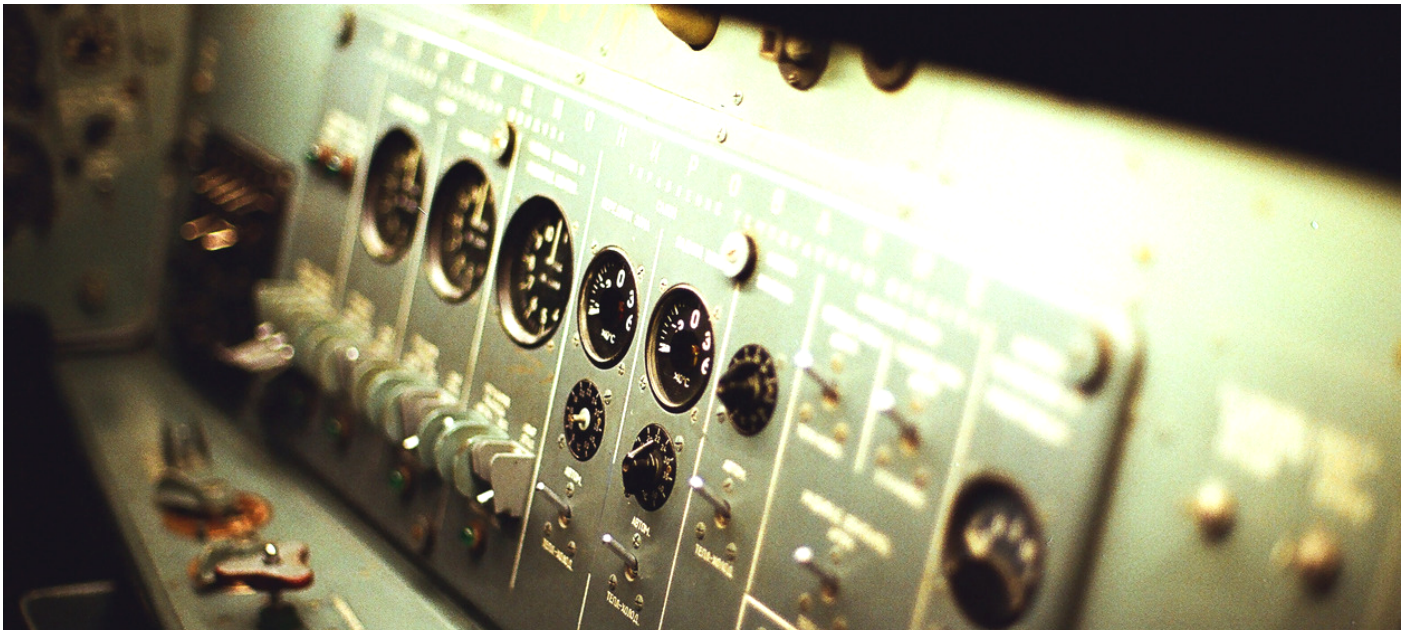
CAMPUS AND COMMUNITY RADIO TECHNOLOGICAL CHALLENGES REPORT

Prepared by: Patrick Grimshaw



Fonds canadien de la radio communautaire | Community Radio Fund of Canada

The NCRA/ANREC is supported by the Community Radio Fund of Canada/Fonds canadien de la radio communautaire (CRFC), the only organization mandated to financially support campus and community radio stations in Canada, and we want to thank the CRFC and the private broadcasters who make it possible.

EXECUTIVE SUMMARY

This Campus and Community Radio Sector Technological Challenges Report, funded by the Community Radio Fund of Canada, is an assessment of technological challenges that campus and community radio stations face, currently existing solutions, and opportunities for future development. The NCRA/ANREC plans to use this report to help guide its development and strategic plan over the next 5 years as related to technology in the sector.

CAMPUS AND COMMUNITY RADIO TECHNOLOGICAL CHALLENGES REPORT

Prepared by: Patrick Grimshaw

Context

In 2017 the NCRA/ANREC asked stations for feedback about the future of the organization, the sector, and new technologies that are being implemented at a local level. In order to better understand these needs the NCRA/ANREC has the intention of researching, and developing solutions for these technical needs. Within the past year the NCRA/ANREC has began this process with the PSA network, and Podcast networks which are digital solutions that members have asked that we developed. Other technological solutions must be carefully planned and developed, hence the need for research into sector-wide technical solution.

Methodology

In order to gather sufficient information to make an informed decision, multiple points of data were gathered through a variety of surveys, in-person discussions, a review of current opportunities or services provided , and from a handful of external sources. Staff gathered new information from a technology survey performed in 2018 asking for information surrounding technical challenges, equipment age, technology budget, staff, station developed solutions, support for NCRA/ANREC developed solutions, and new development opportunities.

The following methods for gathering information were conducted.

Membership Priority Survey 2017 (with just over 50% of members participating)

Membership Priority Survey 2018 (with just over 45% of members participating)

In-Depth Technology Survey 2018 (16 responses from technical staff of member stations)

Discussion/sessions at the National Campus and Community Radio Conference 2018, along with the Station Manager Summit 2018 (Approximately 30 people took part in technology related sessions and discussions)

A handful of external sources containing research, and best practices from the academic, and professional sector

CAMPUS AND COMMUNITY RADIO TECHNOLOGICAL CHALLENGES REPORT

Prepared by: Patrick Grimshaw

Table of Contents

TECHNOLOGICAL CHALLENGES

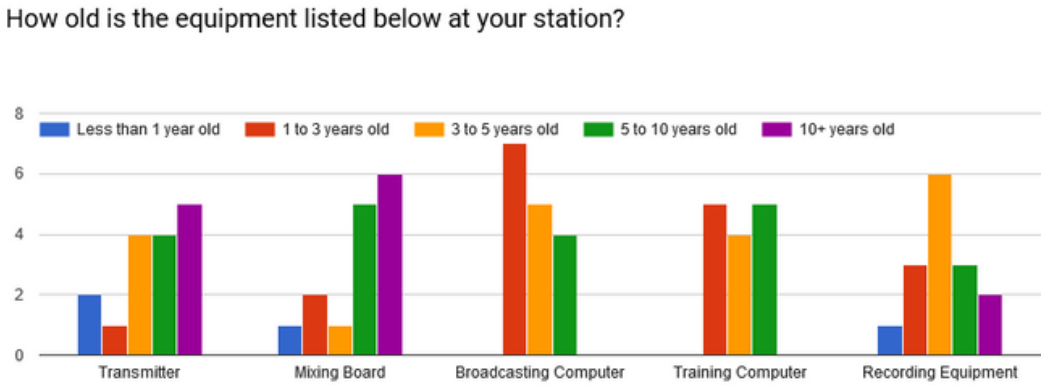
Technological Challenges

As the adoption of technology continues to become more common many campus and community radio stations now have more complex technical challenges to deal with then before. While some of these challenges can be resolved easily, others can take time to find a solution, and the rest do not have a reasonable, or financially sustainable solution.

A broad challenge that stations face is simply finding a solution for their specific requirements.Finding a solution that meets all of the stations needs can be a challenge as many solutions do not offer the features that the diverse range of stations are looking for. In 2018, the NCRA/ANREC put together an example of 6 “typical” stations, which you can see in Appendix A..

Ageing Equipment

As hardware and software ages the cost, and time needed to maintain them increases. For hardware this can be due to companies no longer supporting, or no longer producing parts that would be used to replace broken parts. For example several analogue mixing board providers have ceased doing business. One station in particular previously used a mixing board where only a single individual across the world had the expertise to create a replacement part for the board. Older hardware may not be able to run newer software reliably due to software now being designed for current hardware specifications, and using cutting edge technology.



From this graph we can see a rough distribution of the age of hardware used at campus and community radio stations. There are some patterns that we can begin to see from this. Firstly we can see that transmitters, and mixing boards are skewed towards being older, computers are skewed towards being younger, and that recording equipment has a rough standard distribution. It is important to note however that this is a relatively small sample size, and may not accurately represent the age of equipment across the entire campus and community radio sector due to the responses in this survey coming mostly from larger stations.

TECHNOLOGICAL CHALLENGES

Software on the other hand normally stops receiving support as it gets older, is replaced by newly developed software, or software updates can become too costly resulting in stations using older versions. In addition, older software can be incompatible with newer hardware, and operating systems. As software continues to run for extended periods of time the likelihood of an error occuring increases.

Inadequate Commercial Solutions

Many 'out of the box' technical solutions do not meet the requirements of stations. This leads to stations relying on a patchwork of commercial, free, and open source software. For some challenges conventional commercial solutions are not feasible for campus and community radio stations as they have different specific requirements, or have an unreasonable price price point for both initial purchase and maintenance/licensing.

Historically, campus and community radio operates at a lower technology integration then commercial radio. Broadcasters in commercial radio are trained to use advanced level and highly sophisticated software solutions for automation, scheduling logging and reporting. These are typically developed as a package solution and are often very expensive. This means that campus and community stations are forced to pick and choose from solutions that are not designed for non-technologically focused or trained broadcasters.

An example of a specific solution that campus and community radio stations are looking for is a digital logging system for CRTC, and SOCAN logs. Several campus and community radio stations have developed their own solutions for this problem. As each campus and community operates differently, and vary in size this undertaking of developing a digital logging system affects campus and community radio stations differently. Some of the NCRA/ANREC's member stations that have technically inclined individuals have been able to develop their own solution to this problem, however many stations still still rely on creating physical logs.

Hardware/Software Reliability

The reliability of hardware, and software can also be a technical challenge at times. This can be due to the hardware/software failures, a lack of maintenance, or hardware/software being outdated. Any of these can lead to failure of the hardware/software which could mean downtime, data loss, security breaches, etc.

Hardware reliability issues can normally expected to appear as hardware ages, or if software with higher hardware requirements is in use. Newer hardware is unlikely to have reliability issues unless it is installed incorrectly or has defects. For instance a computer's normal life cycle would have organizations replacing a computer 4 to 5 years after being purchased. Additionally depending on hardware requirements for software, this can cause software to run slowly, use every available resource, or function unexpectedly.

TECHNOLOGICAL CHALLENGES

Commercial software on the other hand can have issues with stability that cannot be resolved solely by a radio station. This is due to software having bugs that need to be corrected within the code by the developers. As radio stations normally run software for extended periods of time with little downtime this can lead to software not updating regularly. These two factors can lead to failures which cannot be resolved without external input or restarting the program, and could create issues if not addressed.

In addition a general lack of maintenance, and using outdated hardware/software can cause unexpected financial costs over time. This is because the impacts the productivity of staff and volunteers using older technology. A survey performed by Robert Half Technology (Robert Half Technology 2016) stated that employees working in an office can be spending 22 minutes daily dealing with IT-related issues which can add up to 91 hours per year. Without the proper maintenance, and replacement of hardware/software this time can increase over time.

Budget

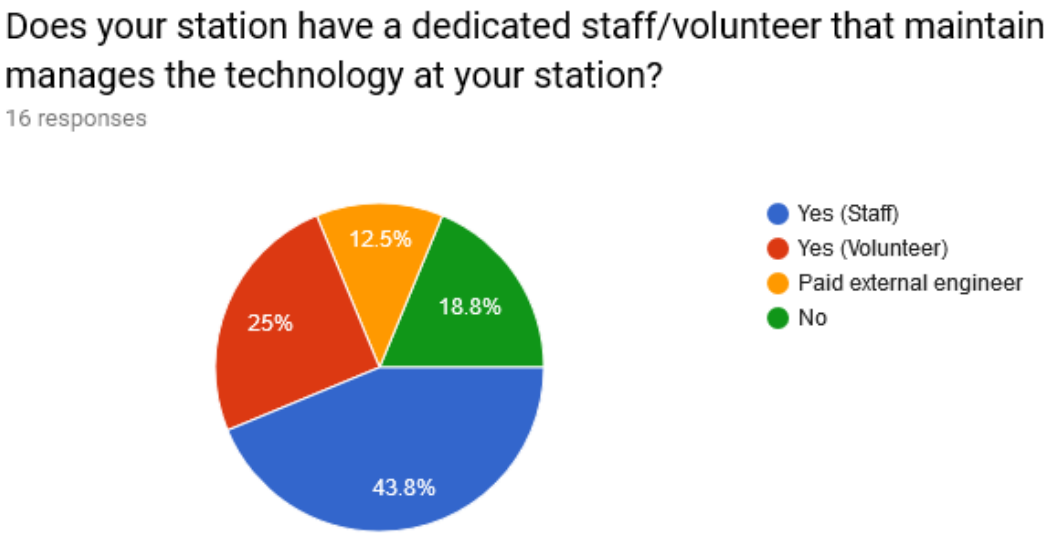
Many of the NCRA/ANREC's member stations have a limited budget for their technological needs, and can be limited in their buying capabilities. When asked member stations estimated that between 5% to 10% of their annual budget was spent on technology. We completed calculations using data shared with us from member stations from the 2017 CRTC annual returns: the NCRA/ANREC has estimated that this average to be between 7% to 12%, higher then what stations self-reported. This could be due to the fact that emergency purchases often are beyond the budgeted financial amount as stations struggle to meet their financial obligations and as a result often under-budget were possible. Additionally the NCRA/ANREC calculated that the mean technology budget is $12,608, and the median is $5,907. This budget can cover items such as buying equipment, equipment maintenance, service fees, and staff/external engineers depending on what a station considers to be a technological expense. For stations that do not have the budget to replace hardware, or software can use an increasing amount of paid labour instead to maintain their systems.

As the NCRA/ANREC's member stations are not-for-profits the costs associated with buying new equipment/services can be a challenge for many stations looking to upgrade their systems. This challenge impacts smaller community stations more as the annual budget at these stations is smaller than their larger counterparts. The majority of stations operate on a break-even format, with close to 1/3rd losing money (as reported in the shared data from the 2017 CRTC annual returns).

TECHNOLOGICAL CHALLENGES

Staff and Volunteer Technology Management

Within campus and community radio stations there can be a single individual managing technology. Some stations do not have anyone that focuses on the management of technology at their station. This individual can range from a staff member, volunteer, or an external paid engineer. With a single individual managing technology they can be required to work additional hours of work to resolve technical issues. From the 2018 membership survey 40 stations responded to questions about technologically focussed staff. Of those 40 respondents 20 stated that they have staff focused on technology, and 20 indicated that they do not have anyone focused on technology. Of those that have staff focused on technology 76% were male, 23% were female, and the average pay was $27,000 annually. From the technology survey the NCRA/ANREC found that 81.2% of those stations had some sort of staff focused on technology; However this value may be additionally skewed due to the survey being sent to stations that stated they would be interested in participating in a technological survey.



Also to note, there are fewer schools offering technical broadcast training as an education opportunity, and therefore there are less people working in the broadcast technical field. Only two are in Canada. Many broadcast technicians are aging and are expected to leave the market. This makes it difficult for stations to access highly technical solutions and increases the potential for further technical problems down the road when equipment is not installed correctly, maintained or replaced properly.

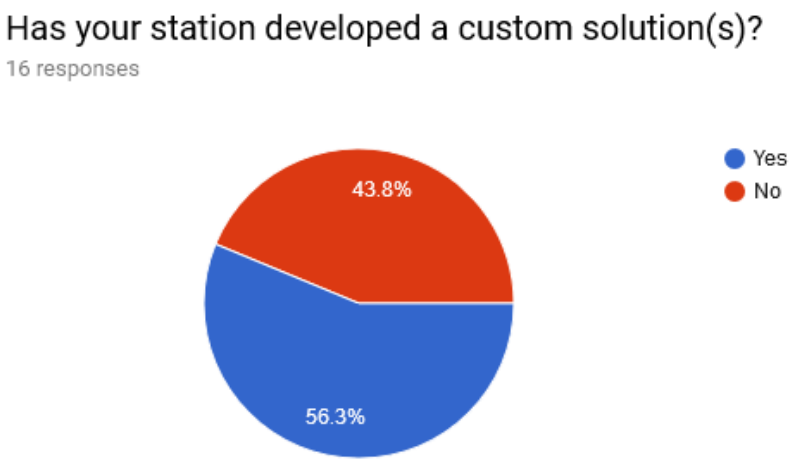
TECHNOLOGICAL SOLUTIONS

Technical Solutions

While campus and community radio stations face technological challenges there can be existing solutions that can meet the requirements of stations. These solutions can range from existing commercial solutions, custom station built solutions, solutions built by the NCRA/ANREC, etc. Finding some of these solutions can be as simple as performing research into commercial solutions that meet the need of stations while other solutions can require input from outside consultation companies. Some solutions can require additional work by the stations to adapt them to their needs..

Custom Solutions

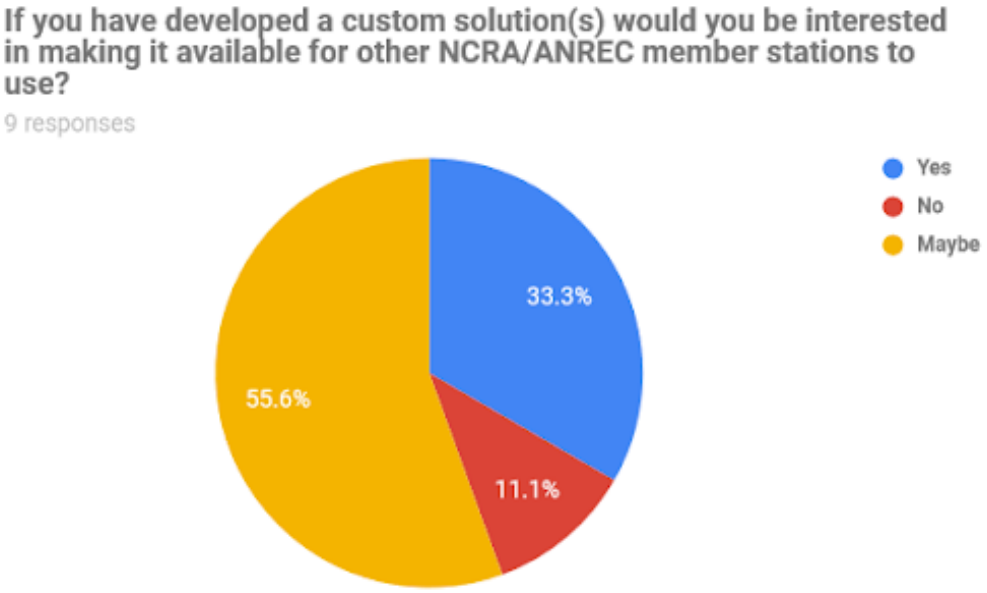
At this moment in time there are several solutions that have been developed by member stations. These solutions were developed to solve a technical challenge that they could not find a commercial solution for. There are a couple reasons for a station to develop a custom solution such as saving money, no other solutions exist, or an existing solution does not provide the specific functionalities that a station needs. Some examples of custom solutions that stations have developed themselves include music databases, studio/transmitter link, studio clock, audio logger, emergency alert relay box, show archiving, show streaming, extensions for existing software, and data backup systems. From the technological survey the NCRA/ANREC found that 56.3% of respondents had developed some sort of custom solution.



A common solution that has been developed by several different member stations is a digital CRTC and SOCAN logging system. It is worth noting that the CRTC and SOCAN logs are a legal requirement, however there is no standard form for recording those logs. From several solutions that the NCRA/ANREC has seen they have been designed to be accessed through a web interface, and the logs are stored internally for future reference. Three stations that have developed software like this that the NCRA/ANREC knows about are CHUO-FM, CFUR-FM, and CHYZ-FM for example. Another common solution that stations develop are extensions that integrate with a commercial software solution to meet a specific need for a station that the software does not support natively. One example of this is known as Airtime_Eh which was developed by a former NCRA/ANREC member station that adds a metadata field for CRTC requirements, compendium management for shows, and a wordpress integration of show history to SourceFabric Airtime.

TECHNOLOGICAL SOLUTIONS

During the technology survey the NCRA/ANREC asked stations if they would be interested in sharing solutions that they have developed with other member stations. From the graph seen below there was not a decisive decision. While it does lean towards stations being interested some additional information that stations provided as to why they wouldn't be interested were that their solutions were old, unreliable, or that the station would not be able to share their solution at this moment in time.



Hardware/Software Reliability

To increase the reliability of hardware/software there are a couple of methods that can be used. The first method is to perform maintenance at regular intervals. This can include cleaning the interior hardware of computers, updating software/operating systems, keeping drivers up to date, replacing failing parts, etc. When dealing with software most updates can be scheduled to update automatically which could allow for updates to be scheduled at night when it would affect the stations to a lesser degree. The second method would be to setup redundant systems so that if a failure occurs operation can continue while a fix is being implemented. This can be a costly solution as it requires additional equipment. The last method would be to implement a hardware lifecycle replacement plan. This would be a procedure that would replace older hardware after a set amount of time. As mentioned in the technical challenges section the normal life cycle for a computer is around 4 to 5 years as hardware improves, and software requires more resources.

The software market is also changing how they develop, and provide software that may be of beneficial to campus and community radio stations with regards to reliability. Within the past couple of years companies have been moving away from the one time payment model for software, and towards a software as a service (SaaS) model. Garter has estimated that by 2020 up to 80% of existing software solutions and that all new developed software will be offered as a

TECHNOLOGICAL SOLUTIONS

SaaS (Gartner 2018). This can have several advantages, and disadvantages that may affect radio stations decision when choosing a solution. The main advantages of SaaS are that the software is usually hosted on the developers servers, and that they continues to receive updates/support as it ages. The main disadvantages would be that as the software is hosted on the developers servers which would prevent member stations to develop customized extensions to fit their needs, and that an annual budget would need to be introduced to cover the recurring costs.

SaaS also uses a subscription payment plan instead of a one time payment. Depending on how the software is priced SaaS can end up causing a station to spend more, or less money to use the software. An example that would affect broadcasters would be Microsoft office 365 is offered at $10.50 per user per month for their business edition, and $3.60 per user per month for their not for profit edition. Compared to Office Home & Business 2016 which uses a one time payment method is offered at $299.00 per computer.

Software Solutions

Logging Software

During the NCRA/ANREC's 2018 membership survey the NCRA/ANREC asked for information about software used by stations with regards to how it helps them meet the needs of a CRTC report. These needs included how scheduling/automation software helps stations meet music regulatory requirements, and generate a list of music played. While many of these solutions can provide a logging solution they are not used for live shows. This is because while the software can track what it has played from it's playlists/databases, but it cannot track what a host is playing depending on the source of the music. Because of this show hosts still have to log what they have played during their show manually. This is either performed by pen and paper, or by an electronic solution usually developed by the station. It is important to note that different stations have different requirements based on how they manage CRTC and SOCAN logging requirements for audio and written logs. Therefor, it is difficult to recommend a single, unified log or logging solution that meets the needs of all stations.

Scheduling Software

Scheduling software is used by radio stations to play music when a live show isn't on air. Most of these options allow broadcasters to designate music as a certain category that is designed to be pulled from at a later date. Below is a list of some scheduling software that the NCRA/ANREC is aware of that campus and community radio stations use.

SAM Broadcaster, Music 1, Radio DJ, StationPlaylist Creator, Radiologik Scheduler, Natural Log, OTsAV, Airtime, Megaseg, RSC Zetta & GSelector, Radio Boss, OpenBroadcaster, Rivendell Radio Automation, Selector

TECHNOLOGICAL SOLUTIONS

Automation Software

Automation software is usually used in conjunction with scheduling software to play music during a stations downtime. These periods of downtime often occur overnight, during the weekends or when programmers are unable to make it to their show. During these periods of time the automation software can log what has been played through the various systems. Depending on the requirements set by the station the automation software can be used to pull music from specific categories set by the station this helps them address CRTC regulations, which are sometimes difficult for those who schedule the programming to know exactly what is mandatory or what categories are under-serviced on a week to week basis.Below is a list of some automation software that the NCRA/ANREC is aware of that campus and community radio stations use.

iMediaTouch, SAM Broadcaster, My Radio DJ, OTS 1.85, Megaseg, Radio Boss, Radiologik, Airtime Pro, DAD Presenter, RSC Zetta & GSelector, StationPlaylist Studio, Audio hijack, OpenBroadcaster, Rivendell Radio Automation, DirEttore, Winamp, OMT Technologies, Station Playlists

Event App vs Conference Guide

The National Campus and Community Radio Conference has been documented through a physical handbook in the past. In recent years people have been suggesting and using smart device applications to fulfil the same purpose. With levels of smartphone users in canada reaching over 25 million (Number of mobile phone internet users in Canada from 2015 to 2020 (in millions)in 2017, the need for physical documentation is reducing. Event apps such as EventBoard, Webmobi, 10Times Events App, BusyConf, EventMobi, Whova, etc, offer instant updates, easy ability to add notes or share documentation and include gamification (where participants interact more in order to gain points). These apps have become more popular, and are becoming a preferred/accepted alternative to physical handbooks in many cases.

NCRA/ANREC developed solutions

In addition to member stations developing their own solutions the NCRA/ANREC has been developing technical several solutions as well. Within the last year the NCRA/ANREC has been working on the development of a podcast network, PSA network, and the !earshot Digital Distribution System. These solutions were designed to meet the needs to the NCRA/ANREC's member stations that they could not otherwise develop themselves, or find a feasible solution.

Podcast Network

The Podcast Network was recently launched in 2018.. The Podcast Network was designed to create a central location where programming can be found in a podcast format. Of 700 hours of original content created by the NCRA/ANREC's member stations, less than 5% gets created into a podcast format. The NCRA/ANREC Podcast Network has two key features. Firstly it is a

TECHNOLOGICAL SOLUTIONS

location for programmers at member stations to upload using the Community Radio Exchange, and store programs which generates a RSS feed. Secondly a plugin is fed the RSS feeds that pulls programs, and allows people to download/stream the content.

PSA network

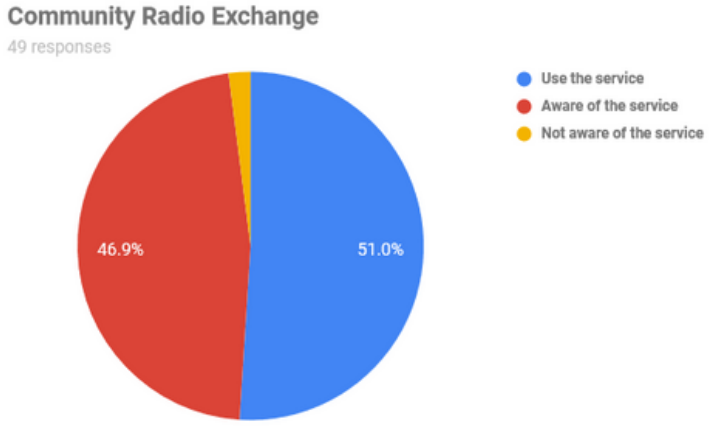
The PSA Network is in the early phases of development. It is being developed as a tool for the sharing, and creation of national public service announcements to the NCRA/ANREC's member stations. Many of the NCRA/ANREC members had indicated to the NCRA/ANREC that there was an ongoing need for high quality PSAs. This initiative includes an update to the Community Radio Exchange and the member's only website for the distribution of the PSAs to the stations. Additionally a public facing website for national not-for-profits, and charities is available that allows them to view key information. This initiative has already seen initial success with a campaign from the White Ribbon.

!earshot Digital Distribution System

The !earshot Digital Distribution System (!eDDS) is an online database where the Canadian music industry, and independent artists can upload their music. Once uploaded campus and community radio stations can search, review, and download music to be broadcast within their local communities. The !eDDS is currently under development, but is available to be used by the Canadian music industry, and campus and community radio stations. The NCRA/ANREC is planning to make the !eDDS available to Alliance des radios communautaires du Canada (ARCC), and Association des radiodiffuseurs communautaires du Québec (ARCQ). The !eDDS will allow the Canadian music industry, and independent artists to reach more campus and community radio stations at a reasonable price once fully launched. ARCC and ARCQ, and their member stations are not likely to start using the !eDDS until it is available in French which will be developed with the coming phase of development. The app has had two phases of development over 2017 and 2018, with a third phase needed and expected to be completed in 2019.

Community Radio Exchange

The NCRA/ANREC's Community Radio Exchange is way for radio producers to share their programs with other member stations. It is also a great location for radio stations, and programmers to find programming to broadcast. Developed by and exclusively for the NCRA/ANREC in the early 2000s and updated in 2016, the exchange hosts approximately 40 hours of original programming each week.



TECHNOLOGICAL SOLUTIONS

THE COMMUNITY RADIO EXCHANGE

MADE IN CANADA / FABRIQUÉ AU CANADA

community radioExchange
The National Campus and Community Radio Association

A sharing platform for community radio programing!

www.exchange.ncra.ca
Sign up now! For Free

Sort View by Series, Program, Language or Producer

Under 'My Account' you can download your 'download log' which tells you all the stations who have downloaded your show!

Filter by a number of different factors, such as genre, length and program date and type

Easy to use & great help guides! Just ask True North

Top choice for Canadian Community Radio, with over 7,200 episodes!

Check out our over 260 Distinct Series! Such as Ear Candy!

Some shows have a large back catalogue such as Amplified Radio which has over 60 past episodes available!

Use the Search Function to find a specific show or such as The Velvet Studio!

Producers can upload their own show logos or graphics to help build a stronger following! Check out Cheeze Pleeze!

You can upload shorter clips, such as interviews, PSA's and other useful content!

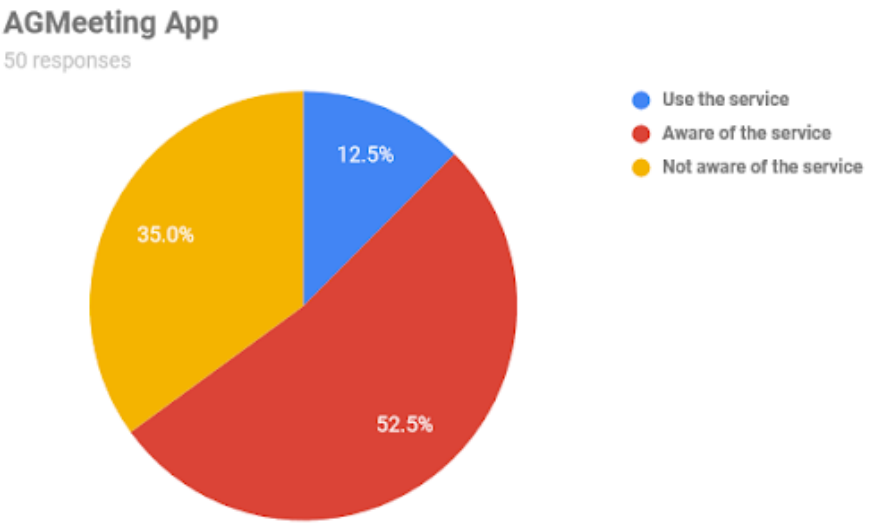
The National Campus and Community Radio Association is one of Canada's national associations for community and campus broadcasters representing over 95 licensed stations!
The Community Radio Exchange is one of many services offered by the NCRA to members

TECHNOLOGICAL SOLUTIONS

AGMeeting App

This application was created by the NCRA/ANREC to help members stations have an improved, and more effective annual general meetings from 2016 onwards. This app was designed to facilitate Robert's Rules of Order for meetings, and is available to the NCRA/ANREC member stations to use freely. However as the NCRA/ANREC is an association that focuses on the campus and community radio sector, the NCRA/ANREC is looking for someone who has an interest in developing the application to take over this project. The app allows for remote participation, records its own minutes, and smoothly aids in the facilitation of the meeting process. Some of AGMeeting App features include:

- Most Robert's Rules of Order integrated into an online system
- Remote participation over any mobile or internet-equipped device (SmartPhone, Tablet, Computer, etc.)
- Multiple types of voting (for/against or selecting X of X number of candidates)
- Timing, archiving, and restricting settings that can be customized (E.g. how much time for a vote, how many times a person can speak, etc)
- Real-time notifications, and sharing of content through vault and archive system
- Real-time communication with built-in chat network between participants, and the administrator/moderator (not participant and another participant)
- Secure login
- Real-time statistics of people logged in, people ready to vote etc.
- Automated generation of minutes
- "Lite" version for voting only, no motion or second
- Templates for AGM, Meeting or Custom built-in and saveable.



NCRA Members-Only website

The NCRA/ANREC members only website allows member stations to find information around governance, regulation, compliance, services, training, and the wiki. This information allows for stations to find specific subject matter that they are looking for. Some technical information that

DEVELOPMENT OPPORTUNITIES

is hosted on the website includes: new technologically regulation information, a significant number of technology wiki entries, and lists the technical solutions developed by the NCRA/ANREC. These are intermixed along with other non-technical information throughout the website based on the type of information being presented at the source. There is no dedicated space for technical discussion.

Technical Master Skeleton

One solution that was developed by the NCRA/ANREC and the technical advisory committee (TAC) was the TAC Master Skeleton (https://go.gliffy.com/go/publish/9679469). The TAC Master Skeleton is a map of technological solutions that are expected to be at a station, and how they connect to one another. While a couple of specific solutions are mentioned the TAC Master Skeleton it provides more of an idea of how technology at a station is layed out overall.

Technical Advisory Committee & Technical Mailing List

In 2015, the Technical Advisory Committee (TAC) was put together to help NCRA/ANREC with sector-wide technical solution that come from members. It consists of about 20-25 members from across the NCRA/ANREC Membership network and includes various levels of technological skill, and background. The committee helps by reviewing various issues or ideas that are brought forth by the NCRA/ANREC Staff, or Board of Directors. For example, it was the first place which offered feedback to the !earshot Digital Distribution System. The technical mailing list is a place for NCRA/ANREC members to share questions or concerns about technical issues. Any member on the list may share information. It is used a few times each month and can be very helpful when it comes to solving local solutions which the NCRA/ANREC office does not have expertise on. It has been operational for the last 15 years, and often is dominated in discussion by a few key players. Uninformed members will often post to the generalized mailing list with technical questions or comments, possibly unaware there is a dedicated list.

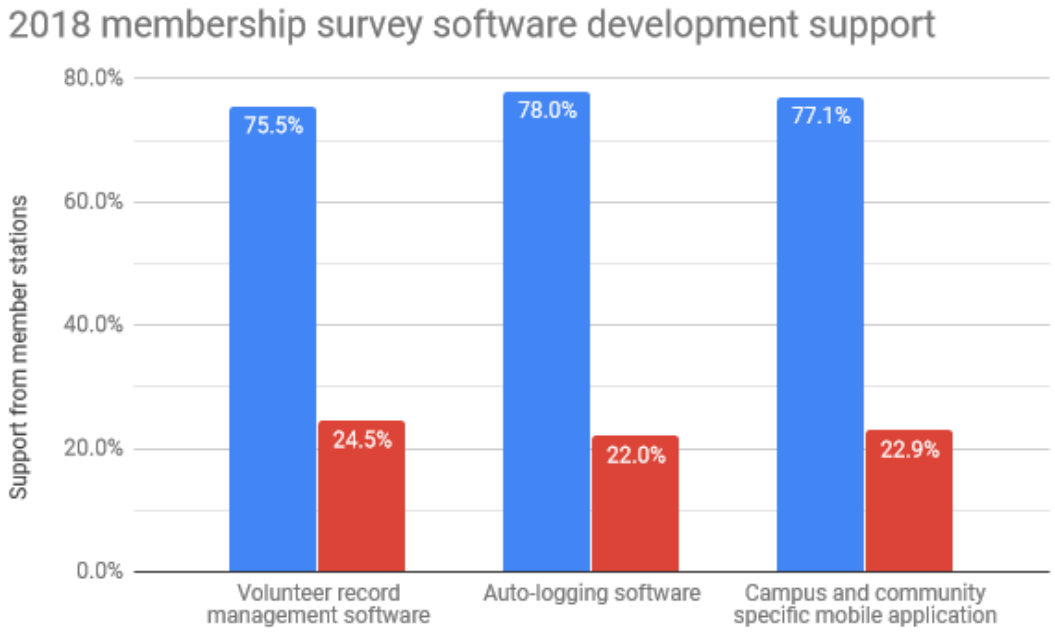
Development Opportunities

Within the last couple years the NCRA/ANREC has been looking to developing technical solutions that meet the needs of its member stations. One example of this would be the development of the !eDDS mentioned above. Looking towards the future the NCRA/ANREC has been looking into possible development opportunities such as software development, knowledge sharing, and service development. Software development would be focused on developing software for specific challenges of campus and community radio stations. Knowledge sharing would be developing solutions that allow stations to share technological information between member stations of the NCRA/ANREC. Finally service development would be focused on finding companies willing to provide their services to the NCRA/ANREC's member stations with a discount.

DEVELOPMENT OPPORTUNITIES

Software Development Opportunities

During the NCRA/ANREC's 2018 membership survey the NCRA/ANREC asked for input on three development opportunities, and if member stations supported each idea. The three suggested development opportunities were a volunteer record management software (75.5% support), an auto-logging software (78.0%), and a campus and community radio specific mobile application (77.1%). When looking into possible solutions for these challenges, the NCRA/ANREC would consider finding a current commercial solution and try to make a deal for access, find a solution that can be modified to meet the needs of the NCRA/ANREC's member stations, or develop a solution from scratch. For any solution that the NCRA/ANREC would be looking to develop would occur after the development of the !eDDS has been completed due to budgetary constraints.



Auto-logging Software

The first option would be an auto-logging software received the most support it will be the first solution to be looked at by the NCRA/ANREC. This software would look to automatically track what songs have been played during a shows runtime. Such a software would need to be able to connect to a stations song database to allow it to pull the appropriate information for each song. Currently an individual from one of the NCRA/ANREC's member stations has developed a solution that could potentially be used, however it requires more development before it would be usable by stations. NCRA/ANREC staff also met with SOCAN in 2018, and proposed a possible solution for logging of content for royalty purposes.

DEVELOPMENT OPPORTUNITIES

Mobile Application

The second option for developing software would be a mobile application specifically designed for campus and community radio stations. An example of this development opportunity was proposed by SmartTones Media which would be a campus radio app that would allow each station to have its own independent app that would be housed in the aggregate app. Individuals that download the app would be able to select a station as their favourite, and be able to discover shows from other stations. The intention of a specific campus and community radio app would be to make campus and community radio more social, and interactive.

Volunteer Record Management

The last option the NCRA/ANREC explored for developing software within the near future would be a volunteer record management or similar customer relationship management software (CRM). This CRM would most likely be an existing solution with modifications made to suit the needs of the NCRA/ANREC, and it's member stations. The NCRA/ANREC needs to perform more research into the large variety of CRM solutions to find one that meets the requirements, and can be customized. A trial currently being used by several members stations was started in 2018, and is a current ongoing project.

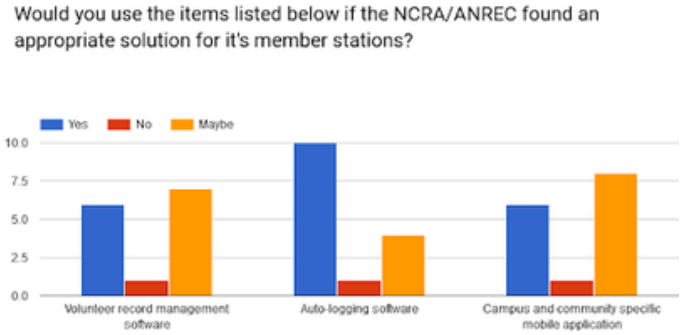
Other Development Areas

Other areas identified for possible development though the Membership Priority Survey 2017/2018 and Open Space include:

- Storage and Archiving,
- Volunteer Record Management,
- Streaming Software,
- Scheduling Software

Software Development Follow-up

From the technology survey the NCRA/ANREC asked stations if they would use the three solutions noted above if the NCRA/ANREC were to develop them. From the responses support for an auto-logging software received the most support. For a mobile application, and volunteer record management software the response was more mixed, and the NCRA/ANREC will need to gather more information to determine what the next steps for these development opportunities would be.



DEVELOPMENT OPPORTUNITIES

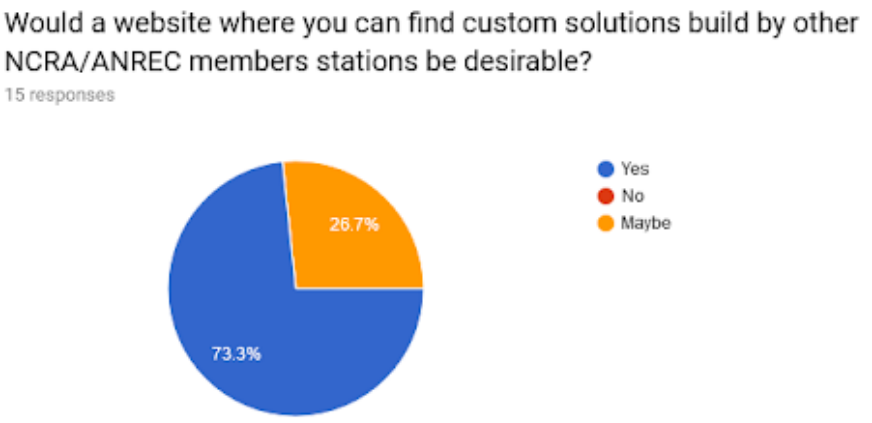
In the future when developing software the NCRA/ANREC should look to develop under an open source license. The NCRA/ANREC is looking at this possibility as member stations have stated trying to create an entire all in one software solution that meets the needs of every member stations is beyond the capabilities of the NCRA/ANREC, and is an unrealistic goal. Developing under an open source license would allow the NCRA/ANREC to develop a software solution with the basic functionalities, and allow member stations to develop addition functionalities to meet their specific needs. Any additional functionalities that are developed by member stations will be required to be under an open source license as well, and will allow other members to use, and modify the code as needed.

Knowledge Sharing

One way for the NCRA/ANREC to promote technical knowledge sharing would be to create online solutions where member stations can share, review, and discuss various technical challenges/solutions. Currently the NCRA/ANREC provides a mailing list for it's member stations where members are using it to discuss technology in general. While this is a good step towards knowledge sharing between stations there are several possible opportunities that could allow for further knowledge sharing. The four ideas that the NCRA/ANREC is looking to cultivate are a custom station solution sharing platform, a technology review platform, technology best practices, and a technical forum for members.

Custom Solution Sharing Platform

The first solution would allow member stations to share custom developed solutions. This was mentioned above in the technical solutions sections, but did not show a decisive amount of support. However from another question in the same technology survey there was support shown for a solution sharing platform. For this solution each member station would need to submit their solution to make it available for other stations. This site would only provide information about the solution such as a description of what it does, what station has developed it, and who to contact for more information. With this solution the NCRA/ANREC would not store be looking to store the specific solution to distribute, but rather provide a platform when these solutions can be displayed.



DEVELOPMENT OPPORTUNITIES

Technical Forum

The last solution would be to expand and highlight a technical forum for the NCRA/ANREC's member stations. This forum would be added on to its own section of the members only website. A technology forum would aim to promote discussion around technology, technological challenges, and archive discussion for future reference. If the NCRA/ANREC develops a technical forum the ability for stations to share their custom solutions may be included within the forum structure. While the NCRA/ANREC already operates a mailing list there are several benefits of having a forum specifically for technology when comparing the two. The main benefits that a forum provides over a mailing list are that all member stations will have access to the forum, the history of previous conversations can be easily found, topics are grouped together, and that forums are pulled by individuals that allows them to use the forum when they want.

Additional Proposed Solutions

Technical Training/Reference Material

Creating training/reference material specifically for hardware/software would be available for the NCRA/ANREC's member stations, and allow stations that do not have a technically trained individual to train staff/volunteer. Training material would be developed by the NCRA/ANREC, or by staff/volunteers at member stations. Once developed the training/reference material would be hosted on the members only website as a wiki.

Another option that was suggested by member stations would be to find a grant that allows technical individuals to travel to other radio stations to share their knowledge. During this time staff would be able to exchange information, train staff/volunteers on how to maintain systems, and provide technical assistance if needed.

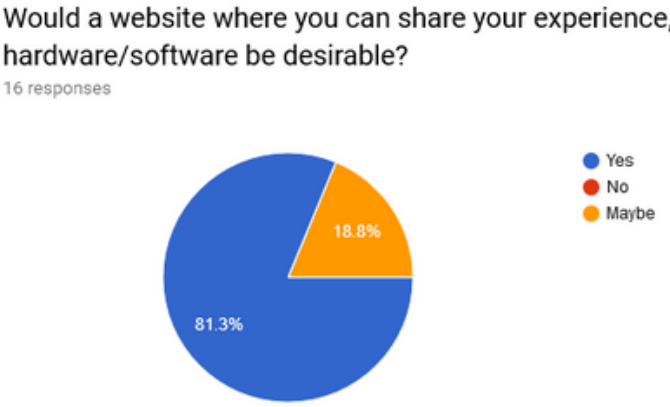
Software Discounts

A current solution that the NCRA/ANREC is providing is through discounts for services for member stations. These discounts have allowed member stations to gain access to services that they wouldn't otherwise use, or be able to afford. Several services that the NCRA/ANREC has been able to receive discounts for its member stations are iHeartRadio, RadioPlayer, Fitzii, and etc. As NCRA/ANREC staff discover services that members could use as a group, they should continue to check with members around interest and attempt to secure discounts. Promotion and awareness of any service that is provided in this fashion should be done though an annual or biannual direct email to members, as well as promotion in the newsletter and membership benefits packages set when renewing membership fees.

DEVELOPMENT OPPORTUNITIES

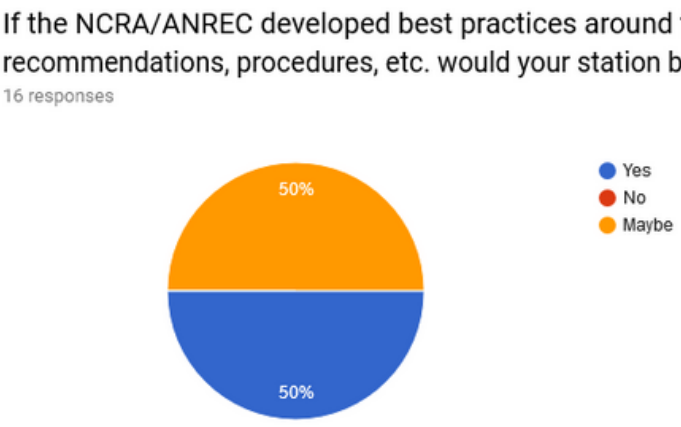
Technology Review Platform

The second solution would allow member stations to review different technical solutions needed to operate a radio station. For this solution member stations will be able to create a post for a specific hardware, software, or service. Posts would include comments from the reviewer, score, the specific solution, and miscellaneous information. Once a post has been created other individuals can provide their own input, and review on the specific product. This will allow members to find information about a variety of different technical solutions from the experience of other member stations. Responses from stations with regards to this idea have been positive, and has received a good amount of support.



Best Practices Development

The third solution would be for the NCRA/ANREC to develop best practices surrounding technology that could be adopted by member stations. To develop best practices the NCRA/ANREC would need to research, and consult with member stations to determine what the best practice should be. When asked during the technology survey if stations would adopt best practices put forth by the NCRA/ANREC it received a mixed reply compared to the previous two solutions. From the graph that you can see that stations did not oppose adopting best practices developed by the NCRA/ANREC, but it may be on a case-by-case basis.



DEVELOPMENT OPPORTUNITIES

Collective Purchasing Group

The NCRA/ANREC will soon be looking to work with its member stations on the possibility of collective purchasing that would enable a group of stations to purchase equipment in bulk allow for member stations to save money. This would provide stations with a way of purchasing recording equipment, broadcasting equipment, and parts at a lower cost. To start this project, and iron out the details the NCRA/ANREC will be creating a committee of interested member stations to explore the possibility of such a collective entity.

Setup Software Package

One suggestion that member stations of the NCRA/ANREC provided during the 2017 National Campus and Community Radio Conference (NCRC) was the creation of a setup package that would provide new stations with basic software solutions. This software package would allow newly formed campus, and community radio stations to have access to the basic software needed to operate a radio station. Developing a such setup package would need time to find the appropriate software, consult with member stations, and put the software package together.

CONCLUSIONS & RECOMMENDATIONS

Conclusion

As adoption of technology increases at campus and community radio stations they face an increasing amount of technological challenges. Without properly addressing these challenges campus and community radio stations can have issues running efficiently, meeting requirements, or experience technical failures. While there are solutions for some challenges there is still opportunities that can be explored by the NCRA/ANREC to help campus and community radio stations deal with technical challenges. With guidance from technical individuals from the NCRA/ANREC's member stations the NCRA/ANREC will continue to look for development opportunities to that meet the technological challenges that campus and community radio stations face.

Recommendations

1) Continue to provide forum for member stations that allows for discussion of specific topics, and allows member stations to easily view previous discussions. Encourage stations to use the technical-list@ncra.ca account and document the stories in the Members' Only Website

2) When developing software in the future the NCRA/ANREC should adopt an open source license when developing software to enable member stations to develop extensions to meet their own specific needs.

3) Develop software to meet the needs of campus and community radio stations that commercial software can't meet. Once the !eDDS has completed development the NCRA/ANREC should focus on the development of an auto-logging software, followed by a campus and community specific mobile application. Continue to include the question of development needs of software in the Membership Priority Survey and adopt as necessary into our strategic plan.

4) Follow up with the development individual with regards to a potential auto-logging software solution

5) Follow up with SOCAN and the CRTC with regards to the proposed solution for logging content

6) Follow up with the volunteer record management trail that is currently ongoing.

7) Continue to seek feedback from the Technical Advisory Committee, and Technical mailing list with reference technology at campus and community radio stations.

CONCLUSIONS & RECOMMENDATIONS

Recommendations

8) Adopt a digital event guide for use during the NCRC

9) Look into the feasibility of creating a collective group to purchase software/ hardware in bulk for member stations.

10) Continue to look for organizations willing to provide software to member stations at a discount.

11) Expand the technical wiki on the members only website. Additional information such as guides, reference material, training material, best practices, etc could be added.

12) Develop best practices for technology that can be adopted by campus and community radio stations. These best practices should be made available on the members only website once they have been developed.

13) Start development on a starter software package that would allow new campus and community radio stations to get access to basic software for broadcasting.

14) Attempt to sell or off-load the AGMeeting app for further development or financial income.

15) Complete development on !earshot Digital Distribution System and use a portion of the earnings for further software development.

16) Make sure the NCRA/ANREC provides a technical opportunity to connect for new and seasoned technical people though its Strategic Learning and Development Plan's Mentorship Program.

17) Include technical trainings and a place for technical minded people to collaborate at the NCRC, and Station Manager Summit on an annual basis. Research opportunities for regional or technical specific conferences for people to attend.

18) Share technical summits or gatherings with the technical-list@ncra.ca as they are announced

19) Share more findings on technical changes with the technical-list@ncra.ca, including new or interesting stories. Capture discussion for Members' Only website.

20) Explore providing webspace for members at a reduced rate.

CONCLUSIONS & RECOMMENDATIONS

References

Robert Half Technology 2016, Wasted Workday: Employees Lose Over Two Weeks Each Year Due To IT-Related Issues, accessed August 2018, <http://rh-us.mediaroom.com/2016-03-22-Wasted-Workday-Employees-Lose-Over-Two-Weeks-Each-Year-Due-To-IT-Related-Issues>

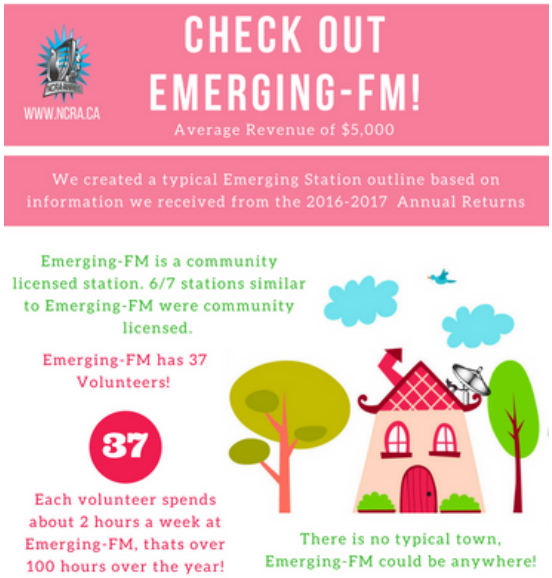
Gartner 2018, Moving to a Software Subscription Model, accessed August 2018, <https://www.gartner.com/smarterwithgartner/moving-to-a-software-subscription-model/>

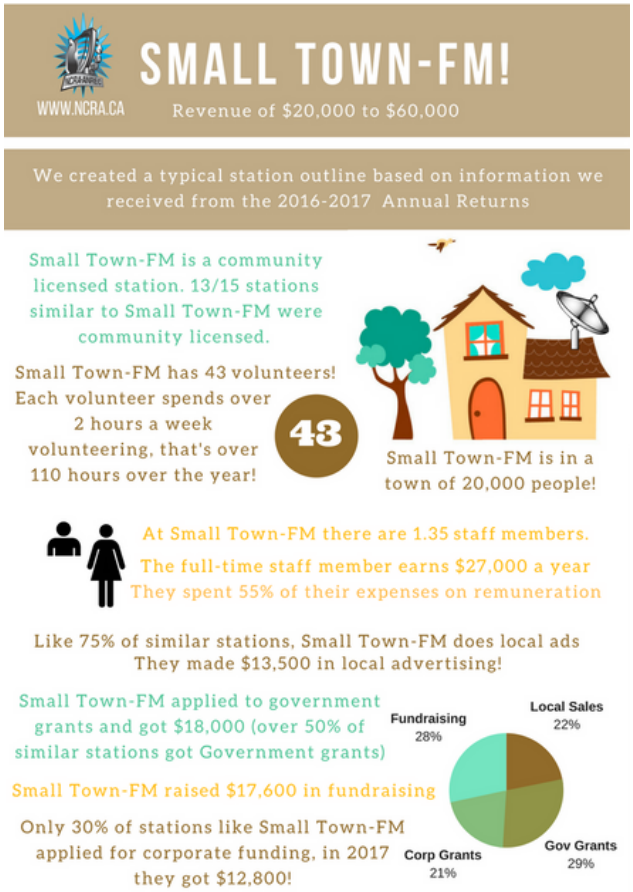
2017, Number of mobile phone internet users in Canada from 2015 to 2020 (in millions), accessed August 2018, <https://www.statista.com/statistics/482507/canada-mobile-phone-internet-users/>

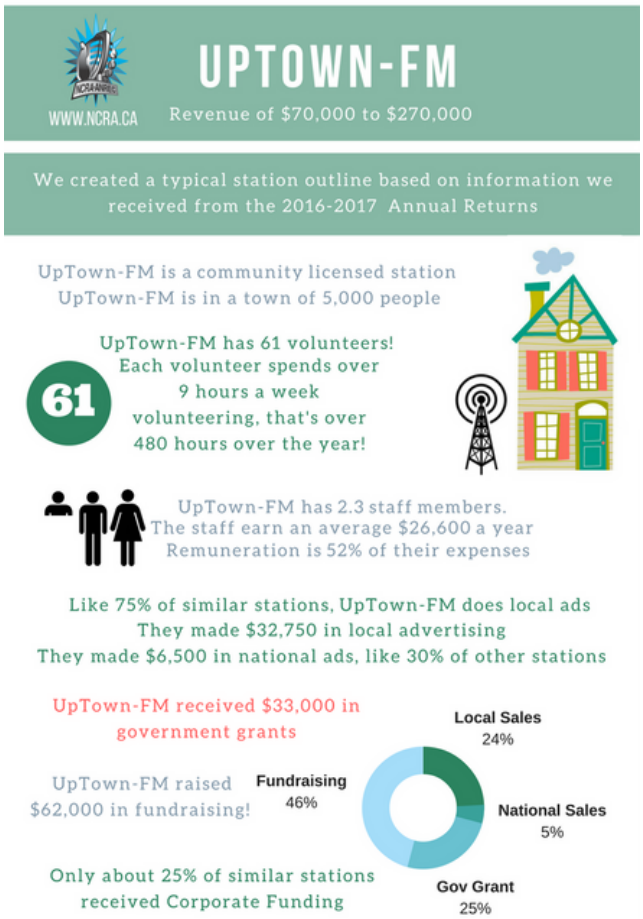
The Shortage of Broadcast Engineers – is there, or do we just need to know where to look? 2012 <http://www.sbe.org/sections/documents/ShortageOfBroadcastEngineers.pdf>

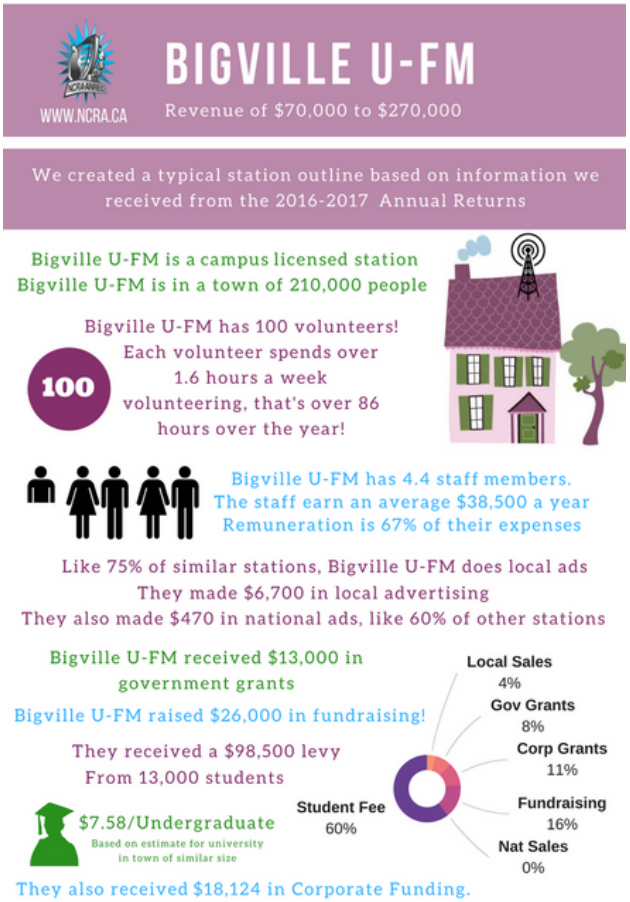
CONCLUSIONS & RECOMMENDATIONS

Appendix A - Typical Stations



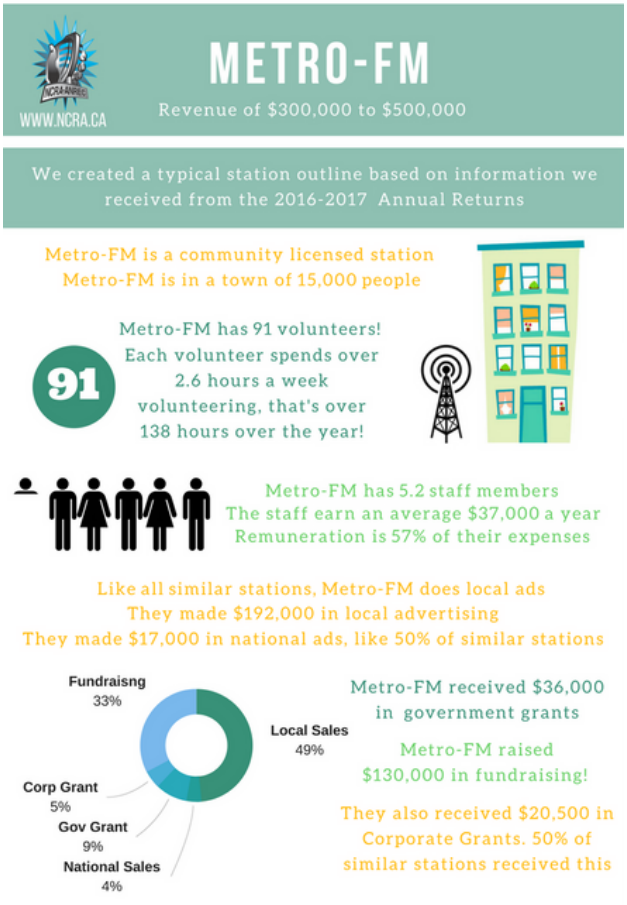


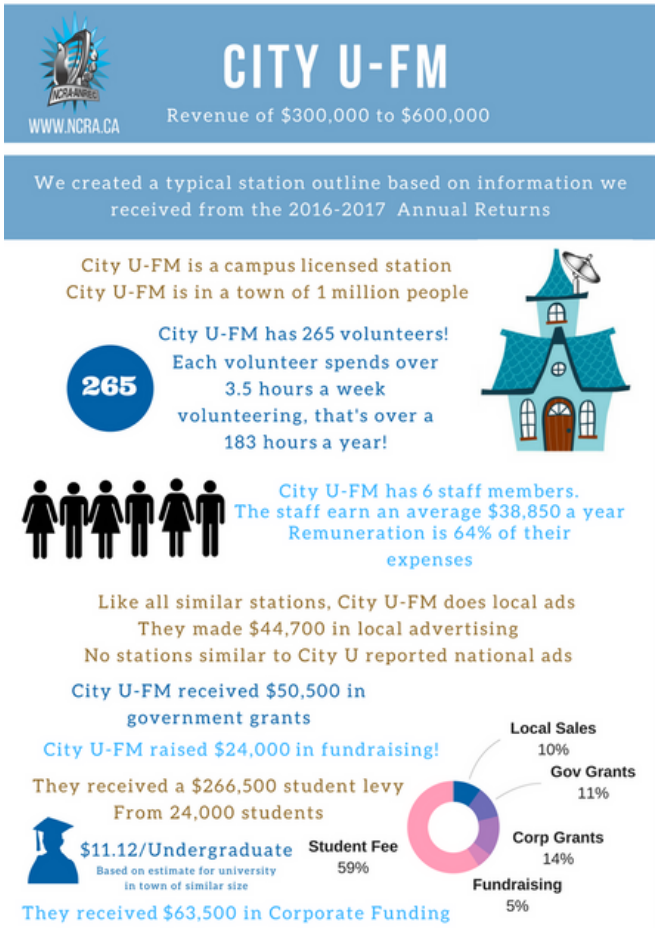




CONCLUSIONS & RECOMMENDATIONS

Appendix A - Typical Stations





Broadcast Tool & Die Radio Automation Comparison

Name	Airtime	Audio Vault	AutoRadio	Dalet Radio Suite	Enco DAD	GRINS	Megaseg Pro	Mixxx	OpenBroadcaster	RadioDJ	Rivendell	SAM Broadcaster Pro	Simian	Subsonic	Station Playlist	TuneTracker Command Center	Zara Studio	Zetta
Version	2.5.2	10.40	2.8.2		16, etc.	0.5.0	6.0.4	2	5.1	2.0.0	2.19.2	Current?	2.3	6	5.30	5	3	Current?
Info last updated	2017-09-10	2017-09-10	2017-09-10	2017-09-10	2017-09-10		2017-09-10	2017-09-10	2018-09-25	2018-01-16	2018-04-14	2017-09-10		2018-01-16	2017-10-30		2017-09-19	2017-09-10
Author	Sourcefabric	Brodcast Electronics	Paolo Patruno	Dalet Digital Media Systems	Enco, Inc	Gram Vaani	Megaseg	Mixxx Community	https://openbroadcaster.com/	http://www.radiodj.ro/	Paravell Systems	Spacial	Broadcast Software International	Sindre Mehus (sindre@activeobjects.no)	Station Playlist	Tune Tracker Systems	Kero Systems S.L.	RCSWorks
Operating system	Linux, Cloud	Windows	Linux	Windows	Windows	Linux (Ubuntu)	MacOS	Linux, MacOS, Windows	Linux, Ubuntu, BSD	Windows	Linux	Windows, Cloud	Windows	Mac, Windows, Linux, any Java	Windows, Cloud, Linux (with WINE) [1]	Haiku (BeOS)	Windows	Windows
Initial cost	$0.00	"If you have to ask ..."	$0.00	"If you have to ask..."	"If you have to ask ..."	$0.00	$199.00	$0.00	$0.00	$0.00	$0.00	$299 (non-profit pricing available)	$1,499.00	$99.00	$438.00	$1,500.00	€170 + shipping per licensed computer	"If you have to ask..."
Recurring licensing costs	$9.99/mo - $99.95/mo (https://www.airtime.pro/pricing/)	$0.00	$0.00	See above.	See above.	$0.00	Yes	$0.00	$0.00	$0.00	$0.00	?	Yes	Lifetime license	$59.00	?	Yes	See above.
Use restrictions	None	Licensed to each computer on which it is installed.	None		Licensed to each computer on which it is installed.	None	Licensed to each computer on which it is installed.	None	Open Source AGPL	None	None	Licensed to each computer on which it is installed.	Licensed to each computer on which it is installed (USB port hardware key (dongle) required). Multiple workstation discounts available.	None	Licensed to each computer on which it is installed.	Licensed to each computer on which it is installed.	Requires "a USB dongle that must be connected for the software to work."	Licensed to each computer on which it is installed.
Demo available?	Y		N/A			N/A	Y	N/A	N/A		N/A				Y			
Program multiple, simultaneous "streams"	Y (with customization)	Y	?	Y	up to 16	N	N	N	Yes, including video/images	N	Unlimited	up to 3	N (up to 3 for $499 extra)	Unlimited, except by your server's capability	up to 5	?	up to 5	Unlimited
Technical support options	email, forums	phone, email, forums, etc.	?	24/7 response, SLA, professional services, etc.	phone, email, forums, etc.	???	phone, email	forums, email lists	Dedicated support site, Wiki, Forums	forums	phone, email, remote access, 3rd party support contracts	email, forums	Comprehensive phone, remote login, email, etc.	Email, Help, FAQ, Forums	email	phone, email, forums, IRC	email, phone (extra cost)	Comprehensive, phone, email, forums, etc.
Training options	online	Several	N	Several	Several	???	online	X	Onsite and Webinars	online	on-site, remote	?	several options available	?	?	Y	online	?
Dedicated audio library required	Y	Y	N	Y	Y	Y	Y	N	Online and Local	Y	Y	Y	Y	Y	N	Y	N	Y
CD Import with metadata	N	Y	N		Y	N	N	N	N	N	Y	N		N	Y	Y	N	Y
iTunes Import	?	N	N		N	N	Y	Y	N	N	Indirectly	N		Indirectly	Indirectly	N	Indirectly	N
Arbitrary audio file import	Y	Y	Y		Y	?	N	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y
Audio formats supported	MP3, AAC, Ogg Vorbis, FLAC, WAV	"WAV, MP3 or other standard audio file"	"ogg, mp3, wav and other media file format"	"Designed on open standards and modern IT technologies..."	?	?	MP3, MP4 (MPEG-4), AIFF, WAV, and anything QuickTime can play	MP3, M4A/AAC, Ogg Vorbis, Opus, FLAC, WAVE, and AIFF	Ogg, Wav, Flac, Mp3 and MP4	MP3, WAV, WMA, FLAC, AC3	OGG Vorbis, FLAC, MP3, MP2, WAV	AAC, aacPlus, AAC-HE, MP3, mp3PRO, Ogg and Windows Media		MP3, OGG, AAC and any other audio or video format that streams over HTTP.	MP2, MP3, MP4/M4A (AAC), OGG, WAV (PCM/MP2/MP3), WMA, FLAC, APE, AIFF, plus CD tracks directly from a CD drive.	MP2, MP3, WAV, AIFF, Ogg Vorbis, ADPCM, MTS	MP2, MP3 (CBR and VBR), WAV, OGG, WMA and FLAC	?
Metadata (tag) import and assignment	Y	Y	N		Y	?	Y	Via Musicbrainz	ID3 and Ogg tag batch ingest	"Support for ID3 tags"	Yes, including Label	Y	Y	Y	Yes, including Label	Y	(free version ID3v1 only)	Y
Automatic audio import	Y	Y	N		Y	N	N	N	Y	N	Y	N	Y (with extra module)	Y	N	Y	N	Y
Daypart assignment	N	Y	N		Y	N	N	N	Y	N	Y	N		N	Y	N	N	Y
"Marker" support ("modify" audio tracks without changing the source material)	Limited: cue in, cue out	Y	N		Y	N	Y	N	N	Y	6 pairs	N		N	N	Y	Y (when using the database)	Y
Library reports	Y	Y	N		Y	?	Y	N	Charts and Graphs	N	Y	?		Y	Y	Y	Y	Y
Playout reports	Y	Y	Y		Y	?	Y	N	Detailed	Y	Y	Y		Y	Y	Y	Y	Y
Share library between computers	Y	Y	Y	Y	Y	?	Y, but requires work	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Share library with other audio apps	Y	N	Y		?	?	iTunes only	Y	Y	N	Y	?	?	Y	Y	N	Y	Y
Rules-based log (playlist) creation	N	Y	Hard to tell: documentation is in Italian and there isn't much of it.		Y	?	Limited	N	Smart PlayList with Dynamic Sections	Limited	Y	Limited	Y	N	Y	Y	Limited	Y
Import logs/playlists from external scheduler app	N	Music Master, and "any standard scheduling program"	N		Integrated scheduling software plus tight bi-directional interface to leading scheduling systems.	N	N	X	N	Playlists are .M3U files, so any properly-formatted .M3U file may be used with RadioDJ.	CounterPoint Traffic, Music 1, NaturalLog, PowerGold Music Scheduling, RadioTraffic.com, Rivendell Standard Import, Visual Traffic, WideOrbit Traffic, Custom	N	"from all major third party log generating s."	Y	Natural Log, AdMaster, The Traffic Light, Radio Traffic, Radio Works, Music 1, PowerGold, RCS Selector, Natural Music	Music Master, Natural Music, Selector, Music 1, and Power Gold	N (But works with Zara Traffic)	GSelector
SoundExchange reporting	Y	?	N		?	?	N	N	Y	N	Y	?		N	?	N	N	Y
Voice Tracking Support	N	Y	N	Y	Y	?	Limited	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
External Hardware Support (e.g., switchers, GPIO, etc.)	N	Y	N		Y	?	N	N	Y	N	Y	N	Y	N	Y	Y	Y	Y
Scripting or Macro Support	Limited	Maybe?			Y		N	N	Y	Limited	Y (macro language)	Y (PAL language)		N	N	N	N	Y
Web Integration	Good	?		Y	?			N	100% Web Based on HTML5		Somewhat, and improves with each release	Great		Yes, and phone apps	Good			?
Common Praise	Web-based, ease of use				One of the best		Ease of use, well integrated with Mac	Powerful, live DJ tool	"Point and Click" easy		High-end at a low entry cost, can do just about anything			Easy to use, easy to set up and access. Gorgeous user interface!	Ease of use, easy to set up and get going		Ease of use	
Common Criticisms		Cost			Cost		Apple only	Not really an automation system, more of an audio player and mixer.	Some Assembly Required		Lack of documentation Complex to set up			More of an audio player than an automation system (but may work well for some stations).			Missing some key features such as reports for PRO requirements.	