business with access to the internet was ten (with answers ranging from 1 to a maximum of 140), and the overall total given for this survey was 1523 people.

Electronic Filing

Businesses were asked if they have a filing system for digital documents (i.e. a paperless Office or e-office) and a significant 37% indicated that they still do not. This represents an opportunity gap in terms of moving towards digital reliance on e-filing and increasing data security, sharing, and general efficiency.

E-Service Delivery and Communication

For businesses, one in three (or 32%) did not deliver services electronically. Of those that did, three quarters responded that they provided e-services through "Reports", while "Accounting data" was noted 57% of the time.

As there is an undeveloped e-commerce sector in Samoa, it became evident during consultations that businesses do not sell goods online using e-payment systems from Samoa as these are not properly developed by the banking sector.

When businesses were asked about other communications services used, more than one in ten (11%) indicated they don't use e-mail. This is a significant number unless this total reflects people who are simply off line. (farmers, fishing, etc.).

Social media was used by 60% which is below the average of developed markets. Meeting online and video-audio conferencing were stated by 20% each.

Perceived Efficiency with Internet

More than half of businesses believed that using the Internet increased their workplace efficiency between 50-100% and a further quarter (22%) believed efficiency gains were over 100%. Conversely, 14% did not think that it was easy to find most data required for their business on the Internet.

Software Used

In terms of businesses' use and familiarity with other types of software, operating systems (mainly Windows) were mentioned by the great majority of respondents. Accounting software was put forward by 60% of respondents, while Graphic and multimedia was mentioned by 34%. Less well-known software (such as Autocad and Room Master) were mentioned by some, but such use was clearly not prolific.

Familiarity with all Microsoft products was high with the exception of Access; however this program is not widely used elsewhere. Less than 2% believed their knowledge to be poor with Word and Excel.

In general businesses in Samoa are well versed in basic ICT systems but they noticeably lack e-commerce and on-line selling opportunities.

Cybercrime

One in four (24%) indicated that they had been a target of hacking or a cyber crime during the past year, while 7% were unsure. Of those who did experience an unwanted cyber action, 82% of those affected indicated that they were a target of viruses (66% through e-mail attachments).

Effective training in how to be protected from viruses is worth exploring. SBEC, who provides ICT training to businesses, continues promoting good anti-virus practices among small and medium businesses.

Security

One quarter (23%) did not use a firewall for their businesses' IT systems, and a further one quarter (24%) were unsure, so it is possible that up to half of respondents operated without a firewall.

For businesses, almost one quarter (23%) indicated that they had no data backup. Nearly 47% relied on an external drive as a backup, while only 6% used a backup server outside of their office.

E-Government Services

Businesses were asked which transactions they usually conduct with government agencies they felt should be offered online. Just over half (52%) of respondents believed that all available online government forms should be offered online. This is a clear request and constitutes an opportunity gap. Again, 51% believed that "On-line payment of due fees and taxes" should be offered.

Awareness of OOTR

The responses indicated that 39% claimed to have awareness of OOTR and its functions. One in five (21%) were completely unfamiliar which is not unusual given that the OOTR is mainly sector-specific.

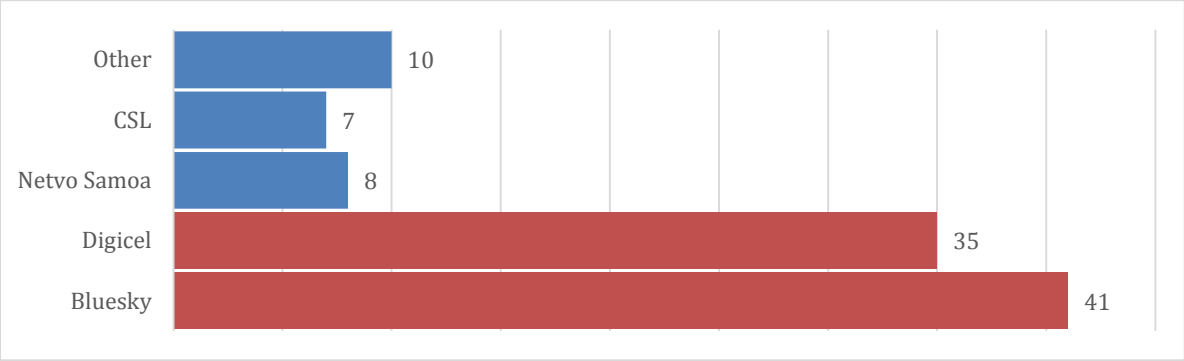
IT Plans

For businesses, 58% indicated that they did not have an IT plan while only 28% had a plan that was being implemented.

"Data security" was the most important priority in the plan, with 86% believing this to be the case. There was a negligible difference between "Data Access speed" and "Effective backups", while "Sharing of Departmental data" was clearly the lowest priority.

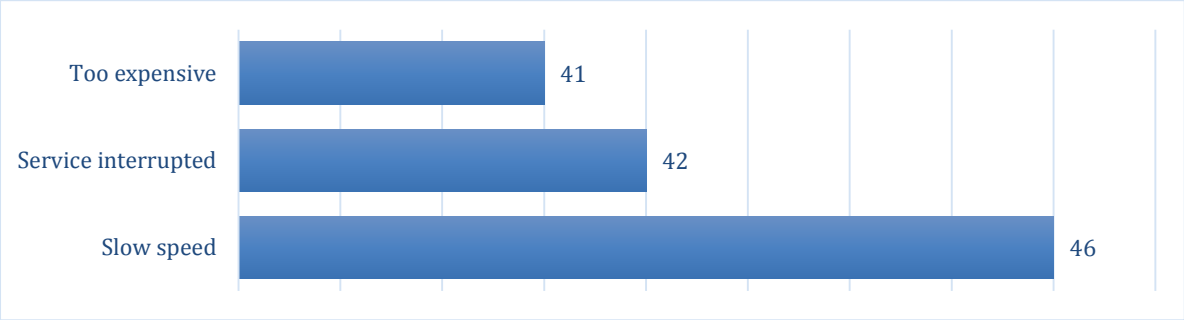
BUSINESSES SURVEY.- THE STATISTICS

SERVICE PROVIDER %



GENERAL SATISFACTION OF INTERNET SERVICES

REASONS FOR DISSATISFACTION %



THE RESULTS

41% of businesses use Bluesky and 35% use Digicel.

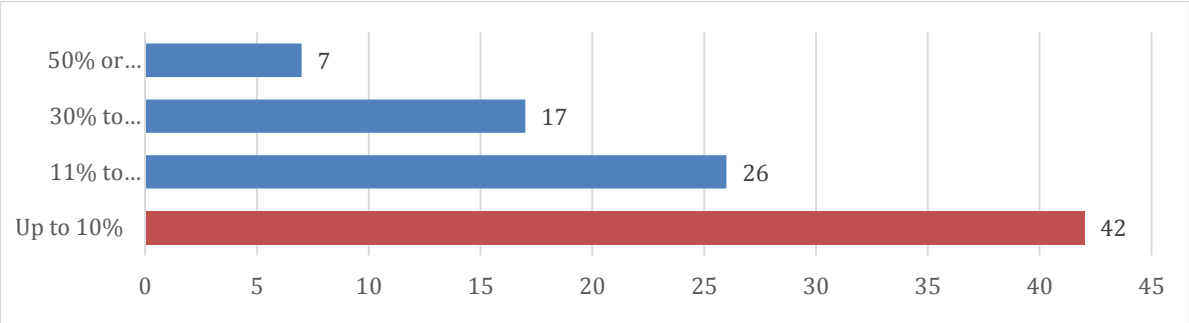
56% are not satisfied with their Internet services and slow speed is the main reason.

WILLINGNESS TO PAY MORE FOR BETTER INTERNET SERVICE

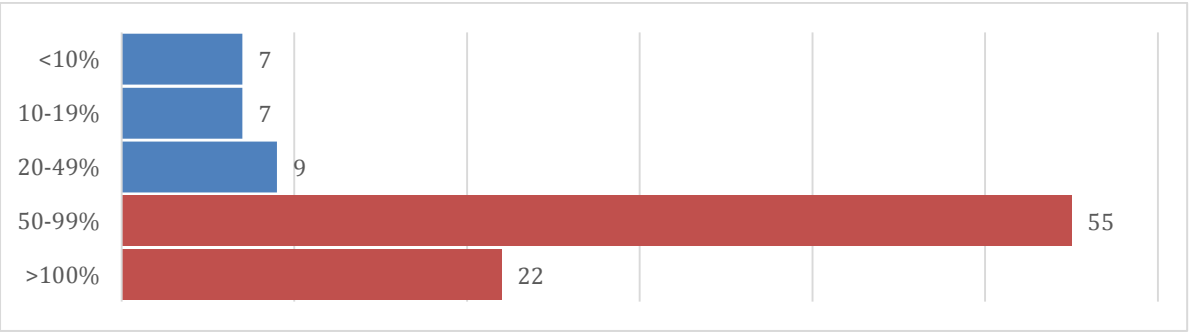
59% NOT Willing	41% Willing

41% are willing to pay more, and 42% of these are willing to pay no more than 10%.

HOW MUCH MORE? %



PERCEIVED EFFICIENCY GAINS USING INTERNET %



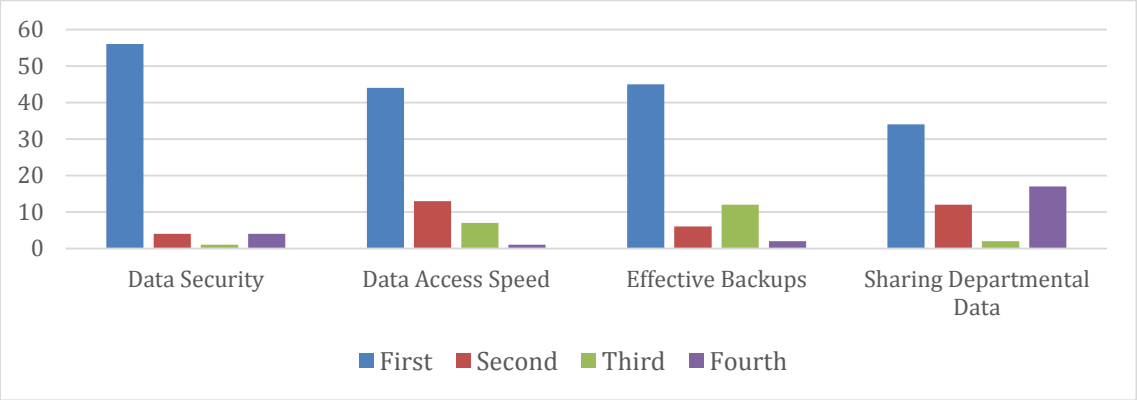
77% believe that Internet makes them at least 50% more efficient at their work

HOW MANY HAVE IT BUSINESS PLANS %

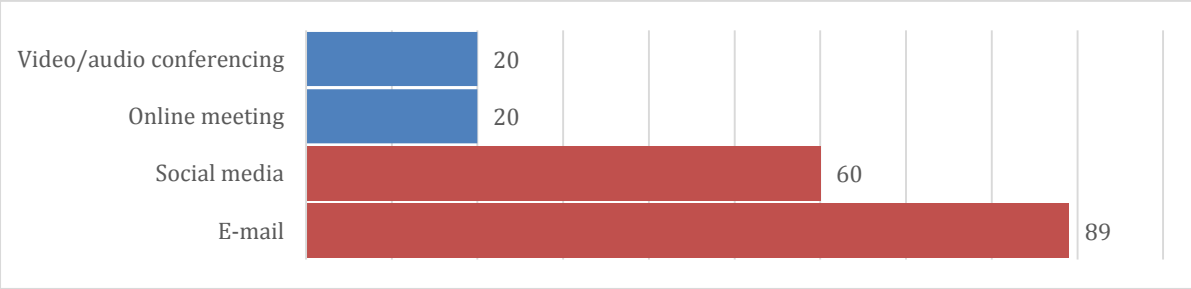
NO plan	Plan	Developing
58%	22%	9%

58% of businesses do not have an IT Plan.

IT PLAN PRIORITIES

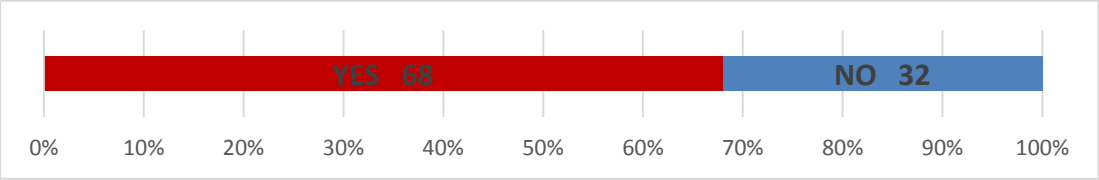


COMMUNICATION SERVICES USED %



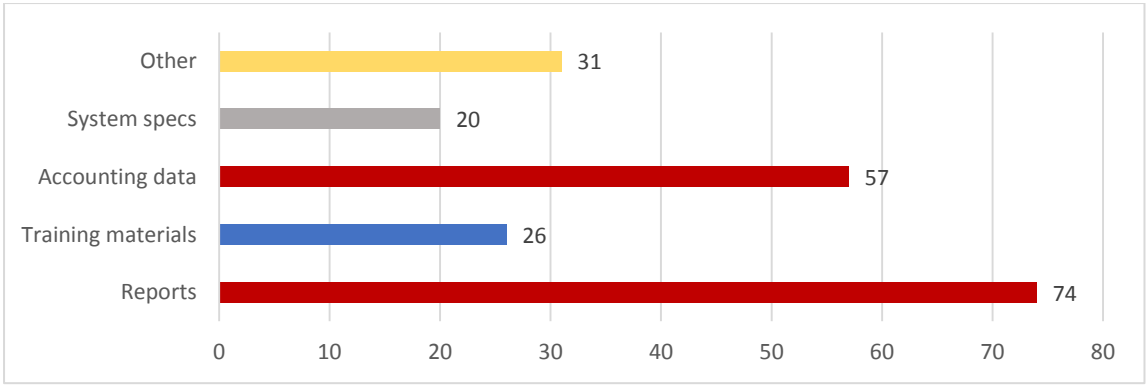
89% use E-mail and 60% use social media.

BUSINESSES DELIVERING SERVICES ELECTRONICALLY %



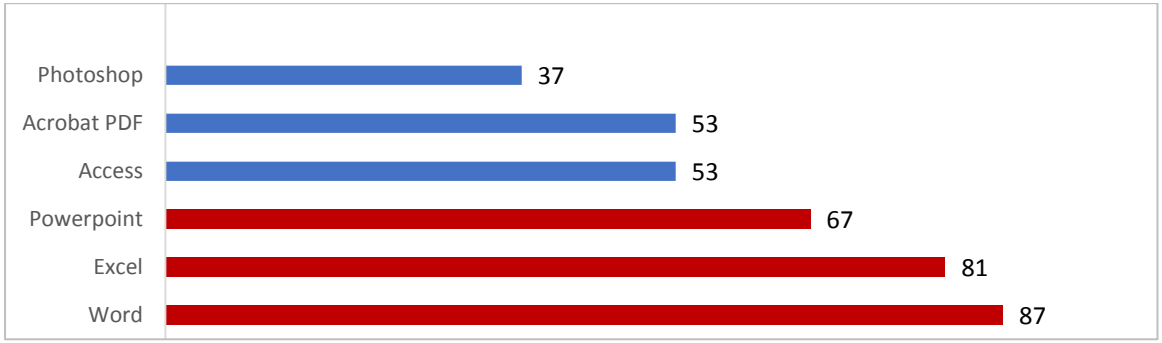
More than two out of three indicated they deliver their services electronically.

TYPE OF ELECTRONIC SERVICES %



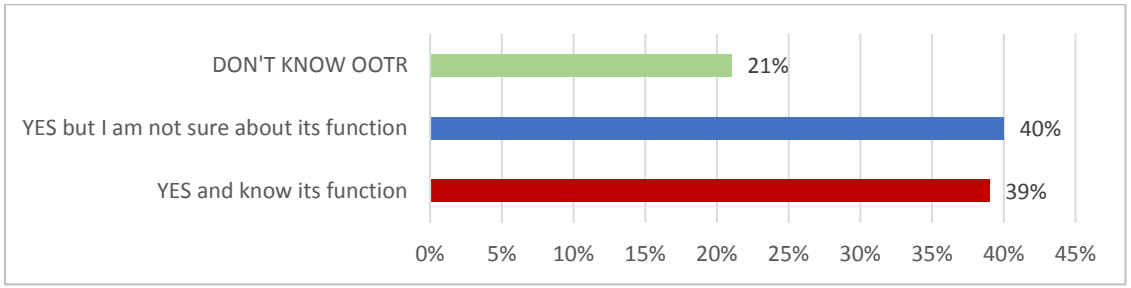
Reports and accounting data were the most common types of electronic services offered.

PERCENTAGE OF BUSINESSES WITH VERY GOOD KNOWLEDGE OF BUSINESS SOFTWARE %



There is a particularly high knowledge and use of word processing, spreadsheet and presentation software applications.

KNOWLEDGE OF THE FUNCTIONS AND RESPONSIBILITIES OF THE OFFICE OF THE REGULATOR (OOTR)



Nearly 80% are aware of the OOTR and half of these indicate they also know the OOTR's function .

General Public Survey

Overview of Key Findings

Although Samoa has a high mobile penetration rate, nearly half of this penetration is not via smart phones with Internet access. There also remains a sizeable portion which does not use the Internet at all (46%) and this is due to either lack of interest, or high cost.

A large proportion (40%) of Samoans admit to having no ICT skills at all. Those who do have skills tend to be self-taught or have acquired instruction from family and friends. Formal education – and in particular lessons through private institutions – represents a smaller proportion of overall ICT learning.

Cyber-crime does not appear to be a widespread and serious problem, but much can be prevented with proper training.

Satisfaction with providers is marginally satisfactory, with room to improve regarding speed, reliability and rural coverage. Fixed line connectivity is not widespread but satisfaction with it is likely higher than with mobile service. There is some desire to spend more for improved services.

Certain online functions that are in common use in other countries – e-commerce and e-banking in particular – appear to be virtually non-existent in Samoa. This is borne out by the predominant use of the Internet in Samoa to date which is to connect with family and friends.

An important aspect of increased Internet use in any society is ensuring the availability of compelling local content. A result of the relatively slow take-up of mobile internet services has been the suspected dearth of local applications and interactive content. Frequency and breadth of use of the Internet will naturally progress ICT skills and work towards diminishing perceived risks and "cultural" disadvantages.

General Observations on the Survey

For this survey:

(i) A total of 44 questions were asked face-to face to individuals both in Upolu and Savaii during March 2018.

(ii) A sample of 176 respondents was targeted. This represents a margin of +/- 7.4% error for all responses, with a confidence level of 95%.

(iii) 56% of respondents were women.

(iv) 5% of the respondents were under age 20 while 27% were above age 50.

(v) All layers of society were interviewed including students, (5%), domestic workers (43%), subsistence workers (21%) employers, regular employees and unemployed.

Who is your internet service provider?

Within the general public, 75% identified themselves as Digicel users of mobile internet services while 30% were with Bluesky. In some cases, respondents may have had more than one device or two SIM cards (Digicel and Blueskly). Less than 10% of

respondents accessed the internet through other means than their mobile phone – a very low figure which demonstrates the difficulty for the average Samoan to be exposed to the greater benefits of accessing Internet on a larger screen and with a proper keyboard (laptop quality).

The 12% who indicated that they did not own a mobile phone suggest Samoa has a penetration rate of 88%. Comparative studies define penetration to include household use rather than individual use, so in this sense penetration would be even greater. 8% who indicated having more than one mobile phone.

Introducing the last tenth of the population to smart mobile phones (or devices) represents an opportunity gap.

64% of mobile users indicated that their phone has Internet access, and this shows that Samoa has a higher take-up of smart phones than many other developing countries (but lower than in developed nations). For those who did not regularly access the Internet, the majority (54%) did not have an interest in using Internet. It is worth mentioning that a smart phone with 2G capability will provide limited Internet access and therefore lack of satisfaction. Upgrading smart phones should be promoted by ISPs.

The general public indicated that a heavy majority (76%) had never switched provider – a very high comparable figure.[3] This reality provides another opportunity gap if different providers can offer unique features and if barriers to switching can be eliminated for example through number portability.

Coverage and Service

In terms of the general public's perception of mobile ISP coverage, the results showed a much higher satisfaction with Bluesky as 93% of its users believed they received proper coverage compared with 56% of Digicel users. Likewise, when asked if the Internet plan met their needs there was a much higher satisfaction with Bluesky with all respondents indicating satisfaction versus 63% for Digicel.

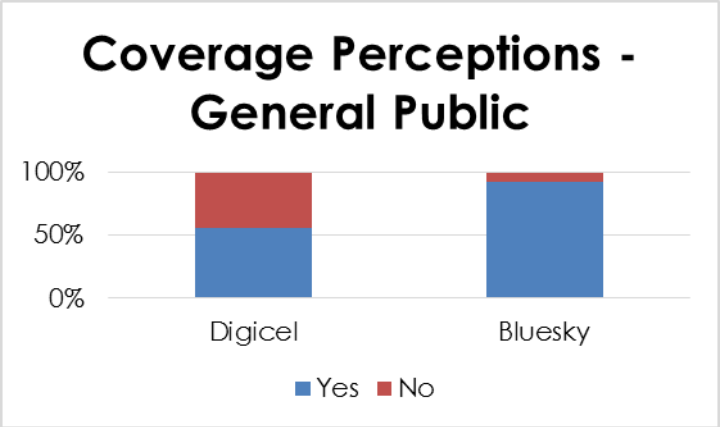


Figure 2 Coverage Perceptions

For the general public, 40% of users are satisfied with speed, reliability and affordability of their Internet service. For those unhappy, data access speed and reliability are the main factors.

[3] http://ec.europa.eu/commfrontoffice/publicopinion/flash/fl_243_sum_en.pdf https://www.businessnewsdaily.com/3524-businesses-can-prevent-customer-defection.html

Fixed Line

There is a low occurrence of fixed line telephony at less than 10%. In line with this rate, less than 10% accessed the internet through other means than their mobile phone.

However there appears to be a high level of satisfaction amongst users, with close to 90% indicating average or better for reliability, affordability and service. With a limited sample, speed does not appear to be ranked as highly as either reliability or affordability.

If this result is indicative, then provision through fixed line might be an opportunity gap where existing infrastructure exists.

Video on Demand (VOD)

The result shows that about 99% didn't have a video-on-demand service with either Moana (BlueSky) or Sky (Digicel) TV in their house. VOD through mobile was effectively the exclusive delivery mechanism and the few responses indicated a high level of satisfaction with speed, reliability and affordability.

The vast majority of respondents do not use VOD and this may be an opportunity gap as this requires fast broadband which is only now becoming possible to provide.

Willingness to Pay

The majority spend between 11 and 50 WST per month on internet subscriptions for their mobile phone with an average of 30 WST; only 17% spend more than 50 WST. The responses suggest that about 70% spent less than 50 WST per month on internet use by another means other than by mobile phone.

Nearly half (53%) indicated that they are not willing to spend any more for improved speed or reliability. However, (33%) of Internet users are willing to only pay less than 10% more so there is little appetite to spend considerably more at this time. Likewise, for VOD services a majority was only willing to spend less than 10% more.

Purpose and Frequency of Use

For Internet users, heavier use of a particular application was found for SMS (67% said they use it "very often") and Facebook (74% said "very often"). One in three indicated they "often or very often" use their connectivity for social networking and this was the most common use. Correspondingly, Family (69%) and Friends (57%) were rated as "very high" in terms of being the most "influential activities or social circles" on the Internet for Samoans.

Conversely, both "work and business", and "online purchases and banking" were rated very low for their influence on Samoans with 1% and 7% deeming these influential. Indeed, less than one in ten made online purchases – a comparatively low rate with most countries[4]. This validates the preliminary findings of a previous August 2017 Report to the OOTR and is a significant opportunity gap.

[4] https://www.statista.com/statistics/251666/number-of-digital-buyers-worldwide/

Further, only about one in four people indicated they search for information "often or very often" and this is a surprisingly low figure[5]. This represents an opportunity gap as there are numerous other applications of value and interest that are clearly not on the radar in Samoa.

In terms of the overall frequency that the general public used the Internet, nearly half (46%) answered "0" hours per day as they were simply unconnected.

Otherwise, 48% indicated less than 5 hours per day with 26% of this number indicating less than 2 hours of connectivity per day. This is much lower than in most other countries[6].

Capacity Building through Education

When asked to rank their own ICT skills, a full 40% of the general public stated they possessed no skills at all, and this was high compared to many other countries[7]. Less than 9% of respondents self-classified as "advanced or expert".

In terms of where people acquired their ICT skills, more than two out of three indicated "Self-learning" as their main method, with "Friends and Family" being noted by almost one in two respondents. School was cited only 36% of the time, while "Private ICT courses" appear virtually non-existent and this backs up the assertion made during this project's Inception Report. Indeed, an overwhelming majority (88%) of the general public has never applied to be enrolled in a formal ICT course.

Cybercrime

Three quarters of respondents indicated they had not experienced an unwanted intrusion (e.g. viruses, cyber crime, malware, etc.). However, this left one in four who had suffered a negative experience. These worries, founded or not, threaten growth and widespread use.

Ransomware was noted as the most common form of intrusion, cited by 78%. This is unusual, given the correct definition: "a type of malicious software designed to block access to a computer system until a sum of money is paid." Otherwise viruses were reported by nearly half of those who had experienced an intrusion.

In terms of concerns related to the material that children can access through Internet, there was significant concern related to "wasting time" (62%) and "erosion of morals" (71%). This issue might be partly addressed through better education and adoption of policies such as those implemented by MESC and OOTR.

E-Government Services

The majority of Internet users (80%) indicated that it was easy to find information on the Internet about the services of the Samoan Government.

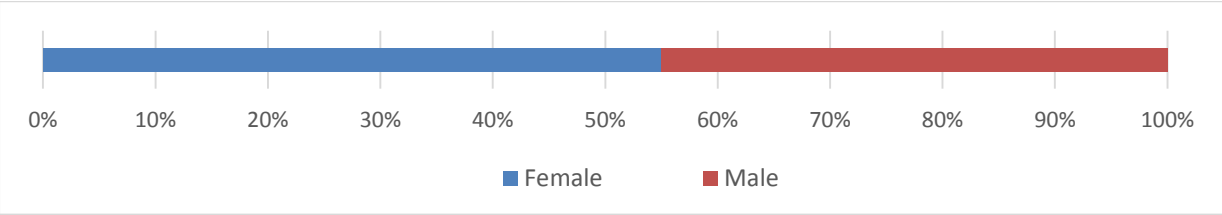
Awareness of OOTR

[5] https://www.smartinsights.com/search-engine-marketing/search-engine-statistics/
[6] https://qz.com/416416/we-now-spend-more-than-eight-hours-a-day-consuming-media/
[7] http://www.oecd.org/els/emp/Skills-for-a-Digital-World.pdf

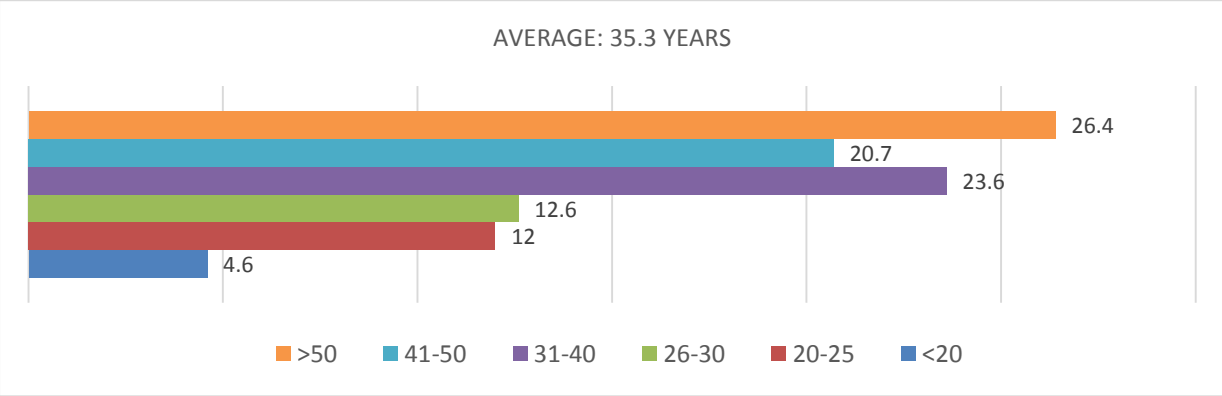
When asked if they knew about the OOTR and were also aware if its functions and responsibilities, the great majority (74%) of the general public had no knowledge. However, this figure may not be unusual - even with public relations campaigns in place from several other regulators worldwide.

GENERAL PUBLIC.- THE STATISTICS

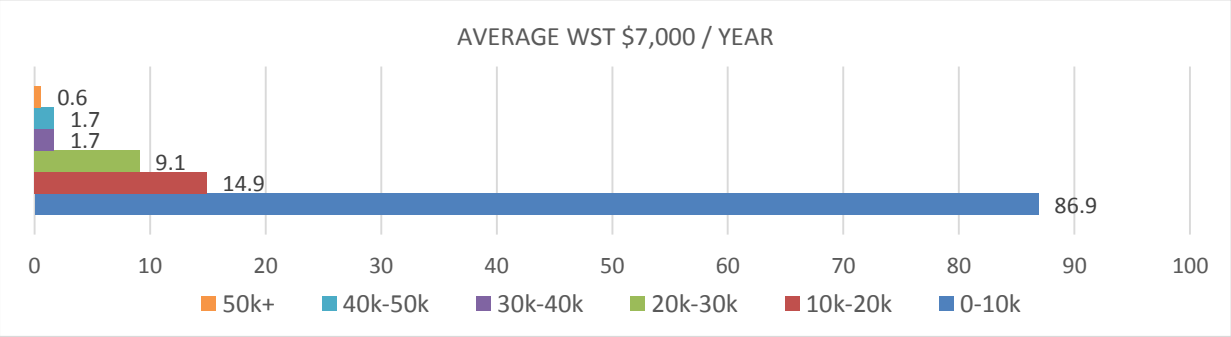
GENDER



AGE (% Respondents)



YEARLY INCOME (category %)

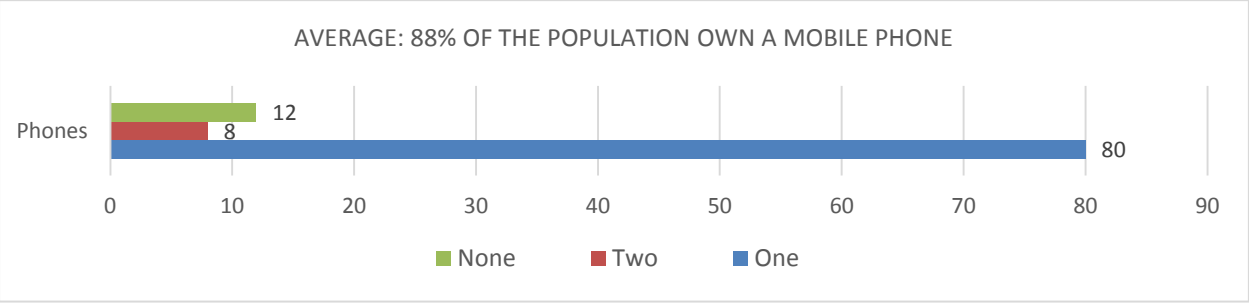


THE RESULTS

Reflecting the national census, 55% were female respondents. The average age was 35.

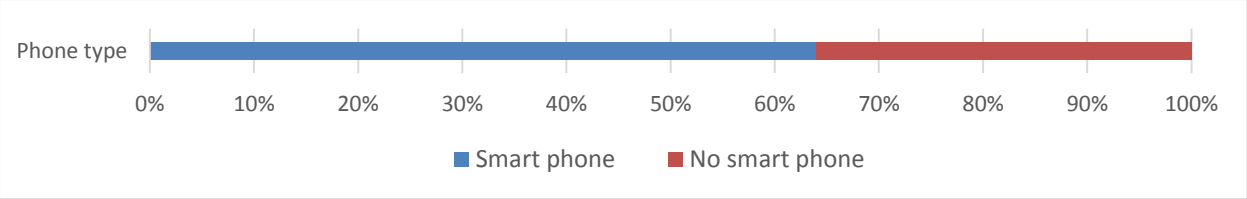
The average yearly personal income of Samoans is WST $7,000/year.

PEOPLE OWNING A MOBILE PHONE %



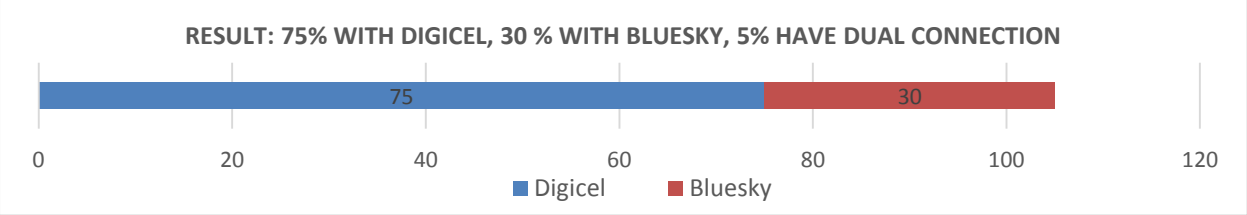
88% of Samoans own a mobile phone

PEOPLE OWNING A SMART PHONE WITH INTERNET ACCESS %



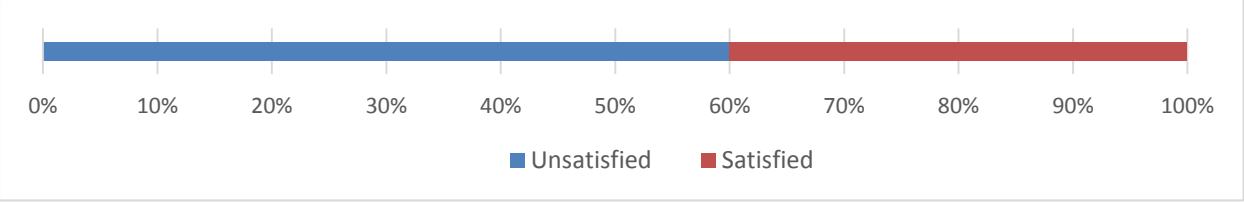
64% of mobile users own a Smart phone.

MOBILE INTERNET SERVICE PROVIDER



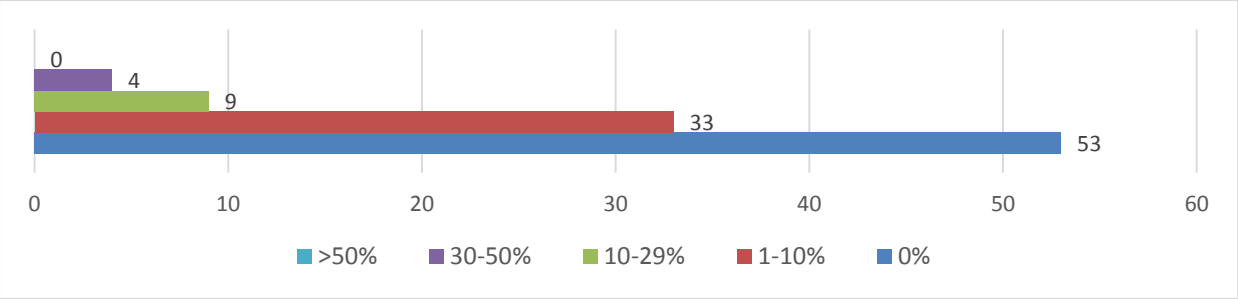
75% of mobile users are with Digicel. 30% with Bluesky.

SATISFACTION WITH INTERNET SERVICE PROVIDER %



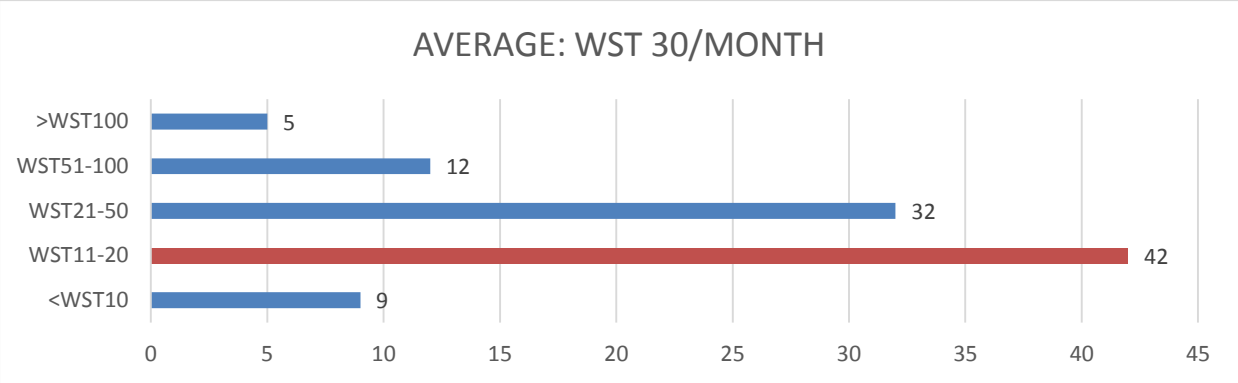
60% of Internet users are unsatisfied with the service (mainly with speed)

WILLINGNESS TO PAY MORE FOR BETTER SERVICE %



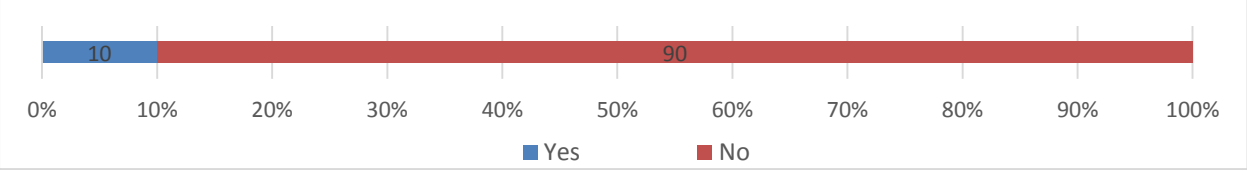
53% of mobile users are not willing to pay more for improved services

MONTHLY EXPENSE OF MOBILE INTERNET %



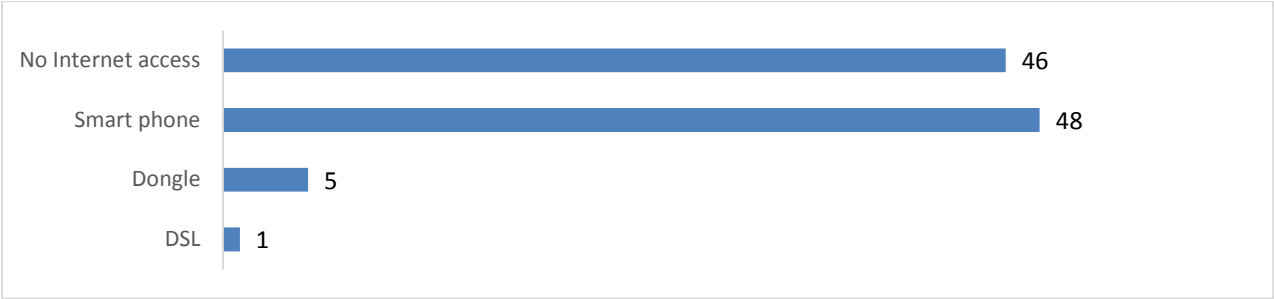
The average Samoan spends WST 30/month on mobile Internet.

PEOPLE OWNING A FIXED TELEPHONE LINE %



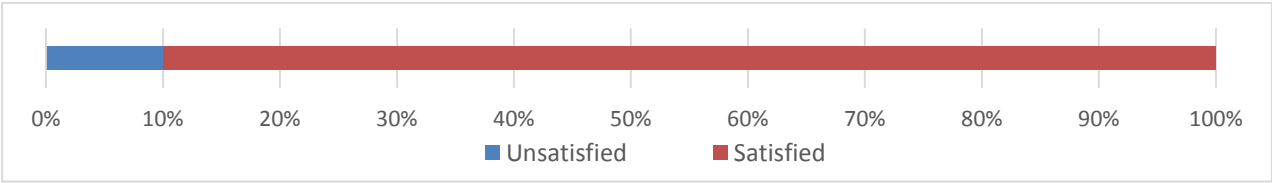
10% of Samoans own a fixed telephone line

ACCESS TO INTERNET WITH OTHER THAN MOBILE PHONE %



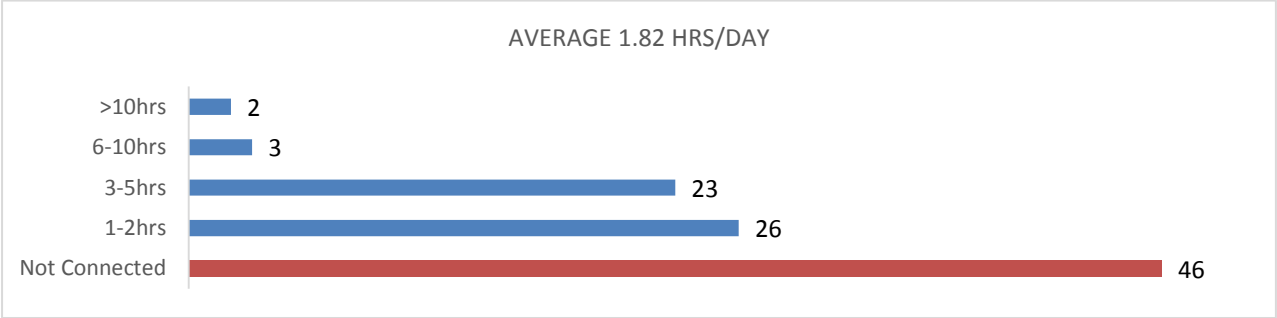
6% of Samoans access Internet with other than a Mobile phone

SATISFACTION WITH FIXED LINE SERVICE PROVIDER %



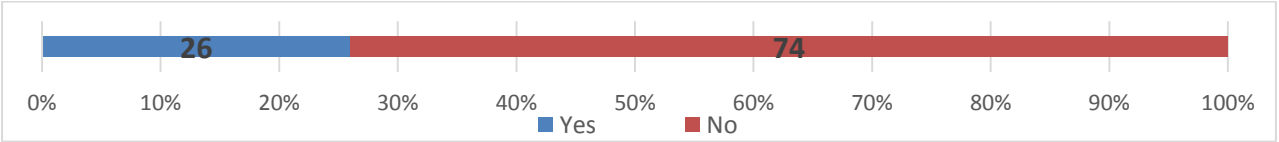
90% of fixed line users are satisfied with the service

HOURS PER DAY CONNECTED TO INTERNET (% OF POPULATION)



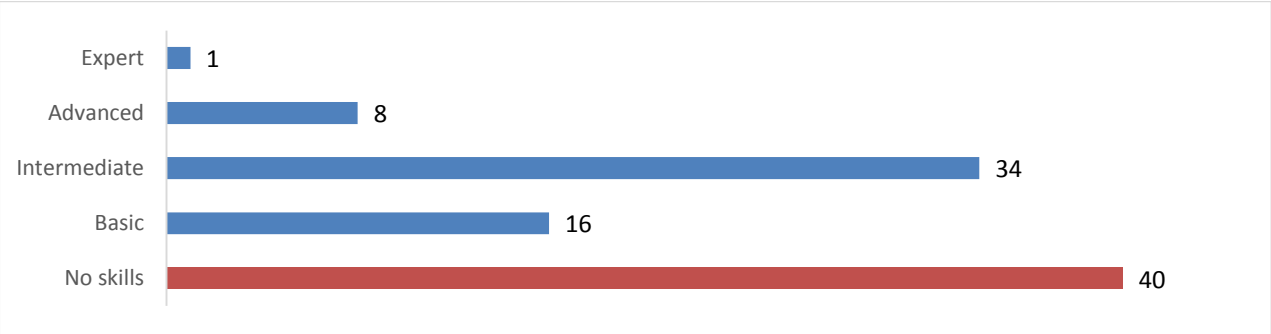
46% of Samoans do not use the Internet at all

UNWANTED INTRUSIONS (VIRUSES) THROUGH INTERNET %



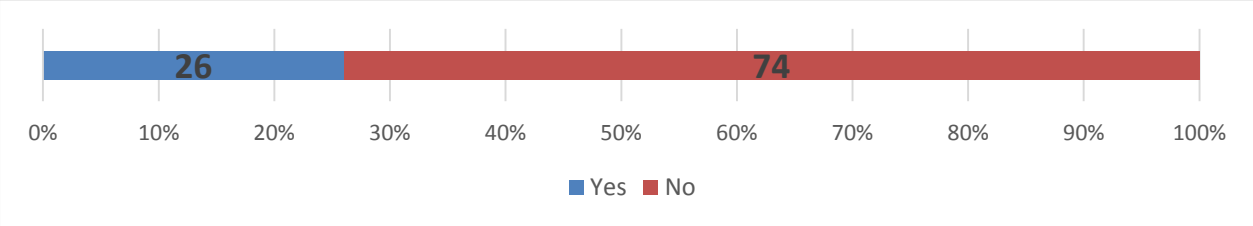
26% of Internet users have experienced unwanted intrusions (viruses)

PERCEIVED ICT SKILLS (% OF POPULATION)



40% of Samoans do not posess any ICT skills at all

AWARENESS OF OOTR ROLES AND RESPONSIBILITIES %

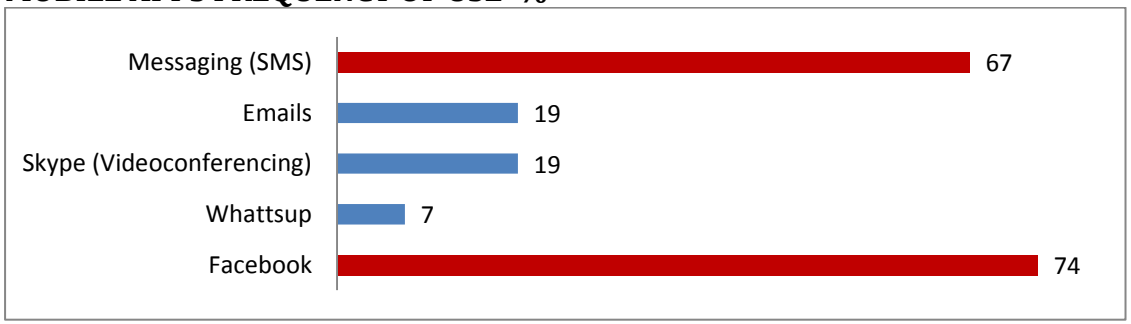


74% of Samoans do not know about the functions of the OOTR

SOURCE OF DISSATISFACTION WITH ISP %

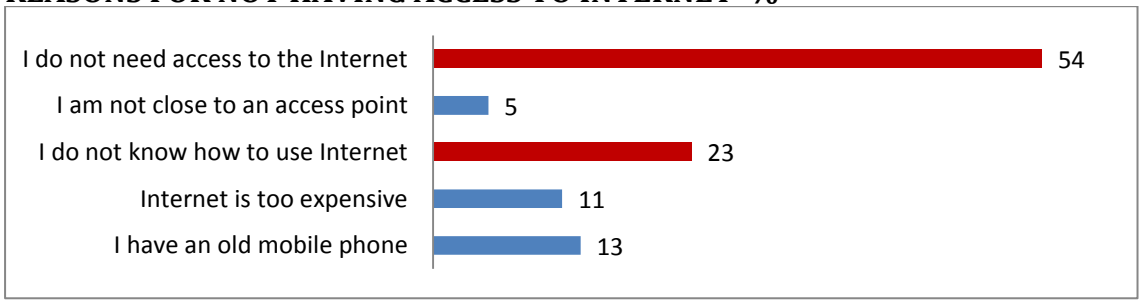
Slow Speed and Service Interruptions are the main causes of dissatisfaction among Internet users

MOBILE APPS FREQUENCY OF USE %



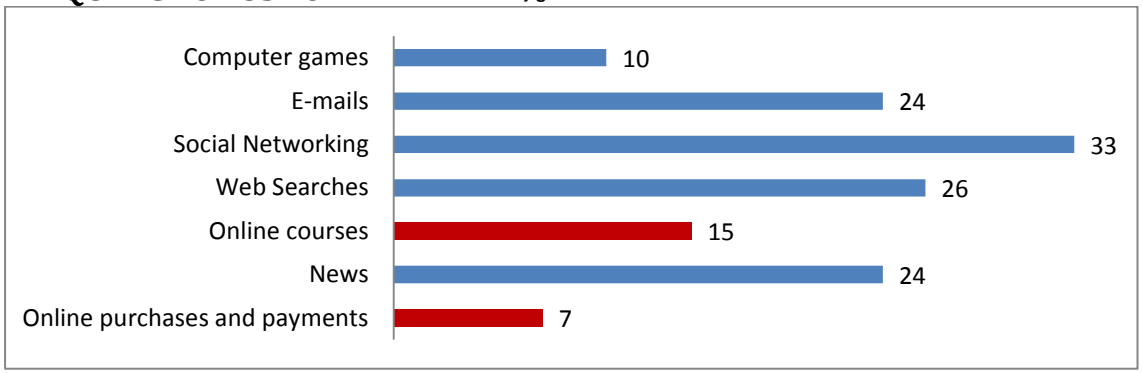
Facebook (Messenger) and SMS are the main apps used by Samoans. Only 19% make use of e-mails.

REASONS FOR NOT HAVING ACCESS TO INTERNET %



The main reasons for not using Internet are lack of interest and lack of knowledge about Internet

FREQUENCY OF USE OF INTERNET %

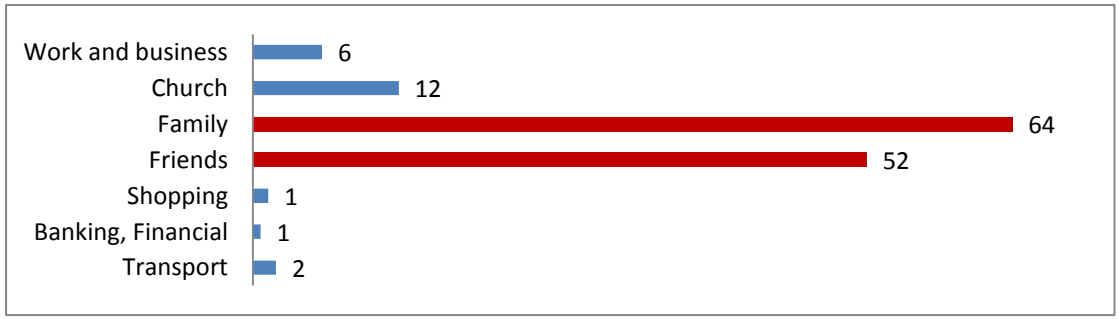


Samoans use Internet mainly for social networking (Facebook) but little use for online purchases, banking or distance courses.

USAGE OF VIDEO ON DEMAND %

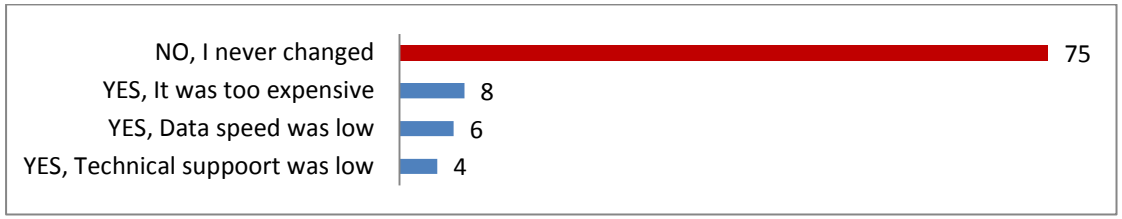
Video on demand (excellent source of education and entertainment) is not popular in Samoa, mainly due to bandwidth requirements.

ACTIVITIES INFLUENCED BY INTERNET %



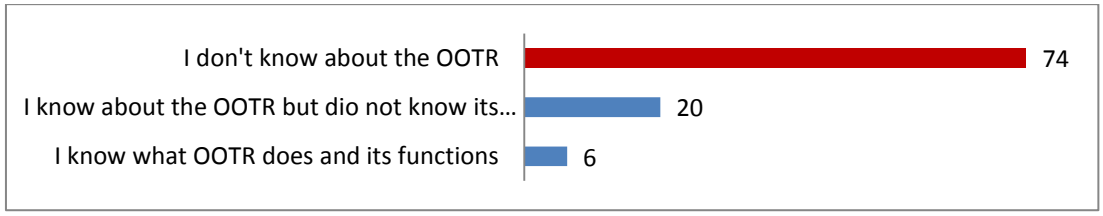
Family and friends are the main reasons behind using Internet

HAVE YOU EVER CHANGED ISPs? %



75% of mobile users have never changed Internet supplier.

KNOWLEDGE ABOUT THE OOTR'S FUNCTIONS %



74% of Samoans are unaware of the functions of the OOTR.

Educational Institutions Survey

Overview of Key Findings

Given that a majority of responses to this survey were from young people (students), some of these results take on a heightened sense of importance. The next generation of employers and workers needs to be ICT-literate and capable of taking advantage of new technologies. A "no child shall be left behind" goal for Government and educators might be deployed to ensure that every young person has the capability to join and explore the online word safely.

Although in most instances there is a majority who utilize ICT in their studies, the proportion should probably be higher still if Samoans are to be competitive in the job market. Compounding this issue is the relatively simple ICT programs and services being used - which are not the sophisticated programs typically requiring extensive bandwidth, capacity and computing power.

Nearly two in three respondents indicated they can't access the Internet at all or have limited access. A procurement strategy of ICT services needs to be revisited with targets set for contractual compliance of delivery.

The lack of an obvious overarching ICT Plan (or equivalent) means that many institutions are either operating without a plan, with a plan that is too far-sighted, or with a plan that is not synchronized with other educators' strategies. Education funding should be increased to ensure that digital efficiencies are realized and ICT technologies are put in common use. Establishing an approved ICT plan might become a prerequisite to receive certain government funding. These plans should have realistic targets, strategies to achieve these targets, and a function in place to measure success.

Digital services - particularly as they relate to youth - do not need to be formal, boring, tedious or monotonous. Sharing more interesting, exciting materials and current events drives demand, use and satisfaction. Genuinely interesting, local, relevant content must be developed and shared.

Most of the respondents are from students with 134 surveys submitted, with the remainder (94) identified as educators – either teachers, principals, Secretaries, Librarians, etc. Therefore the survey is mostly split into two parts as students were asked not to respond to question 8 to 35.

Responses were collected from multiple disciplines including the arts, sciences, commerce and computer studies. This represents a good cross-section of academics.

For this survey:

- A total of 43 questions were asked face-to face to individuals both in Upolu and Savaii during March 2018.
- A sample of 229 respondents was targeted. This represents a margin of +/- 7% error for all responses, with a confidence level of 95%.
- A total of 134 students, 74 teachers and 21 administrators were interviewed.

Connection and Quality

For educational institutions, Bluesky is used in half the cases (50%), while Digicel is used by 18%, and CSL by 10%. Four other providers were named but with very limited reach. SchoolNet was indicated as a supplier by 13% of respondents. Effectively there was a dominant provider in this group through Bluesky, and this poses a competition challenge.

Coverage and Service

Educators' overall view of their Internet access services showed a general lack of satisfaction with 71% of Educators/Administrators not satisfied with either speed (53%) or service interruptions (59%).

42% of Educators stated that their IT service plan did not meet their needs. From the responses, 71% indicated that technical support was poor, 47% believed that the speed promised was not what was delivered, and 34% felt that it was too expensive.

Nearly one in four (24%) students indicated that there was no public Internet Access at their educational institution. Only 37% of students were satisfied with Internet Access. Nearly one in four (23%) indicated that the network was slow and one in five (18%) said that coverage was not good in certain areas.

Nearly half of students (45%) claimed that their institution's ICT lab did not satisfy their needs. It should be stressed that this is their current needs based on limited program availability.

Willingness to Spend

Of the educational institutions who answered, a total of 87,079 WST was paid during the last 12 months for accessing the Internet. Answers ranged from 0 to 45,219 WST. The average was 1893 WST, which is substantially low probably because of SchoolNet being free of charge.

60% of the administrators/teachers are not willing to pay any more for an improved service. Of those who said "Yes", one-third were willing to pay an extra 10% and another one in four were willing to pay up to 30% more. About one in ten were willing to pay greater than 50% more.

Electronic Filing

For educational institutions, 50% did not have an electronic filing system, which is a very high figure even if some or all of those who "did not know" (19%) could be added to this rate through greater investigation. This represents an opportunity to inject efficiency, security and a culture of sharing into the education system.

E-Service Delivery and Communication

There is a greater desire to further promote the use of ICT and provide students with training materials as 84% felt this was the top priority.

Two out of three (66%) educational entities claimed to deliver e-services with the most common being training materials (68%) and student marks (62%). One third

(33%) published all required teaching materials on the Internet. "Campus Activities" were noted in less than one in three cases (29%) and this represents another opportunity as not all services provided need to be formal, tedious or monotonous; sharing more interesting, exciting materials and current events will drive demand, use and satisfaction.

E-mail was the highest communication service used for school work, but there were still 28% who did not use it. Social media (all forms taken together) was only used by one in three (38%) for school work, but more than video-audio conferencing at 31%. These appear to be low collaborative and sharing numbers and they represent an opportunity gap to be filled through better connectivity and training.

Software Used

For educators, the knowledge of Microsoft products was higher than that of Adobe products, with Word (74%) and Powerpoint (70%) being programs with the highest degree of knowledge. Only about 1% stated that their knowledge of Word and Excel was poor. In terms of other software used, 89% indicated familiarity with operating systems, 39% were familiar with graphics and multimedia software, and 17% with accounting software. Four out of five (79%) indicated that they did not use a Learning Management System (LMS).

Capacity Building through Education

In terms of where people acquired their ICT skills, more than two out of three indicated "Self-learning" as their main method, with "Friends and Family" noted by almost one in two respondents. School was cited only 36% of the time, while "Private ICT courses" appeared to be virtually non-existent.

Although 91% of educators indicated that Internet tools were used to teach, only 50% of educators use ICT to send/receive training materials to/from students.

Two out of three (62%) did not publish training materials on the Internet. One third (33%) published all required teaching materials on the Internet and this is a figure that should also be a target for improvement.

One in four (24%) believed that the internet increases work efficiency by less than 20%. At the opposite end, 12% believed it helps more than 100%. Nearly half (43%) believed that efficiency gains were in the 50-100% range. The backdrop to these results is the fact that connectivity has been very slow and so services have been more basic.

For students, 63% indicated that "they need more courses on ICT", and 55% thought "Distribution of training materials" would be of benefit to their education.

Three quarters of respondents (79%) indicated that they did use internet tools to help with their studies. However, the one in five students who did not use internet tools still shows a massive opportunity gap and is a serious concern in this information age demanding these skills. Universal access to broadband at educational facilities would alleviate many student challenges.

Three out of four (75%) students were familiar with Word or equivalent and this was the highest score, followed by Excel at 63%. The lowest was with Adobe Photoshop

(which is not a surprise given its more specific use), and Accounting software which is also not surprising given that respondents were students.

ICT Access in School

When rating the performance of the Internet access at educational institutions, it emerged that for nearly one in four (24%) there was no public Internet Access. Also, nearly one on four (23%) indicated that the network was slow. One in five (18%) said that coverage was not good in certain areas. Therefore, nearly two in three either couldn't access the Internet at all or had limited access. This poor access at educational institutions represents an opportunity gap where universal access to broadband must be considered a priority.

Just over half (55%) of students believed that their ICT lab at their institution satisfied their needs. After consultations with stakeholders it was generally agreed that the one existing computer lab at Secondary Schools is not sufficient (see Section 5.2).

Cybercrime

For educators, 86% indicated they had not experienced a cyber crime in the previous 12 months. A good percentage of those affected had been exposed to a virus. One of the reasons for a low figure on cybercrime is most likely due to SchoolNet that filters both malicious sites as well as programs that may contain viruses.

Security

For Educators, 43% stated that an external drive attached to their computer was used for backup, while 25% used a backup server in the institution. Only 3% used a server outside the institution.

One in five (20%) did not use a firewall, while 35% said that they "Did not know".

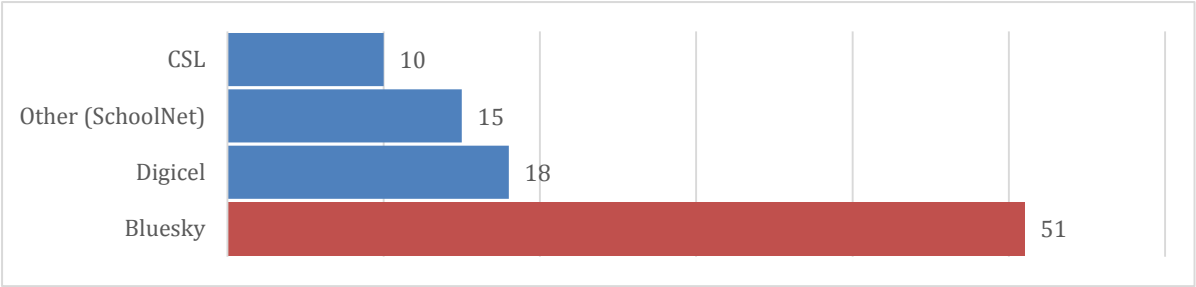
Awareness of OOTR

For Educators, one in five (19%) claimed to have awareness of the OOTR and its function, while 40% had heard of OOTR but with no understanding of its function; the remainder were unaware.

EDUCATIONAL INSTITUTIONS SURVEY.- THE STATISTICS

THE RESULTS

SERVICE PROVIDER %

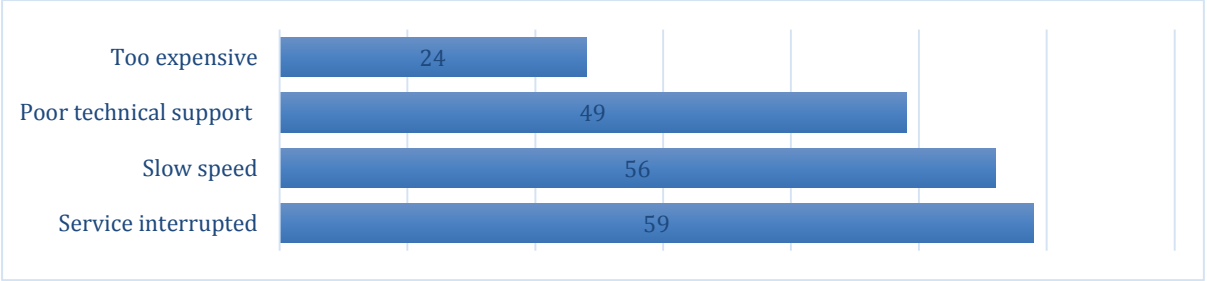


51% of educational institutions use Bluesky.

GENERAL SATISFACTION WITH INTERNET SERVICE %

71% were not satisfied with their institution's Internet service

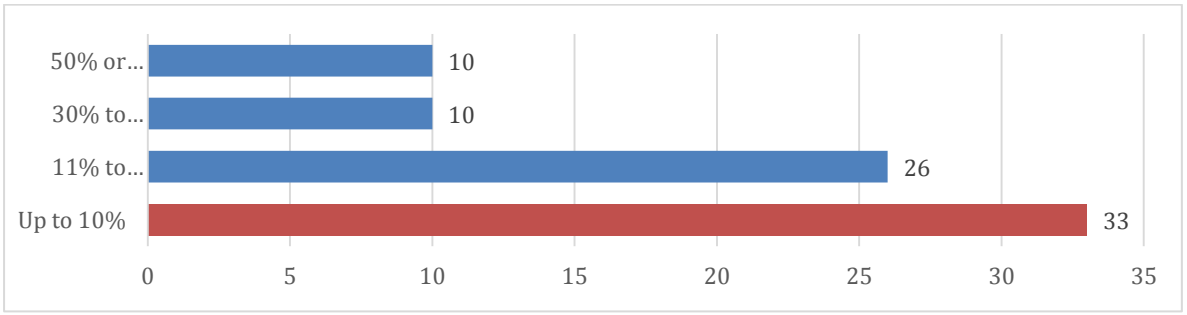
REASONS FOR DISSATISFACTION (% indicated)



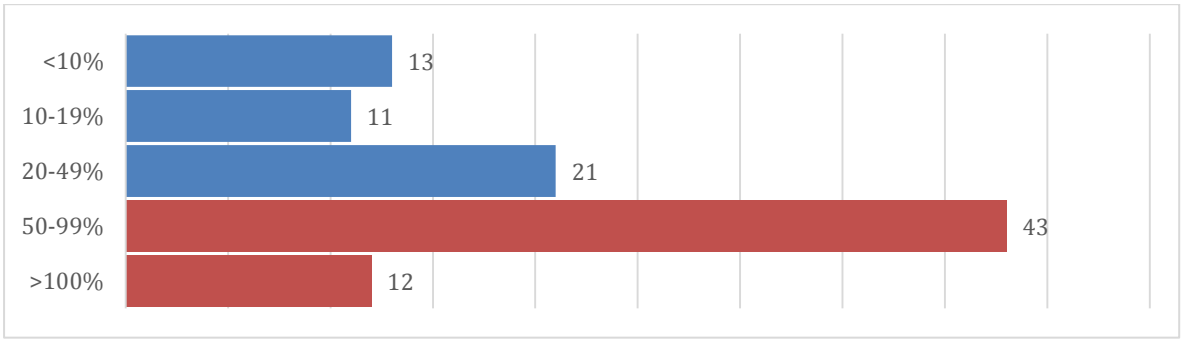
WILLINGNESS TO PAY MORE IF SERVICES WERE IMPROVED %

40% are willing to pay more, but most of these will not pay more than 10%.

IF YES, HOW MUCH MORE?



PERCEIVED EFFICIENCY GAINS USING INTERNET



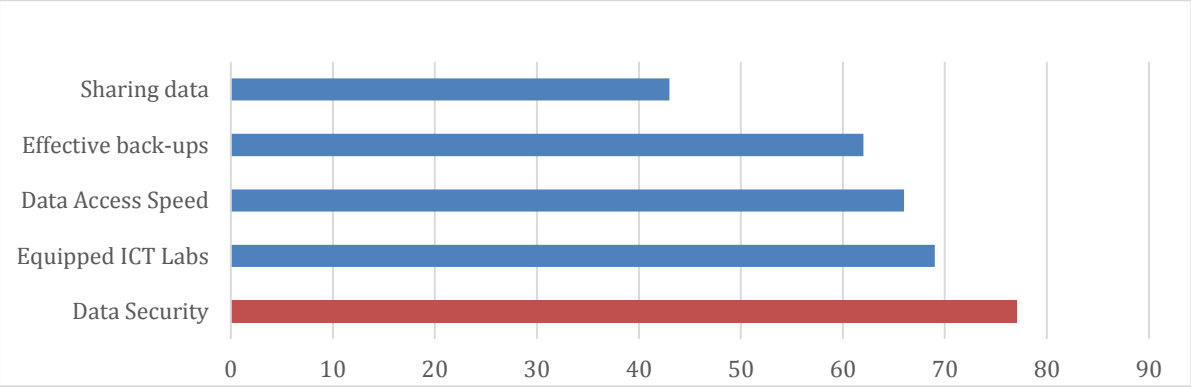
55% believe they're at least 50% more efficient using the Internet

PREVALENCE OF IT PLANS

No plan	Plan	Developing
59%	18%	23%

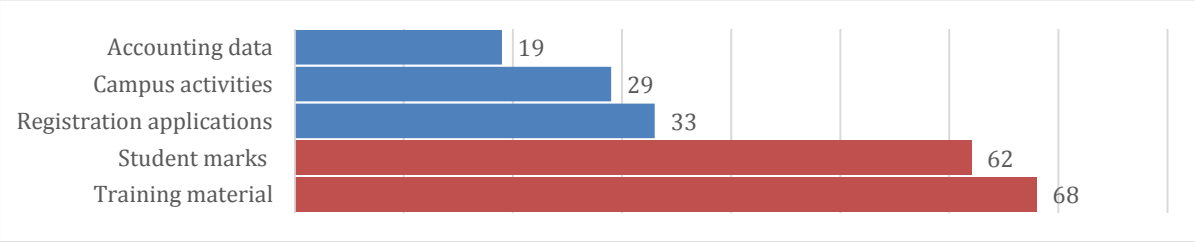
59% do not have an IT Plan. For those who do, data security is a priority 77% of the time.

IT PLAN PRIORITIES %



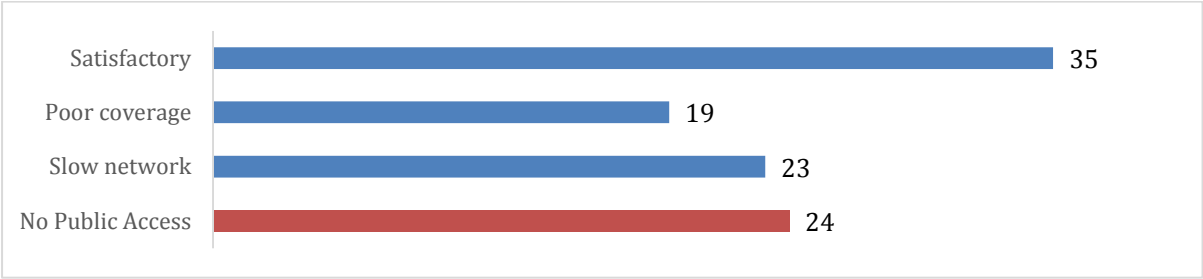
ELECTRONIC DELIVERY OF SERVICES %

66% deliver	34% do not deliver



66% deliver services electronically with student marks and training materials the most common.

STUDENT RATING OF SCHOOL INTERNET ACCESS %

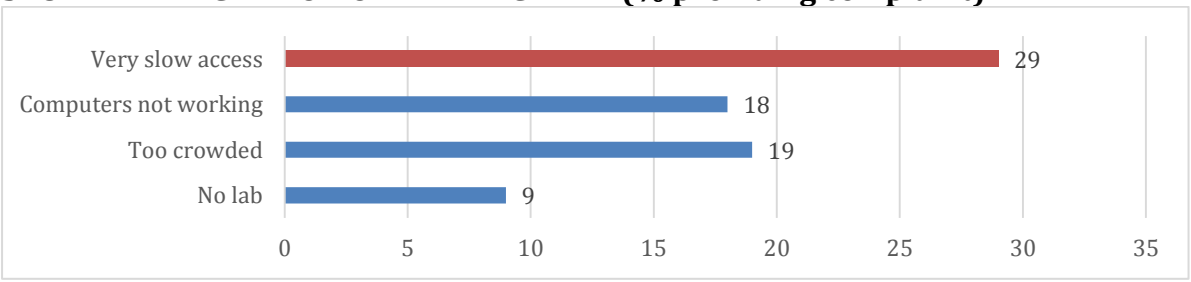


24% do not have public Internet access at school. General satisfaction is low at 35%.

STUDENT SATISFACTION WITH ICT LAB %

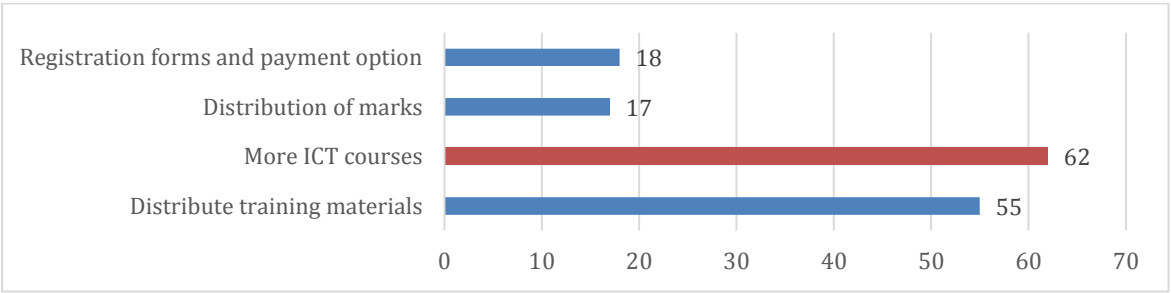
55% of students are satisfied with the ICT lab.

STUDENT PERCEPTION OF THEIR ICT LAB (% providing complaint)



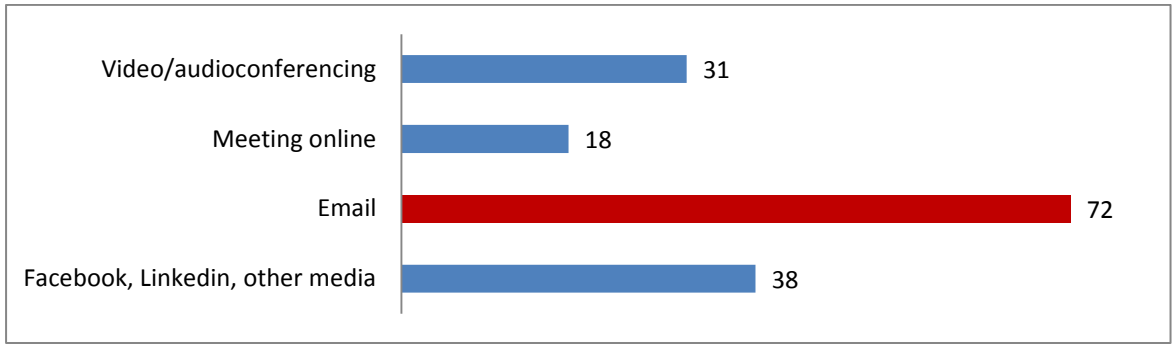
29% of students complain of very slow access while 9% have no lab at all.

STUDENT PERCEPTION OF AREAS WHERE ICT WOULD BENEFIT EDUCATION %



62% of students want more ICT courses, and 55% want access to training materials.

ICT SERVICES USED FOR SCHOOL WORK %

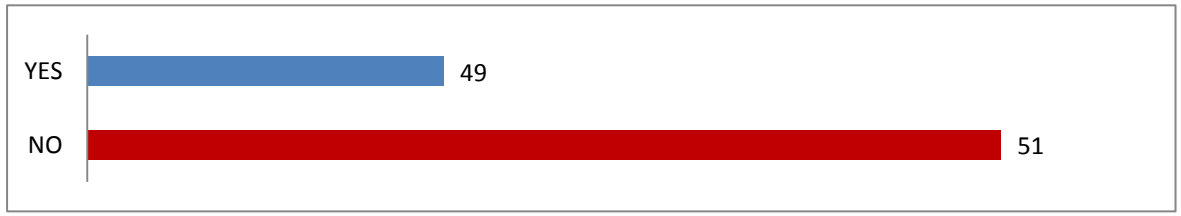


72% of trainers make good use of emails and social media.

INTERNET USERS HAVING EXPERIENCED HACKING %

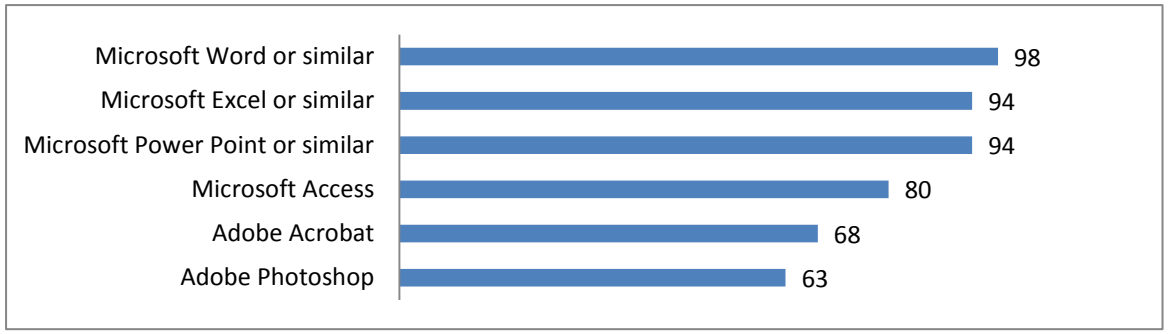
86% of Internet users have not experienced hacking.

TRAINERS RECEIVING OR SENDING TRAINING MATERIALS USING ICT %



51% of trainers receive or send training materials using ICT.

TRAINER'S KNOWLEDGE OF BUSINESS APPLICATIONS %

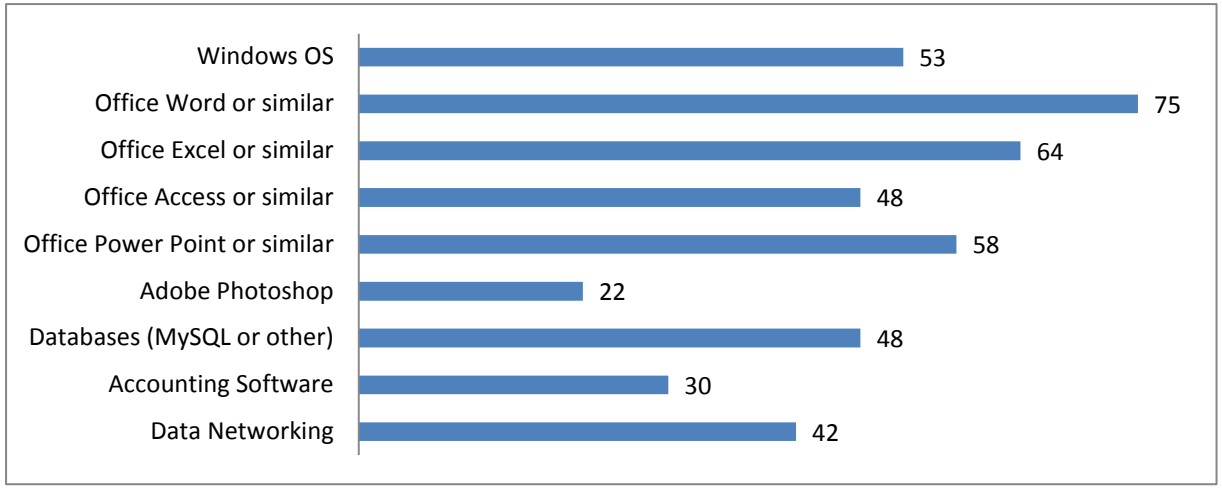


Trainers have a strong knowledge of business applications

FREQUENCY OF USE OF A LEARNING MANAGEMENT SYSTEM FOR STUDENTS %

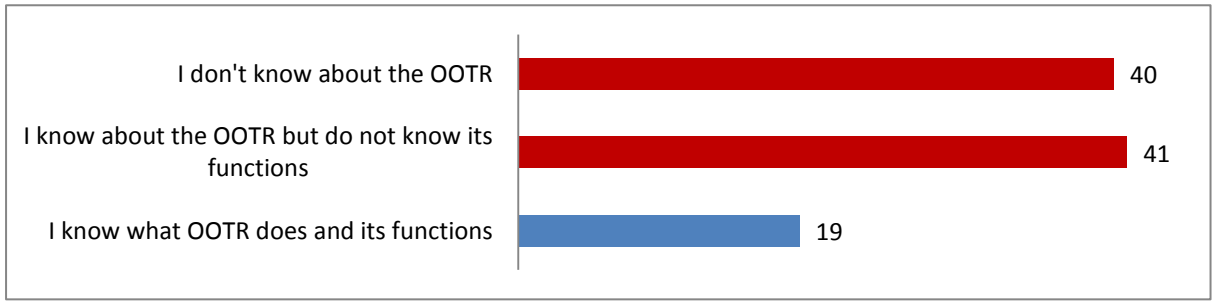
79% of trainers do not use an LMS for sharing course materials with students.

ICT COURSES TAKEN BY STUDENTS %



A majority of students are taught business software courses as well as database and networking courses.

KNOWLEDGE ABOUT OOTR'S FUNCTIONS %



A majority of either students or trainers are not familiar with the functions of the OOTR

5. Analysis and validation of collected information

Further to the results obtained from the four surveys, several workshops (or "focus groups" given the method of data collection) were held on 11, 12, 13, 14th and 18th June with participants in the survey. The group participants were selected from survey responses that indicated an interest in the process. These focus group discussions brought many interesting comments that corroborated the results of the survey and in certain cases clarified the reasons behind the responses obtained.

For instance, during the Education Workgroup some alarming responses about the lack of Internet allocated to students in Secondary schools and colleges were presented by a majority of the participants. The lack of computer resources available to students was also a major concern. These concerns have been verified with meetings held with MESC personnel and corroborated by reports from MCIT. Therefore it can be confirmed that the recommendations in this report are based not only on data obtained from the survey but also from direct inputs of school principals, teachers, students and administrators.

Similar validations have been corroborated regarding the level of ICT knowledge of the general population, where Internet affordability and a lack of understanding the benefits of ICT were the main reasons for rural people not being interested in these technologies. While the older population is more difficult to convince to learn new technologies - even if the cost is low- the young are eager to learn and to explore the wonders of ICT and Internet. What is clear is that a general Training program of the population on Internet and ICT is needed and demanded by all operators and a large sector of the population. This training plan would respond to the high interest in learning by a substantial sector of rural Samoans.

In order to further validate the potential recommendations to the OOTR regarding the "capacity of the population to take advantage of the opportunities provided by currently available ICT services" all operators have been interviewed and asked to validate the data in the survey results and asked for their views on how to make ICT and Internet more affordable and more useful to Samoans. Digicel, Bluesky and SSCC were interviewed on 21st June while CSL. Lesamoa and Netvo were interviewed on 22nd, 27th and 28th June 2018.

In addition to these meetings that corroborated and modulated the results of the survey, further meetings with other relevant stakeholders were held that added to a better understanding of the market, and the technological and economic forces that are today impacting the lives of Samoans. These stakeholders were: MCIT, MESC, MWCSD, DBS, ANZ Bank, NUS, SBEC.

The analysis of the ICT issues that are impacting Samoans the most are listed below in order of perceived importance.

5.1. ICT Capacity building of the General Population. The survey for the General Public indicates that 40% of the population has no knowledge of ICT. When we consider that people in Apia and Solelologa are in general familiar with ICT and access Internet regularly, it seems clear that it is mainly the rural population that has a major gap in ICT skills. If the country is to grow in this important sector of the economy, and to ensure that a digital divide between rural and urban populations does not continue (or get worse), a substantial Capacity Building plan should be set in place.

In discussions with MESC, MWCSD and other stakeholders, it emerged that a more pragmatic approach is needed to bring knowledge to rural communities. These communities are highly involved in family, religion, and in social traditions which all tend to be of greatest importance to them. Therefore a phased approach is being suggested to introduce basic ICT knowledge (also named "life skills of ICT"), described in Annex 1: Package 1. ICT Capacity Building of the General Population.

It is felt that for the adult population to feel empowered by ICT skills, their introduction requires a practical and positive description of the benefits achieved by accessing the Internet. The pilot courses recommended for rural communities need to instill how easy it is to obtain real benefits. The demonstrations could contain features such as:

- Videoconferencing with remote family members (Skype, Messenger, WhatsApp);
- Messaging and audioconferencing;
- Accessing the bank accounts and transferring funds to a remote friend or family member;
- Paying for goods purchased online (Hotels, plane tickets, gifts and other articles available online);
- Finding shops, restaurants, supermarkets, boutiques, online;
- Following The Pope on Twitter or watching online sermons;
- Selling agriculture products online;
- Comparing prices and purchasing and selling goods online;
- Checking weather forecasts and warnings;
- Visualizing street maps and GPS location maps;
- Getting sporting news (including rugby);

and many more.

If rural citizens were to be convinced that accessing Internet is not only safe and affordable but also relevant and interesting, it is expected that the Capacity Building plan would be successful.

If 40% of the working population is offered training, estimated at 87,000 people, this would equate to a total of 35,000 people being invited to take basic ICT courses. Some details of the same are described in the Action Plan of Section 8.

5.2. ICT Capacity Building in Secondary Schools. The Education Survey produced important results as follows:

- When rating the performance of the Internet access at educational institutions, it emerged that for nearly one in four (24%), there was no public Internet Access. Nearly one on four (23%) indicated that the network was slow. One in five (18%) said that coverage was not good in certain areas. Therefore, nearly two in three respondents either can't access the Internet at all or have limited access.
- Just over half (55%) of students believed that their ICT lab at their institution satisfied their needs. It should be stressed that this reflects needs based on a limited supply of ICT applications. We found that each school is

equipped with one Computer lab only available to teach the one basic computer course available in the current plan.

- More than two out of three acquired their ICT skills from "self-learning" with "Friends and Family" being noted by almost one in two respondents. School was cited only 36% of the time,
- For students, 63% indicated that "more courses on ICT", and 55% thought "Distribution of training materials" would benefit their education.

Feedback received through Focus Groups and the Education Survey described a situation where there are very few operable computers with very low speed connectivity – if at all. Compounding this situation is the limited availability of these labs to all students, and the low number of qualified instructors or trainers on hand.

The everyday reality of this situation is that young Samoans are being denied the substantial opportunities that ICTs offer in terms of employment, learning, communications and pleasure. Denying a generation the opportunity to become digitally literate will have major and long-lasting negative impacts for Samoa as graduates enter a world where ICT knowledge is expected. The desire to learn ICTs is clear.

It is essential that the ability for all secondary students to access connected devices is prioritized. This may require a significant increase in the number of computer labs in secondary schools, and it certainly requires the purchase of appropriate devices (computers, laptops, chromebooks, tablets) and the availability of truly high-speed broadband. It is advisable to establish a target ratio of connected devices per student. For example, a ratio of 5:1 may be set so that where there is a school of 200 students, there are 40 quality devices that are always connected.

A ratio 4 to 5 students-per-computer is what many experts considered reasonable for effective use of computers in schools.[8] In much of the developed world this ratio is 1:1.

It is recommended that in order to quickly advance computer knowledge and capacity building, a government-led computing device subsidy and/or payment program is introduced to the families of students. This will assist in reaching a lower ratio of computers-to-student as they can operate their own device.

It is recommended that SchoolNet be enhanced with a wider and faster Internet in order to provide students with the right capacity and speed of access.. According to the ITU, "the education system has not prioritised Internet access for schools, which means that children don't have access to information in the same way that children of other countries do, and this limits the extent to which they are acquiring skills and knowledge that will equip them for productive participation in the national and international economies."[9]

Ensuring world-class connectivity to all schools may be targeted through specific plans outlined in the OOTR Corporate Plan 2014-19 and in particular

[8] President's Committee of Advisors on Science and Technology 1997 https://nces.ed.gov/pubs2002/internet/4.asp

[9] Wireless broadband masterplan for the Independent state of Samoa ITU, 2012

under Goal 2: Availability of and access to services, Goal 6: Consumer protection and Goal 8: Effective competition.

In view of the survey results and more importantly the group discussions and meetings with stakeholders, it is strongly recommended that all secondary schools set as an immediate priority a plan to increase the teaching of ICT in terms of curriculum, access to labs, as well as free personal access to the Internet around the campus for all registered students.

In Samoa there are 23 public Colleges, 15 Mission Colleges and three Private Colleges. In order to provide all colleges with similar opportunity, it has been proposed that enhanced curriculum and additional computer labs be implemented in all Secondary Schools. This may seem to be an expensive proposition but it will pay off with future promotions of top-class young Samoan graduates in years to come.

5.3. ICT Capacity Building at the National University of Samoa.

1. The Education Survey and focus group meetings also showed that:

- Only 36% acquired their ICT skills from school;
- More than half of educational institutions (59%) do not have ICT Plans;
- One in four students do not use internet tools;
- Two out of three educators (62%) do not publish training materials on the Internet.

During the Education Workshop as well as meetings with NUS personnel it was evident that the University takes on a substantial load into bringing programmes that are important to Samoan society. For instance a variety of very rich courses on Marine Engineering and Marine Life, Agriculture, Health as well as subjects related to Samoan Language and Culture are available.

With regards to ICT, under the Faculty of Science, there is a B.Sc degree which includes a Major in Computing consisting of 12 courses. These courses include a variety of Programming as well as Computer Applications. The University does not have a Bachelor of Computer Science diploma.

Six Computer labs are available to students and each lab has an average of 22 computers. The Library also has approximately 20 computers available on a free Wi-Fi network. Two additional labs are available, one for international students (5 positions) and one for Graduate students with 20 positions.

The general sentiment is that the level of computing skills taught is lower than what is required for a BSc in Computer Science. There is also a substantial redundancy in the content provided in several courses. Ideally, many of these courses should be taught at Secondary school level so that NUS can concentrate on higher end computer courses. However there is a certain number of introductory courses (Computer Applications) that should be taught for students in Business, Arts and Humanities.

In order for NUS to be the job-generator that is required in Samoa for ICT development, the Computer Science Department should increase the number of computer labs by three or more labs. The level of courses taught should include topics such as Operating Systems design, Software

Engineering, programmable controllers and other complementary topics that mix with the skills of Computer Engineering.

The NUS campus deploys a Wi-Fi network of 10 Mbps that will soon be enhanced to 50 Mbps. As the number of students has increased to 3,000 the speed allotted to the Wi-Fi network will probably have to be boosted further in the near future.

There is a need to develop Distance Learning courses that will allow teaching students in Savaii without having to travel to and from the island. This future development requires video streaming with high bandwidth requirements. In this regard NUS indicated an interest in developments that could bring the university to use fiber optic speeds between the islands at reasonable cost.

It was suggested during the focus group discussions that to increase ICT jobs in Samoa a group of ICT-related scholarships could be developed for students entering post-secondary education. Scholarships are a good way to invest in ICT for the future and it is recommended that a national ICT scholarship program is pursued with a focus on ensuring that female and lower-income students are provided with opportunities.

5.4. Affordable Broadband Internet for all Samoans through enhanced competition. The survey raised amongst the participants the issue of high Internet cost. Without effectively introducing measures that will reduce the cost of broadband access it is very difficult to increase the demand for services. Affordability is an important factor that most consulted stakeholders raised through their comments.

Among the cost containing measures proposed by operators and by businesses were the following:

a) **Sharing existing infrastructures**.

Both operators and business people interviewed agreed that sharing infrastructures should be favoured over buying new infrastructures. Sharing infrastructures (mainly towers) is a complicated business as the tower owner tends to make the sharing process onerous. The dominant players claim that sharing a tower impacts negatively on their revenues and therefore the Regulator struggles to reach a consensus on interconnection fees. A Policy has been published by the Regulator in this regard but its effective implementation seems to be difficult .

Operators have shown interest in sharing the Samoa National Broadband Highway (SNBH), where there is extra capacity available. The SNBH originated in 2015 from an interest in providing a proper e-government network platform. The network is growing steadily and several ministries use it, with the Health Ministry and MESC being the main participants. The network is currently an Intranet (as it provides connectivity between two or more points but does not give access to Internet). MCIT uses Digicel towers to deploy the LTE base stations of SNBH. The rental fee is close to 1.7 million WST per year. At the moment SNBH is maintained by CSL, the

network is popular, and its resources are properly used by Government ministries. It seems reasonable that SNBH could be shared with telecom operators at reasonable interconnection fees where the rules and fees could be established by the Regulator.

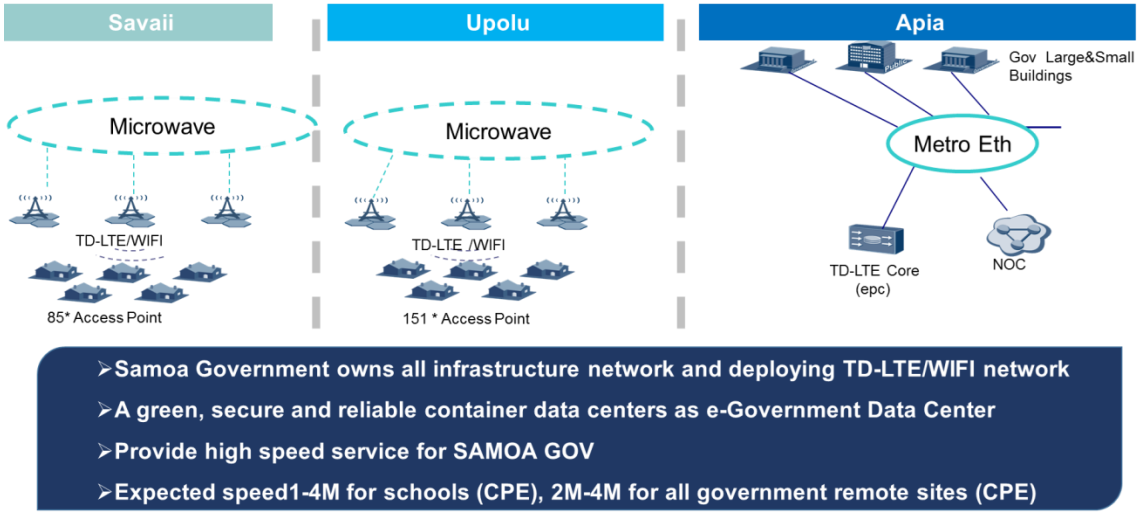


Figure 3 Samoa National Broadband Highway (SNBH)

In parallel, the SchoolNet network serves the purpose of connecting all schools and NUS so that the sharing of education curriculums and administrative data may take place. Internet to the computer labs is also brought to schools and NUS via the SchoolNet. Secondary schools and colleges are not particularly eager to take on Internet using the resources of SchoolNet, as the latter is considered very slow (1 Mbps) and its reliability has not been consistent - particularly in Savaii where schools did not have access to Internet for two months early in 2018.

b) **Removal of custom duty on all imported smart phones, tablets and computers**. The Survey results show that 46% of Samoans do not use the Internet at all. 55% of Samoans use smart phones but it is highly probable that higher end phones (3G and 4G) are a reduced percentage of those smart phones. In order to motivate users to acquire the more modern, reliable and faster units the recommendation to remove or substantially reduce custom duty was generally well received by a large portion of those interviewed. At the moment mobile phones are charged 20% customs duty and personal computers are charged 8%.
The possibility of either reducing or eliminating VAT on these items could also be explored.
Helping Samoans to buy better quality phones for less money will result in an increased use of Internet facilities and the country will gain overall.

c) IXP. The Internet Exchange Point. As proposed in the MCIT Sector Plan, using the IXP by operators reduces the amount of transit traffic leaving the country when this traffic could be local. This applies when the source of the data is in Samoa (e.g. a portal xxx.ws). It would be essential to first determine how much local content is being searched by Samoans as opposed to foreign content. If the percentage is too small, the IXP may not be a great cost reduction solution.

5.5. **E-Government.** The Government Survey shows that E-Government could be improved further particularly in relationship to electronic filing with businesses, as these exchanges are more frequent than those conducted with the general public. The electronic exchanges with businesses also bring efficiency into economic transactions and commerce in the country.
E-government transactions with the general public are perceived as being of secondary importance to those of businesses given the infrequent number of exchanges (often once a year for income tax returns).
One area that clearly needs attention is the matter of e-payments. At the moment the MfR and MCIL do not transfer or receive payments automatically to/from bank accounts. It is customary to issue payments in a cheque format and receive payments in cash format. Samoans receive a high proportion of their income from foreign remittances.

5.6. **E-Payments.** The Survey Results indicate that only 2% of the population use E-Banking. In discussion with DBS and with ANZ Bank, it was clarified that e-banking and e-payments are very much possible in Samoa. As an example ANZ Bank promotes a VISA Debit card that is supported by many international e-commerce entities and foreign banks. The problem seems to originate in the low leverage that Samoans in rural communities have towards e-payments as the card is promoted at the cost of 50 WST per year, while there is an equivalent (only local) debit card that is free of charge. The conclusion is that Internet access needs to be made more affordable and interesting to rural communities, so that E-payments can be easily adopted by all Samoans. Advertising campaigns from banks towards improving the level of confidence of the general public towards e-payments need to be more frequent. Also it may be common that merchants are unsure about how to integrate the e-payment interface from the Bank with their web portal. Banks should offer their support to make the interface functional. Overseas remittances amount to WST $136 million/year. Therefore transferring funds electronically from abroad will help all Samoans[10].

6. Conclusions and Recommendations

6.1. Conclusions

The results of the Samoa ICT Needs and Readiness survey has provided a clear perspective on the needs of Samoan society regarding Information and Communication Technologies. The main global conclusions that have been reached are:

1. The country is steadily advancing in mobile coverage and Internet access. According to the World Bank Country Profile for 2010[10] 29% of Samoans used a mobile phone and Internet was used by 7% of the population. Today in 2018 we find that those numbers have increased to 88% and 55% respectively. While this is a remarkable achievement, we still realize that a large portion of the general population is not

10 http://databank.worldbank.org/data/views/reports/reportwidget.aspx?Report_Name=CountryProfile&Id=b450fd57&tbar=y&dd=y&inf=n&zm=n&country=WSM

taking part in the ICT evolution. A substantial percentage of Samoans are not interested in using Internet as a useful tool mainly due to the high cost and the lack of interest in learning new technologies. Mobile messaging (Facebook, SMS) and voice communication are the key winners in using mobile technology but only . In order to promote the benefits of Internet as a learning and job-promoting tool, a Capacity Building program for the general population, either free of charge or at minimum cost to participants seems to be rated by stakeholders as a preferred government action.

2. There is a general consensus that immediate Capacity Building of the student population is essential for increasing the financial well being of Samoans in the years to come. In addition to expanding coursework, this includes making significant improvements to the accessibility of high speed and reliable broadband in all schools.
3. While the Government, particularly MCIT and MESC has been steadily setting policies[6] and infrastructures [11] (Tui-Samoa cable, SNBH, SchoolNet) there is a generalised concern that the cost of Internet and other telecommunications services (long distance telephony) is not affordable to a large sector of the population and businesses. The ICT Survey shows that the level of Internet affordability is fairly low when compared to the average household income. Therefore policies have to be directed towards reducing or maintaining the cost that operators and ISPs are charging for their services and will be charging for broadband Internet.

The table below sets out recommendations to the OOTR and how these sit alongside relevant Government policies and then also international policies. The recommendations are also directed at the various stakeholders who are interested in promoting ICT in Samoa as a future resource of GDP growth for the country.

6.2. Recommendations

Table 2. Recommendations

#	RECOMMENDATIONS	SUPPORTING INFORMATION
	On improving ICT know-how for all Samoans	
1	Help to target the reduction of 40% of the population who lack knowledge of ICT in the population.	Implementing systematic measurement frameworks to monitor the growth of broadband and digital services is critical for informing policy and regulatory decisions. Ref: **Digital Economy Toolkit OECD 2016 (Ref. 19)** Build digital skills among citizens to improve productivity and job prospects; **World Bank World Development Report**

[11] MCIT. Communications Sectpr Plan 2017-2021

		2016. How the Internet promotes development[12].
2	Implement a low cost ICT basic course for 250 villages (above 100 inhabitants) and analyse results. If results are positive launch a second phase of courses to the same 250 villages.	First day session on Smart Phone basics. Next five days on Windows, Word and Excel plus Internet access. **Ref: See Action Plan as proposed during Workshops. Annex 4.**
4	Bring ICT awareness to primary schools. Consider providing tablets or multi-use laptops. Include ICT basic computer courses at the primary level.	MESC current plan to bring 1500 tablets to primary schools is very encouraging. Primary students will be eager to learn courses taught today at Secondary schools. (Windows, Word, Excel, etc). **Ref: See Action Plan as proposed during Workshops. Annex 4.**
5	Increase the number and level of ICT courses in secondary schools and colleges. As per survey results and consultations. Adding one course on web programming and databases. Transferring Basic Computing course to primary schools.	**Ref: See Action Plan as proposed during Workshops. Annex 4.**
6	Adding two labs per college. One of the computer labs to be used by all students at first-come first-serve basis.	**Ref: See Action Plan as proposed during Workshops. Annex 4.**
7	Consider that the Internet access (filtered) should be provided free of charge to registered students through Wi-Fi.	As per consultations and ITU report. **"ITU Wireless Broadband master Plan for Samoa 2012". Ref. 12**. **Ref: See Action Plan as proposed during Workshops. Annex 4.**
8	At National University of Samoa. Promote a substantial increase in level and number of CS courses and aim towards the establishing of a BSc in Computer Science.	In order to boost the level of know-how in Samoa. **Ref: See Action Plan as proposed during Workshops. Annex 4.**
	On improving affordability by stimulating competition on Broadband Internet	
9	The fiber cable Apia- Savaii (domestic) is currently unutilized.	

12 http://documents.worldbank.org/curated/en/896971468194972881/310436360_20160263021502/additional/102725-PUB-Replacement-PUBLIC.pdf

	Its bandwidth should be properly allocated to all the operators and other government entities in a fair manner that will encourage competition for services. Multiplexing structure and sharing plan should be studied and implemented by OOTR	
10	Pursue infrastructure sharing to reduce prices and expand faster connectivity. Seek to share the SNBH amongst the telecom operators and open those connections to Internet, this in order to reduce the cost of infrastructure sharing. Seek to utilize Bluesky's fiber loop through infrastructure sharing established under the Interconnection Policy. (Telecom Act). In all cases a minimum interconnect tariff (at cost plus a small mark-up) could be applied by the Regulator.	**Broadband: A Platform for Progress, Broadband Commission for Digital Development in May 2010, a joint effort by ITU and UNESCO.** Wireless co-location: Actively implementing co-location between wireless service providers, including cellular companies rather than leaving the onus on the carriers to co-locate. It also involves monitoring and regulating cost-based arrangements for co-location to guard against unfair costings as well as promoting co-location. See: **CT4D Jamaica: Creative Commons Licence 2009** . **Ref: See Action Plan as proposed during Workshops. Annex 4.**
11	Remove (reduce) duties on mobile phones, tablets and laptops. A five-year plan could be implemented to evaluate the results of the policy.	**Ref: See Action Plan as proposed during Workshops. Annex 4.**
12	Introduce number portability in order to enhance competition	Statistics indicate that a large number of Samoans have never changed supplier.
13	Establish and ensure entry-level broadband services that are affordable through adequate regulation and market forces (amounting to less than 5% of average monthly income for starter packages).	The International Telecommunications Union's (ITU) Broadband Commission defines affordable Internet access as 500MB of Internet data costing 5% or less of gross national income. Generally, Internet access affordability has improved in Asia and the Pacific region, with the cost of 500MB of broadband Internet access falling from 10% of gross national income (GNI) in 2013 to less than 5% in 2015 (**Alliance for Affordable Internet, 2017**). In Samoa, prices have been falling since competition was introduced in 2007, and affordability is now at around 1.9% "entry level broadband services should be made affordable in developing

		countries through adequate regulation and market forces (for example, amounting to less than 5 per cent of average monthly income)"; Broadband Commission for Digital Development. Broadband should be made increasingly accessible and affordable to disadvantaged groups and people living in rural areas, sectoral over-taxation that deters expansion and use should be avoided. Public authorities can also establish incentives and finance networks when markets alone are unable to meet the demand. See: **Digital Economy Toolkit OECD 2016.**
	On long term Broadband Internet Policy for Samoa	
14	Consider re-activating the existing ICT Policy and Broadband Policy and update both.	All countries should have a national broadband plan / strategy or include broadband in their universal access / service definitions. **Broadband: A Platform for Progress, Broadband Commission for Digital Development in May 2010**, a joint effort by ITU and UNESCO ITU BROADBAND COMMISSION RECOMMENDATIONS (2014) • Launch a national broadband plan; Digital strategies and national broadband plans should seek to increase broadband access usage by using whole-of-government and multi-stakeholder approach. Ref: **Broadband Policies for Latin America and the Caribbean: A Digital Economy Toolkit 2016. Also Ref. 30.** **Ref: See Action Plan as proposed during Workshops. Annex 4.**
15	Focus E-Government efforts in Samoa firstly on businesses. A major digitization of forms for the general public would not yet be very effective, given the small population and frequency of use.	
	On ICT Job creation	
16	Encourage the availability of easy credit for qualifying young	Use digital technology to encourage innovation and entrepreneurship for local

	entrepreneurs.	businesses; **Ref; World Bank Connecting Islands with Technology 2016.** **Ref: See Action Plan as proposed during Workshops. Annex 4.**
17	Encourage tax benefits to ICT start-up companies	For instance providing tax credits for eligible R&D expenditures and low-interest loans. **Ref: See Action Plan as proposed during Workshops. Annex 4.**
18	Pursue online outsourcing (OO) covering different types of tasks, from low complexity activities such as data entry and website sign-up, to high complexity ones such as web/software development and accounting services.	In consultations with MCIT we were informed that this type of action is being currently undertaken by the Ministry. This is very encouraging news.
	On Performance Indicators for OOTR	
19	It is recommended that a new survey be conducted in early 2019 in order to compare values of certain statistics with those from the current survey. Preferably, the new survey should be sent out by email to all respondents, although telephone interview is also possible.	

7. Performance Indicators

7.1. Indicators based on data provided by ISPs and telephony operators.

It was indicated in the Inception Report that the Final Report of the current project should attempt to measure:

1. *Wide accessibility of both Mobile telephony and Internet. (universal service)*
2. *Affordability of mobile telephony and Internet at all levels of the Samoan society.*
3. *Level of usage of Internet traffic*

Additionally, OOTR should be interested in measuring the:

4. *Level of usage of voice traffic (both mobile and fixed)*

Objective No.1 can be measured with the following Indicators:

7.2. *Confirmed radio coverage of mobile services. This is an ongoing task at OOTR.*

Objective No. 2 can be measured by regulating the tariffs proposed by mobile operators and other ISPs. In order to regulate the proposed tariffs, it is important that ISPs provide the means to demonstrate the volume of Internet subscriptions and volumes of data being transferred to the Internet. (Objective No. 3)

Objective No. 3. Measuring the Level of local and Internet data usage per ISP is a prerequisite to attempting to regulate the tariffs that those ISPs are proposing.

Objective No, 4. Level of voice traffic (both mobile and fixed) requires access to CDR (Call Detail Records) data from the fixed and mobile operators in order to obtain an insight into parameters that may be useful in the calculation of tariffs:

These are, for mobile traffic[13]: (they also exist for fixed voice)

Table 3. Mobile traffic Performance Indicators

A.2.3	Mobile-to-mobile on-net call minutes	The total number of chargeable post-paid retail voice call minutes that originated and terminated on the licensee's mobile network during the month. Chargeable minutes are those actually carried on the licensee's network and for which the licensee may charge the caller, irrespective of whether or not an actual charge is levied on the caller.
A.2.4	Mobile-to-mobile off-net call minutes	The total number of chargeable post-paid retail voice call minutes that originated on the licensee's mobile network and terminated in Samoa on another licensee's mobile network during the month. Chargeable minutes are those actually carried on the licensee's network and for which the licensee may charge the caller, irrespective of whether or not an actual charge is levied on the caller.
A.2.5	Mobile-to-fixed call minutes	The total number of chargeable post-paid retail voice call minutes that originated on the licensee's mobile network and terminated in Samoa on a fixed network during the month. Chargeable minutes are those actually carried on the licensee's network and for which the licensee may charge the caller, irrespective of whether or not an actual charge is levied on the caller.
A.2.6	Outbound international call minutes	The total number of chargeable post-paid retail voice call minutes that originated on the licensee's mobile network and terminated outside Samoa during the month. Chargeable minutes are those actually carried on the licensee's network and for which the licensee may charge the caller, irrespective of whether or not an actual charge is levied on the caller.
A.2.7	On-net SMS	The total numbers of chargeable retail post-paid SMS messages that originated and terminated on the licensee's mobile network during the month Chargeable messages are those actually carried on the licensee's network and for which the licensee may charge the subscriber who originates it, irrespective of whether or not an actual charge is levied on the subscriber.

[13] Inception Report Annex "C" Performance Indicators.

A.2.8	Off-net SMS	The total number of chargeable retail post-paid SMS messages that originated on the licensee's mobile network and terminated in Samoa on another licensee's mobile network during the month Chargeable messages are those actually carried on the licensee's network and for which the licensee may charge the subscriber who originates it, irrespective of whether or not an actual charge is levied on the subscriber.

Several companies have software that will obtain these values by hooking data collecting equipment to the CDR output of the mobile and fixed operators[14].

7.3. Indicators based on awareness campaigns and occasional surveys

The ICT survey provides indicators that may give an insight into the level of ICT readiness of Samoan society over time.

The following statistics shall provide some of the required information:

1. *Percentage of the population that feel that their ISP service is not reliable or not fast enough. (Quality of service)*
2. *Percentage of the population that feel Internet access is too expensive. (affordability)*
3. *Percentage of the population that feel more should be done to stop cyber-crime*
4. *Percentage of the population that feel Government Information systems should be improved in one way or another.*
5. *Percentage of the population that would rather pay more money for improved Internet services.*
6. *Percentage of the population that need to be trained in basic IICT and Internet features, this in order for them to start using it with confidence*.

The current survey should be repeated in March or Aprl 2019 in order to evaluate the impact that changes introduced by operators has on Samoan society.

A new set of optimised questionnaires is to be provided to the Regulator not later than mid-August, 2018. The next survey should be conducted either by email or by phone except for certain citizens that do not any communications media, for whom face-to-face will be the only possible means of interview.

[14] An example of such software is TKC Telecom's "Traffic Management System" www.tkctelecom.com

8. Action Plan Proposed

Table 4. Action Plan Proposed

#	ACTIVITY	ESTIMATED COST	PROPOSED START DATE
1.0	**ICT CAPACITY BUILDING FOR THE GENERAL PUBLIC**		
1.1	To provide training of 250 villages (Savaii and Upolu) of a six-day course on smart phone use (1 day) and laptop use (5 days). It is proposed to hold the course twice per village so as to cover approximately 25,000 villagers in total. A pilot to run the course in three or four villages before full deployment would be useful.	WST $3,000,000	2019
2.0	**ICT CAPACITY BUILDING AT SECONDARY SCHOOLS AND COLLEGES**		
2.1	To provide one more computer course (web programming and database) on ICT at 23 secondary public schools, 15 mission colleges and three private colleges with two more computer labs of 50 positions each.	WST $11,800,000	2019-2020
3.0	**ICT CAPACITY BUILDING AT NATIONAL UNIVERSITY OF SAMOA**		
3.1	To increase the level and number of computer courses towards eventually have the capacity to provide a BSc Computer Science degree. To increase by four the number of computer labs with 50 computers each.	WST $3,500,000	2019-2022
4.0	**REMOVAL OF CUSTOM DUTY ON MOBILES, TABLETS AND COMPUTERS**		
4.1	Policy to be requested from Ministry for Revenue	N/A	2018-2019
5.0	**SHARE INFRASTRUCTURES AT RELAXED PRICES**		
5.1	The Regulator to ensure that Interconnection of infrastructures is permitted without undue imposition by the owner.	N/A	2019
5.2	Introduce new dispositions in order to permit the sharing of available capacity of the SNBH by the telecom operators.	TBD	2019
5.3	Operators owners of towers and fiber cables to be offering those facilities, if extra capacity is available, at reasonable prices so that building of new infrastructures is to be postponed or avoided.	TBD	2019

#	ACTIVITY	ESTIMATED COST	PROPOSED START DATE
6.0	**PROMOTE E-PAYMENT SYSTEMS AMONG BUSINESSES AND THE POPULATION**		
6.1	Banks having e-payment interfaces advertise those among the population and make it easy for merchants to promote their products on Internet facilitating the payment interface.	N/A	2019

References used in the preparation of the report

1.-MCIT. Communications Sector Plan 2017-2021
2- MCIT National ICT Policy 2012-2017
3- MCIT. Samoa National Broadband Policy 2012 “BETTER CONNECTIONS TO THE WORLD”
http://ssccsamoa.com/about/
4- Telecom Act. 2005.
5- OOTR. ANNUAL REPORT 2015
6- OOTR Corporate Plan 2014-19
7- OOTR. National Frequency Allocation Table.
8- OOTR CO-LOCATION & INFRASTRUCTURE SHARING POLICY & GUIDELINES.2011
9- OOTR.CSAM Abuse Policy. 2016
10- OOTR. Spectrum Management Policy and guidelines
11- SAMOA. Strategy For the Development of Samoa (SDS) 2016/17-2019/20
12- ITU. Wireless broadband masterplan for the Independent state of Samoa ITU, 2012
https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2015/Sep-WABA/Presentations/BB%20Deveopment%20in%20ASP%20Final.pdf
13- Measuring the Information society Report. 2016. https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2016/MISR2016-w4.pdf
14- The state of Broadband. 2017 : https://www.itu.int/dms_pub/itu-s/opb/pol/S-POL-BROADBAND.18-2017-PDF-E.pdf

15- World Bank (2010). Building broadband: Strategies and policies for the developing world, p. 2.
http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1208273252769/Building_broadband.pdf

16- Margin of Error Calculator” https://www.survata.com/margin-of-error/ and
http://americanresearchgroup.com/moe.html

17- STEM Education. https://www.csreurope.org/sites/default/files/EU-ICT-Benchmark.pdf

18- President's Committee of Advisors on Science and Technology 1997
https://nces.ed.gov/pubs2002/internet/4.asp

19- OECD. http://www.oecd.org/els/emp/Skills-for-a-Digital-World.pdf

20- EC. http://ec.europa.eu/commfrontoffice/publicopinion/flash/fl_243_sum_en.pdf
21- https://www.businessnewsdaily.com/3524-businesses-can-prevent-customer-defection.html
22- https://www.csreurope.org/sites/default/files/EU-ICT-Benchmark.pdf

23- Sweden Completely connected by 2025. https://www.government.se/information-material/2017/03/a-completely-connected-sweden-by-2025--a-broadband-strategy/

24- ON PUBLIC AWARENES SURVEYS: https://www.ccts-cprst.ca/about-ccts/public-awareness/2016-public-awareness-survey/
25- https://www.statista.com/statistics/251666/number-of-digital-buyers-worldwide/
26- https://www.smartinsights.com/search-engine-marketing/search-engine-statistics/
27- https://qz.com/416416/we-now-spend-more-than-eight-hours-a-day-consuming-media/

ON ICT FOR EDUCATION.
28- President's Committee of Advisors on Science and Technology 1997
https://nces.ed.gov/pubs2002/internet/4.asp
29- Integrating ICT in education in Sweden.
http://cees.mak.ac.ug/sites/default/files/Integrating_ICT_in_Education_Sweden.pdf

30- Unleashing the Internet in the Caribbean.
http://unctad.org/meetings/en/Contribution/dtl_eWeek2017c06-isoc_en.pdf

Annex 1.- LIST OF PEOPLE MET DURING CONSULTATIONS

ANZ.	Mr. Mark Burns, Manager Advocacy & Business Projects
DBS.	Mr. Mark Bartley, Manager ICT
MESC.	Mr. Werner Kappus, ACEO ITC
MCIT.	Mr. Tuaimalo Asamui Ah Saun, CEO
	Mr. Manusamoa Tary Saaga, ACEO, ICT
	Talatalaga Matau, Policy
	Rosianna Maimai,
	Susanna Stowers, Policy
	Faaifo Faaifo, Policy
	Rebecca Fanea
NUS	Cheri M Robinson Moors, Deputy Vice Chancellor Corporate Services.
MWSCD.	Mr. Nanai Sovala Agalava, ACEO Economic Empowerment
	Maria Bernard-Tiatia
	Ana Leau Vaasa-Teo
	Rubylou Tuilona
SBEC	Alatina Ioelu, CEO
Digicel	Farid Mohammed, CEO
	Dennis Williams, Sales Manager
	Derek Resmusen, Technical Manager
Bluesky	Omana Sua, ICT Manager
	Alani, Director Technical operations
SSCC	Emmanuel Delanou, CEO
CSL	Rita Eteuati, Operations and Technology Manager
NetVo	Stephen Leota, Owner
Leasamoa	Tavita Lealaiauloto, General Manager
	Makoto Nakayama, System Administrator

FOCUS GROUPS CONSULTATIONS

Apia. 11 June: Government Ministries.	18 participants.
Apia. 12 June : Businesses.	14 participants
Apia. 13 June : General Public.	9 participants
Apia. 14 June: Educational Institutions:	24 participants
Salelologa. 18 June: Savaii meeting:	10 participants

ANNEX 2.- NUMBER OF SURVEY RESPONDENTS (ORIGINALLY PLANNED)

GOVERNMENT MINISTRIES AND CORPORATIONS

		Ministries	No. Resp
1	MOF	Ministry of Finance	4
2	MfR	Ministry for Revenue	5
3	MNRE	Ministry of Natural Resource and Environment	4
4	MAF	Ministry of Agriculture and Fisheries	4
5	MCIL	Ministry of Commerce Industry and Labor	4
6	MJCA	Ministry of Justice Court Administration	4
7	MWCSD	Ministry Women Community Social Development	5
8	MOP	Ministry of Police	4
9	MCIT	Ministry of Communication and Information Technology	4
10	MPMC	Ministry of the Prime Minster and Cabinet	4
11	MFAT	Ministry of Foreign Affairs and Trade	4
12	MWTI	Ministry of Works Transport and Infrastructure	4
13	MESC	Ministry of Education Sports and Culture	4
14	MPE	Ministry of Public Enterprise	2
15	MOH	Ministry of Health	4
16	PSC	Public Service Commission	4
17	OAG	Office of the Attorney General	4
18	SAO	Samoa Audit Office	4
19	SBS	Samoa Bureau of Statistics	4
20	LA	Legislative Assembly	
21	OO	Ombudsman Office	3

		Government Corporations	No. Resp
24	EPC	Electric Power Corporation	4
25	SWA	Samoa Water Authority	2
26	CBS	Central Bank of Samoa	4
27	LTA	Land Transport Authority	2
28	SHC	Samoa Housing Corporation	4
29	SLC	Samoa Land Corporation	2
30	NPF	Samoa National Provident Fund	4
31	DBS	Development Bank of Samoa	4
32	SLAC	Samoa Life Assurance Corp	4
33	STA	Samoa Tourism Authority	2
34	SPL	Samoa Post Office Limited	2
	SIFA	Samoa International Finance Authority	
	SAA	Samoa Airport Authority	
35	PTO	Public Trust Office	2
36	NPF	National Provident Fund	4
37	SPA	Samoa Ports Authority	5
38	SSC	Samoa Shipping Corporation	4
39	STEC	Samoa Trust Estate Corporation	4
40	SSS	Samoa Shipping Services	4
41	UTOS	Unit Trust Of Samoa	2
42	ACC	Accident Compensation Corporation	4

		Ministries	No. Resp
22	OEC	Office of the Electoral Commissioner	4
23	MPCS	Ministry of Prisons Correctional Services	

		Government Corporations	No. Resp
43	SNHS	Samoa National Health Services	1
44	SUNGO	Samoa U.NGO	5
45	SFESA	Samoa Fire & Emergency Services	4
46	SLRC	Samoa Law ReformCorporation	4
47	SQA	Samoa Qualification Authority	4
48	SSFA	Samoa Sports Facilities Authority	4
49	SROS	Scientific Research Organization of Samoa	4
50	OOTR	Office of the Regulator	4
	TOTAL RESPONDENTS		**176**

EDUCATIONAL INSTITUTIONS

	COLLEGES AND SECONDARY SCHOOLS	No. Resp
1	R.L. Stevenson College, Apia	18
2	St. Mary's College, Apia	19
3	St, Joseph College, Apia	18
4	Samoa College, Apia	18
5	Aleipata College, Aleipata	18
6	Lefaga College	18
7	Aaana 1 College	18
8	Mataaevave College	18
9	Itu AsauCollege	18
10	Savai SisifoCollege	18
11	National University of Samoa	41
	TOTAL RESPONDENTS	**222**

BUSINESSES

Village	No. Resp
UPOLU	
Alafua	1
Alamagoto	1
Aleipata	1
Apia	8
Falelauniu	2
Fugalei	5
Lalovaea	6

Village	No. Resp
UPOLU	
Mulinuu	1
Saleufi	17
Savalalo	10
Siumu	1
Siusega	2
Sogi	7
Tafaigata	1

Village	No. Resp
Lefaga	1
Lepea	4
Lotopa	9
Magiagi	1
Malifa	2
Maluafou	1
Matafele	3
Matautu	6

Village	No. Resp
Taufusi	2
Togafuafua	11
Ululoloa	3
Vailima	4
Vaimoso	4
Vaitele	16
TOTAL UPOLU	**130**
SAVAII	
Salelologa	26
Iva	5
Saipipi	3
Safotu	3
Asau	3
Sagone	5
Satupaitea	5
TOTAL SAVAII	**50**
TOTAL RESPONDENTS	**180**

VILLAGES AND GENERAL PUBLIC

Nr.	VILLAGES	No. Resp
	UPOLU	
1	Alamagoto	8
2	Magiagi	8
3	Vaitele-Tai, Vaitele-uta	8
4	Fale'ula	8
5	Le'auva'a Sasae	8
6	Faleasiu (Sapulu)	8
7	Satapuala	8
8	Matautu Lefaga	8
9	Siumu-i-Sisifo	8
10	Lepa	8
11	Tiavea	8
12	Salimu	8
13	Solosolo	8
14	Lauli'i	8
	TOTAL UPOLU	**112**
	SAVAII	
15	Salelologa	8
16	Luamanuvae	1
17	Tulimu	1

Nr.	VILLAGES	No. Resp
18	Iva	8
19	Saipipi	8
20	Lalomalava	8
21	Safotu	8
22	Asau	8
23	Sagone	8
24	Gataivae	8
25	Vaitoomuli Palauli	8
	TOTAL SAVAII	**74**
	TOTAL RESPONDENTS	**186**

ANNEX 3. Action Plans as agreed during the Workshops (Focus Group Discussions)

Government Workshop, Apia, 11 June, 2018

ACTION PLAN AS PROPOSED BY THE ATTENDEES

ICT POLICY.
The current ICT Policy is outdated. It was recommended to implement the existing ICT Policy in order to re-activate it and update it.
We have the people but we need the high level training. It was proposed to provide scholarships for these people abroad.
It was proposed that the IT Society of Samoa, could be re-enacted in order to lead some of the activities ahead.

E-Government in Samoa is mainly beneficial to businesses. A major digitization of forms for the public would not be very effective, given the small population.

Cybercrime does not seem to be a major threat. It should be given second priority in the ICT Development strategy.

COMMITTEES. The issue of creating committees within each affected organization such as Ministry of Education, University of Samoa, and other institutions was brought up. It was suggested that MCIT should invite other ministries and corporations to participate in the National ICT Committee
SHARING INFRASTRUCTURES.
Bluesky has a private fiber loop. This is not being shared by other operators.
Samoa National Broadband Highway network is already in existence but it is not connected to Internet. It creates an Intranet amongst ministries.

CONCLUSION: We need to obtain further information with regards to:
1. Specifications and Use of the Samoa National Broadband Highway Network.
2. Specifications and use of the SchoolNet.

Businesses Workshop, Apia, 12 June, 2018

1. ACTION PLAN AS PROPOSED BY THE ATTENDEES

Questions are raised on tax refunds applied to ICT jobs Tax benefits are applied to Agriculture and fisheries but not to ICT jobs.

Low interest loans to ICT start-up companies and tax incentives to ICT jobs could work.

Tax benefits are only refunded after the personnel has been hired and the results are to show.

The suggestion is to create a niche of expert companies in ICT in Samoa so that ICT expertise could be exported abroad, now that there will be better Internet access.

Another suggestion was to offer scholarships as part of the package.

Properly trained Samoans could work from Samoa on international projects. The result is that there is a huge future for any graduate in ICT with good enough knowledge. The market will never be flooded as the clients are abroad. Due to the Tui Cable students will be able to export their knowledge.

We could add to the Action Plan that Ministries (Revenue, Commerce, Communications) could provide information to businesses as part of the e-government plan.

What other lobbying can be done ?

.Villages may get funding from Ministry of Women. By introducing ICT knowledge to village people If it is accessible from villages then this is a way forward.

SBEC may go to villages to train villagers. Funding would be required if it is expensive.

It was also suggested that local content be used in villages as many villagers do not feel comfortable with English.

Duty on ICT equipment (mobile phones and computers 20% and 8%) could be reduced or eliminated to boost ICT proliferation among the citizens.

General Public Workshop. Apia, 13 June 2018

ACTION PLAN AS PROPOSED BY THE ATTENDEES

1. Teaching ICT at village level, using organizations such as SBEC.
2. Promote Capacity Building by giving inexpensive tablets to children. And bringing computer knowledge to primary schools.
3. To make sure that ICT training is welcome by rural communities some pilots are first needed.
4. To increase ICT jobs in Samoa a group of high level scholarships can be given to some students starting from secondary level.
5. To request that NUS trains trainers, Bring one excellent foreign trainer here and he can train hundreds of teachers.
6. To reduce the price of smart phones and computers by reducing the duty on imports, In this way more options are given to people
7. For ISPs to use more base stations in order to increase capacity
8. To extend the concept of Telecenters.
9. To share infrastructures so that the systems are environmentally healthy.

Educational Institutions Workshop, Apia, 14 June, 2018

ACTION PLAN AS PROPOSED BY THE ATTENDEES

PROMOTE ICT HIGH LEVEL PROGRAMS AND TRAINING OF TRANERS
The NUS is in the process of creating a BSc in Computer Science with a vision for research and Training of Trainers

The NUS is committed to increasing the number of courses in Computer Science and their level.

It was suggested to add to the ActionPlan the following item: Colleges and NUS: To boost the capacity and quality of existing ICT labs and free Wi-Fi network.

It was also suggested to add the following Action Plan item: Colleges and NUS: Increase the number of ICT courses.

It was suggested that The content of courses have to be defined by experts.

It was suggested to add the following Action Plan Item: Colleges and NUS: Bring Samoa to the forefront of ICT know-how in the Pacific. And also the following one: Foster ICT Capacity Building for all citizens in Samoa.

It was suggested to add the following item: Expand the Broadband ICT Committee jointly with MCIT and MESC towards implementing an ambitious and effective Broadband ICT policy for Samoa.

General Public and Educational Institutions Workshop, Salelologa, Savaii, 18 June, 2018

ACTION PLAN AS PROPOSED BY ALL ATTENDEES

1. Bring Samoa to the forefront of ICT in the Paciific.
2. Increase the level of ICT knowledge for all citizens in Samoa.
3. Boost the capacity of existing labs at schools.
4. Increase the number of computers in schools.
5. Increase the number of ICT courses in schools.
6. Help in financing start-up companies in ICT.
7. Provide tax benefits to companies working in ICT research.
8. Create and publish stronger ICT policies in Samoa.
9. The Government should promote scholarships for accessing specialized online courses on Internet.