WORCESTER POLYTECHNIC INSTITUTE

Interactive QUALIFYING PROJECT

Completed in partial fulfillment of the Bachelor of Science degree at

Worcester Polytechnic Institute

Building Website for WICN Public Radio Station

Sponsored by:

WICN National Public Radio Station

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ABSTRACT

WICN at 90.5 FM is a public radio station located in Worcester, Massachusetts. WICN required

that it's website be modified in order to promote its radio station and to attract a bigger audience.

The current website, wicn.org, had several issues that impacted the accessibility of updates, as

well as aesthetic updates that they wanted to implement. The team explored the systems and

aesthetic designs employed by other non- profit radio station websites, devised a list of common

features, and worked with WICN to ultimately make recommendations to address the

aforementioned issues. The project did not include implementation of an actual website but the

team followed certain procedures and steps that were necessary to build an efficient website for

WICN. The tasks and the timeline of each task are listed as follows.

1. Background (Aug 23, 2018 - Oct 11, 2018): In the A-term, the team gathered information
    on history and social impact of WICN, WICN's website status, WICN's requirements,
    website designs and trends of other popular radio stations and potential solutions.

2. Methodology and Findings (Oct 23, 2018 - Dec 14, 2018): Methodology was carried out
    in two parts in two different terms. The first part is to come up with a reliable content
    management system for WICN. This part includes performing research on various
    content management systems, choosing the most reliable content management systems,
    testing them according to the WICN's requirements and recommending the best and
    reliable system for WICN.

3. Methodology and Findings (Jan 9, 2019 - March 1, 2019): The second part of
    Methodology has to deal with design decision, choosing themes, setting up the content

management system that the team recommended in prior term and coming up with the

actual steps to build a functional prototype based on findings.

Throughout the project, the team performed research in various ways. These includes asking for

advice from WPI professors and staff members, researching online for reliable sources,

contacting personnel from other radio stations, contacting services that are connected to WICN

and discussion with WICN staff members.

Keywords: WICN, website, content management system, WordPress, radio station

ACKNOWLEDGEMENTS

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Introduction

On August 23, 2018, under the supervision of Professor Vincent J. Manzo, a team of three WPI students, Hou Xiaoqiu (Chemical Engineering), Robert Ahearn Dutile (Computer Science) and Myo Min Thant (Computer Science), started an Interactive Qualifying Project on Building Website for WICN Public Radio Station. WICN at 90.5 FM is a public radio station located in Worcester, Massachusetts. WICN required that it's website be modified in order to promote its radio station and to attract a bigger audience. The current website, wicn.org, had several issues: a user-unfriendly and outdated content management system, designs and features not keeping up with the current trends and an unattractive website. Therefore, the team decided to come up with solutions and recommendations that were necessary to fix the aforementioned issues. The project did not include implementation of an actual website, but the team followed certain procedures and steps that were necessary to build an efficient website for WICN. The project took three-terms of the WPI academic school year. The tasks and the timeline of each task are listed as follows.

- Background (Aug 23, 2018 - Oct 11, 2018): In the A-term, we gathered information on history and social impact of WICN, WICN's website status, website designs and trends of other popular radio stations and potential solutions.

- Methodology and Findings (Oct 23, 2018 - Dec 14, 2018): Methodology was carried out in two parts in two different terms. The first part is to come up with a reliable content management system for WICN. This part includes performing research on various content management systems, choosing the most reliable content management systems,

testing them according to the WICN's requirements and recommending the best and reliable system for WICN.

- Methodology and Findings (Jan 9, 2018 - Feb 1, 2018): The second part of Methodology has to deal with design decision, choosing themes, setting up the content management system that we recommended in prior term and coming up with the actual steps to build a functional prototype based on findings.

After gathering information, we had enough resources on WICN's background information and figured out the trends in popular radio stations and how they attract audience using websites. In deciding on a content management system for WICN, we narrowed down the choices to five including WordPress, SquareSpace, Wix, Drupal or Joomla, and Aiir. After testing plugins and figuring out the potential of these systems, we had finally decided WordPress as the best system for WICN due to its user-friendliness, non-requirement of technical expertise, compatibilities and reliabilities of plugins. Then, we came up with a design questionnaire for WICN which was necessary to start building an actual website. After receiving responses and answers from WICN, we set up WordPress instance on WPI server and defined steps to build a functional prototype.

1.   Background

1.1.   History and social impact of WICN

Serving as one of the public radio stations in Worcester, Massachusetts, WICN(90.5 FM) communicates business free, 24 hours per day to a crowd of more than 40,000 people. Its programs are for the most part jazz, with day by day evening indicates committed to

soul, twang, Americana, society and blues, world music, and Sunday night open issues

programming. It is well-known for drawing in unique live projects, and its commitment to the

protection of jazz music.

WICN Public Radio, Inc. has been an active presence in the social existence of Central

Massachusetts for more than half a century. Starting in 1969, WICN began in the Greater

Worcester school network and joined The College of the Holy Cross and Worcester Polytechnic

Institute (WPI) with other neighborhood schools. WICN was certified by the Corporation for

Public Broadcasting in 1987. Through 2000, its studios were situated at 6 Chatham Street. This

area was in the past a YMCA and the swimming pool, now depleted, housed the station's record

collection. At this time the station's transmitter was 8,000 watts and co-situated at the WUNI TV

tower on Styles slope in Boylston. In March 2010, WICN finished another change making their

flag less directional. It is currently situated on Asnebumskit Hills in Paxton, Massachusetts

alongside the receiving wire for WAAF.

1.2.   Current WICN's website status

In order to better redesign the WICN as a radio station, a current website status

analysis was performed by the team regarding basic layout, font, and functionalities.

The current design layout has the navigation bar as shown in Figure 1 below.
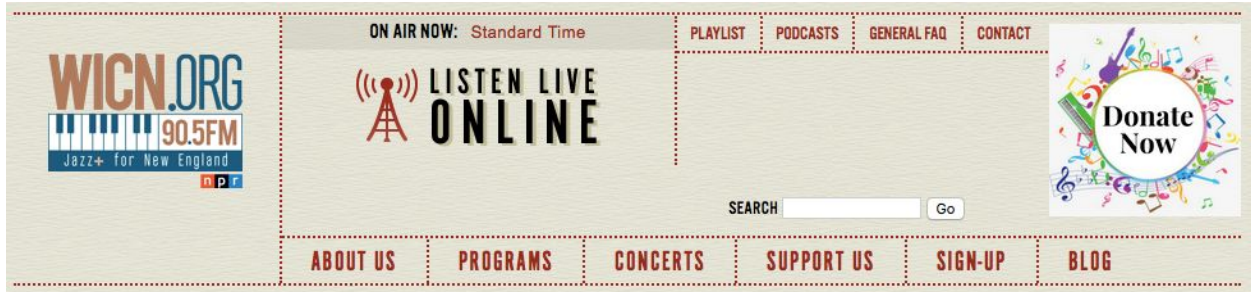
Figure 1: Navigation bar of wicn.org. Adapted from wicn.org, screen captured by Myo Min Thant, 2018. Captured with permission.

Every text and image inserted inside the navigation bar is functional and reachable to respective resources. WICN logo is located on the left side of the navigation bar and is clickable. On clicking the logo, the website will take the user to the home page of wicn.org. On clicking the logo while on another page such as "ABOUT US", the website will create a new tab redirecting to the home page. Something odd about the logo is its placement and size. The logo size is relatively small and positioned upward center. The logo being small also leaves wide white space between the logo and border and makes the navigation bar looks ugly.

In the middle of the navigation bar, there is a space for "Standard Time" and "Listen Live Online". Both are clickable and "Standard Time" shows a different colored text when the user hovers his mouse over it. "Listen Live Online" doesn't change on mouse hovering but it leads to different page. The location of image for "Listen Live Online" also positioned off since it leaves useless space underneath it.

On the right side, there are four tabs marked as "PLAYLIST", "PODCASTS", "GENERAL FAQ", and "CONTACT", an image labeled "Donate Now" and a search bar. Some tabs have sub-menus that lead to different sources. On mouse-hovering, the text of these tabs

changes color to black. The "Donate Now" image is clickable. However, the image design does

not suit well with the background color that WICN's web page uses. The image should have a

transparent background to suit within the navigation bar. The Search bar is functional and shows

result in a different page. However, search bar is relatively small and barely noticeable. It should

be separated from the navigation bar and placed somewhere near the navigation bar.

The bottom of the navigation bar has six tabs and those six tabs are presumably the

most frequently visited tabs of the website as they lead to important and informative parts of the

website. These six tabs have slightly larger fonts and bigger tab sizes than the four tabs which are

mentioned above. These six tabs also have the same functions as the aforementioned four tabs in

that they also have sub-menus and color-changing text on mouse-hovering. However, these tabs

should have slightly different darker or lighter color than the other area of the navigation bar.

Regarding the website context as presented in Figure 2 below:
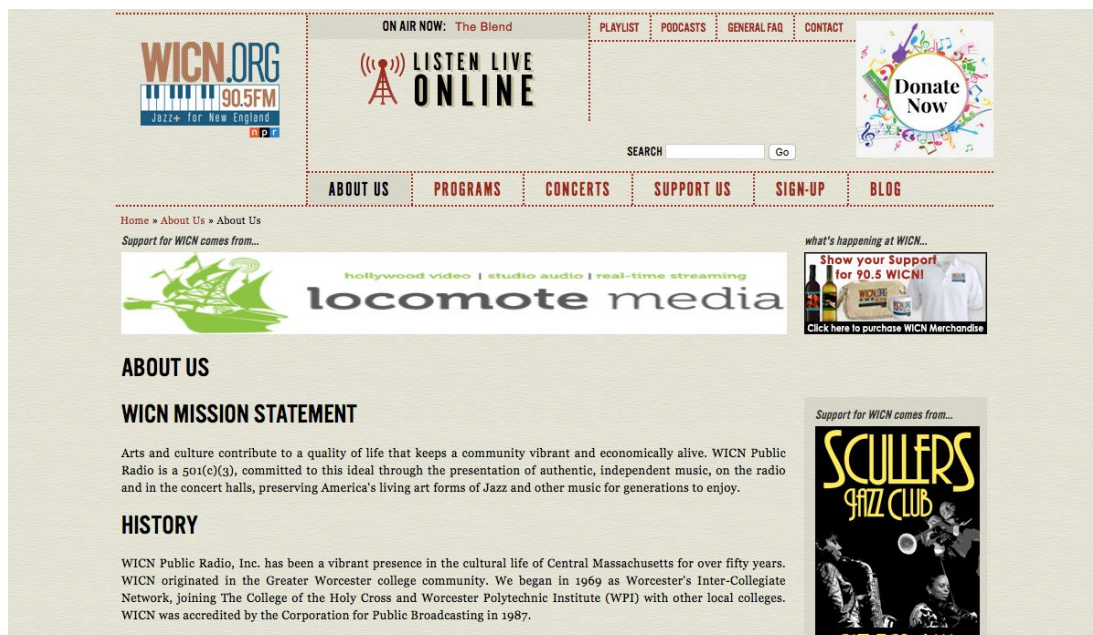
Figure 2: "ABOUT US" page of wicn.org. Adapted from wicn.org, screen captured by Myo Min Thant, 2018. Captured with permission.

In most of the pages, the content area of the website stays consistent. The content of the website is positioned center on most of the pages. This makes the text of the content relatively smaller and with advertisements also taking places on the top and right sides of the content area, the user will have trouble viewing contents of the website. The content area should take more space but also be positioned center. The main content and advertisements should be separated across the content area. The main content of the web page should be considered priority and advertisements should not be on top of any content. The variation of heading style and font style will look much better.

The functionality of serving as a radio station website has also been discussed an checked regarding basic components as presented in Table 1 below.

Functionality	Fulfill	Missing
Live-streaming broadcast	✓	
Schedule and archive for previous broadcasted programs	✓	
Local musical events announcement	✓	

Access to on demand podcasts of aired programs including : radiofreeamerica.com	✓	
Donation method	✓	
Basic blog settings	✓	
Social media linkage	✓	
Advertisements of sponsors	✓	

Table 1: Functionality checklist of current WICN radio station website

1.3.   Current website design of other radio stations in the field

Serving as one of the major branch of marketing, the use of websites as a promoting tool has developed during this century. (Balaure et al., 2002) The given condition of a digital environment has led to certain level of difficulty of the marketing mix. Several literature papers have addressed the importance of certain type of promotions that can lead to different impacts.

In order to get a thorough understanding of what other radio stations websites were designed in the field, we investigate both the WWOZ and KRTU websites for further comparison.

Regarding other radio station websites such as the wwoz one, the navigation bar is more concise compared to what WICN has. Other than putting everything as individual divisions,

sections are organized under the appropriate category which provides a more professional form

to the people browsing the website. Features including music playing and donation with red

highlighting are also included in the navigation bar in the WWOZ website. The strong color

contrast will provide a more eye-catching impression to people compared to the color WICN

used. White icon collaborates with light beige background does not have the same impression as

red to black.

The donation part of WWOZ is consistent with the other categories with an extra heart

design, while for WICN the donation was listed separately with a roughly made icon. An extra

navigation bar is also provided in the WWOZ website so there's no need for scrolling up to the

very beginning when people are trying to look up other activities. For the calendar, WWOZ

provides a more reasonable layout by enhancing the events besides the date which is more logic

since people are actually driven by the interest to certain events, not the dates the events are

holding.

Some more variable, attractive features are listed in the content of WWOZ such as

guidelines to specific videos or events while WICN only includes the advertising and signup

section. As for the bottom of the website, WWOZ centers several social media icons for reaching

while WICN only has twitter and facebook. Another extra navigation bar is also placed at the

very bottom which helps to guide whoever is visiting the website more efficiently.
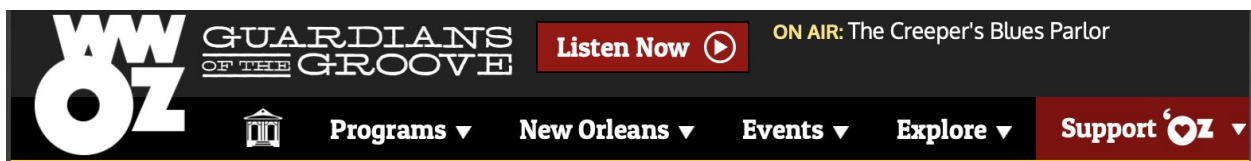
Figure 3 : Current navigation bar design of WWOZ website. Adapted from wwoz.org, screen captured by Myo Min Thant, 2018. Captured with permission.

As for KRTU, the navigation bar seems relatively messy and redundant due to the number of sections it includes. As for the calendar, there's no mark of major events nor dates on the front page of the website which makes it less attractive to the audience. Most people won't be satisfied with a group of texts as their first impression of a website. Although the donation part is included in the navigation bar, the lack of extra ornaments makes it less appealing to the audience. It is highly possible that people will just ignore it and scroll down. After scrolling down to the second page, the major events and corresponding dates are listed which presents the information explicitly. Although KRTU does include more interesting contents in the website compared to WICN, the history of the radio station seems pretty boring compared to what WWOZ has, not even mentioning a total of three pages of history description. For the bottom part, KRTU does a fair job by providing social media which can be used to reach them, but the lack of contents in the navigation bar makes it tedious which could have been improved.
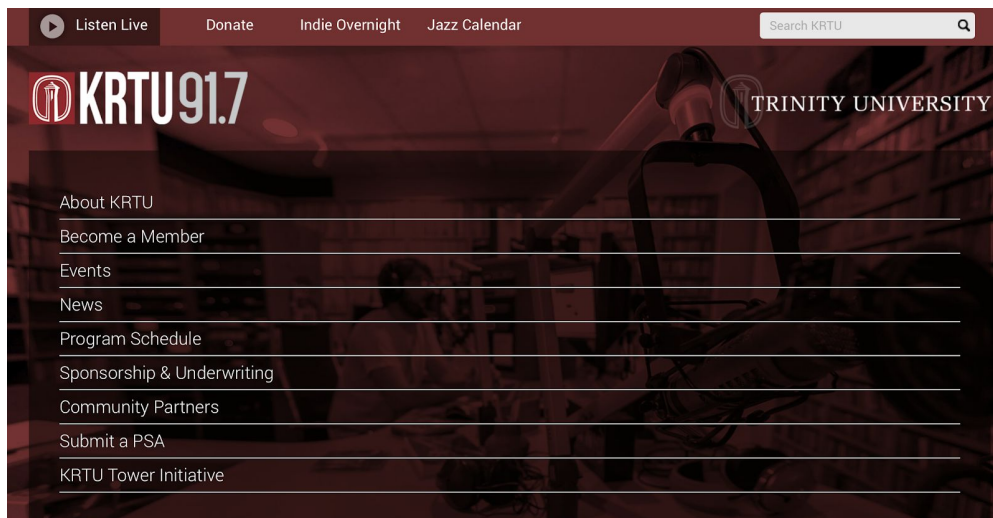
Figure 4: Current navigation panel of KRTU website. Adapted from https://krtu.trinity.edu/, screen captured by Myo Min Thant, 2018. Captured with permission.

1.4.   Potential solutions synthesis

Based on our knowledge regarding Computer Science, we came up with two potential solutions that could be useful to implement a new website. They are web-application development and using content management systems (CMSs). They both are very different in a way that the former method requires technical expertise but allows more custom and homegrown feature integrations to new websites. The latter method does not require extensive background in Computer Science and Programming but it is more suitable for Enterprises and Companies which are not in Internet industry since the latter method is faster to implement.

According to Kilfeather (2018), we consider using CMSs over web-application for ease of use. CMSs can be purchased through subscriptions or downloaded for free depending on the brands. After purchasing or downloading, they provide editors to update contents, templates to design, storage to store multimedia files and management to manage settings and privilege access to employees. If we consider web-application development, we will have to consider how long it will take and how many developers it will need to develop these types of features while CMSs already have them.

2.   Methodology

After finding information on WICN's background, the current website status, required functionalities for the new website and design trends in other radio stations' websites, another

step for us was to come up with methodology on how to make the new website for WICN.

Before we researched further, we searched for WPI professors who had experience with CMSs

for more preliminary inputs (See Appendix. 3). We found Professor Lane Harrison, who was an

Assistant Professor in Computer Science department of WPI. He suggested that we used

WordPress since he had seen many radio stations utilizing it as an underlying CMS for their

websites. With one CMS that we could research, we knew that we also had to looked at its

competitor CMSs. In order to implement the new website, we formed three tasks as follows.

- Gain better understanding of CMSs

- Find the most suitable CMS for WICN's new website

- Recommended steps to build a Prototype using the chosen CMS

2.1.   Gain Better Understanding of CMSs

Types of CMS differ from company to company. There are CMSs which are open-source

and created by community, CMSs which are proprietary to a certain company, and CMSs which

offer ready-made settings for certain industries. In order to know which type of CMS we would

use for this project, we needed to research different types of CMSs to gain a better understanding

on how to use a CMS for this project.

2.2.   Find the Most Suitable CMS for WICN's new website

After researching CMSs for their functionalities and usefulness, we needed to find which

CMSs are in popular in radio station industry. If we knew the popular CMSs, we would explore

and compare them based on the features they give, the overall cost, and compatibility with WPI

server to decide on the best CMS. We would also acquire a demo version or downloadable

instance to test WICN's radio plugins, social media embeddable links and the workflows of each CMS to determine which would be reliable and effective for WICN.

2.3. Recommended steps to build a Prototype using the chosen CMS

After figuring out the best and most suitable CMS for WICN, another task was to build a prototype. At this point, we had a better understanding of the CMS, we knew which CMS to use and we were familiar with workflow from testing each CMS. However, we did not have the resources to design WICN's new website. Therefore, we would have to generate a design questionnaire first to obtain WICN's desired design features for an upcoming new website. After obtaining this information, we would request WPI server administrator to provide a new instance for building a prototype. Based on the CMS we came up with in the prior task, we would define steps which are necessary in building a functional prototype.

3. Findings

Multiple highly rated options for Content Management Systems have been found and analysed later in this chapter. The highly developed internet field has provided a wide range of options regarding platforms that enable people to create their websites, even without any coding background. In order to obtain a basic understanding of how CMSs work, we chose five platforms that were most popular for any industry. After that, we researched for various CMSs that are used by radio stations and compared and tested them to decide on the most suitable CMS for WICN.

After comparing various systems and communicating with WICN through email, we made the final decision on using a Content-Management System. In order to have a better understanding of design and expectations of the new website, our team scheduled a meeting with the WICN staffs. The team planned to build the functional prototype afterwards. We relied on our knowledge of Computer Science, familiarity with CMS through comparing and testing and online tutorials and documentations to build a better prototype. In building the prototype, we laid out a series of recommended steps to reach the functional prototype.

3.1.1.   Content-Management-System

Content Management Systems or CMS are derived from web-applications. CMS fills the needs of companies which are not in internet or tech industries because it doesn't require a lot of technical knowledge to create a website. In most CMS solutions, to create a website, one only has to pay for features he wants and add them. They often provide domain name service and so companies can easily transfer their domain names from one solution to another. Nowadays, we have countless numbers of CMS on the market.

Our team scheduled a meeting with the WICN radio station. A questionnaire was sent to the WICN faculty ahead of time including color and layout preference, navigation bar, social media linkage preference, and unnecessary context movement. A total of five radio or music themed templates using WordPress were also sent additionally to provide a visualized image. The detailed questionnaire and supplement can be found at Appendix 1.

3.2.   Content-Management-System platforms Introduction

The highly developed internet field had provided a wide range of choices regarding

platforms that enable people even without any coding background to create their websites. In

order to make a subjective decision, a total of five platforms had been selected and analysed for

comparison. The following were the brief introductions of each platform.

3.2.1.   WordPress

This CMS was used by a lot of e-commerce companies, marketing agencies and

bloggers. WordPress was also very flexible in a way that a company could add features from

another application. It was also the go-to solution for most people as it offers free-subscription

but with its subdomain. The subscription fee was also cheaper compared to other CMS but

additional features such as themes and addons were not part of its subscription.

3.2.2.   Squarespace

Unlike WordPress, SquareSpace had much fewer features. However, it was one of the

best solutions for informative purposes. Numerous artists, photographers and designers used this

solution to help showcase their portfolios. Many restaurants and classes also used SquareSpace

to show their information. The subscription didn't come free but still it had many beautiful

themes that help people creating websites.

3.2.3.   Drupal or Joomla

Drupal or Joomla standed out from most of the CMS solutions. They required more technical knowledge to create and maintain websites. Unlike other solutions which were backed by companies, they were open-source and community maintains those solutions. Pricing also varied by features users want to add. However, they offered fluidity and freedom of creating websites when other solutions had limitations.

3.2.4.   Aiir

Aiir was a CMS that targets towards radio stations. One feature that stands out from normal CMS was that it had ready-to-use templates for mobile devices. Aiir didn't need technical knowledge to create and maintain websites. However, it's subscription fees were higher than WordPress and SquareSpace.

3.3.   Content-management-system in comparison

3.3.1.   WordPress

WordPress was one of the most popular and modern content management platforms used for all purposes including e-commerce, blogging and audio management. It had an user-friendly interface with customizable text editor. It also allowed user to embed sharable external links from various resources such as Facebook, Youtube and Twitter. One notable feature of WordPress was version control which allowed user to revert back to previous version of his or her website if an error occurs. It also integrated business features such as SEO

(Search-Engine-Optimization) management and text search engine. Additionally, WordPress

editor had three levels of customization: Web, Tablet and Mobile. Thus, clients who browse

website built in WordPress with mobiles would not have any difficulty at all.

Plugins including facebook update, youtube video, podcasting options and payment

features were given to better serve the website.
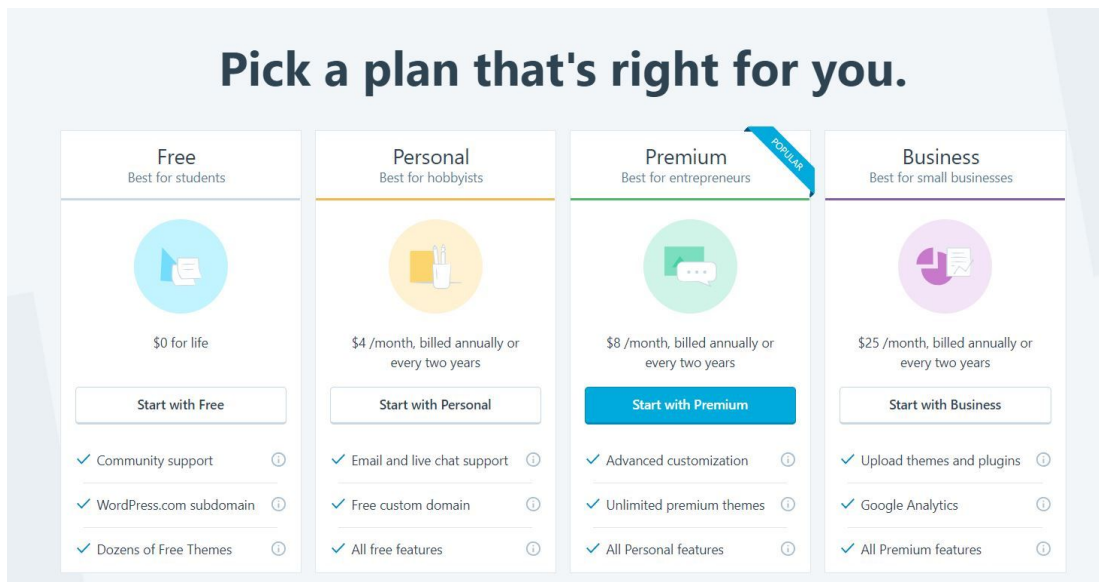
Figure 4: WordPress subscribed plans. Adapted from wordpress.org, screen captured by Myo

Min Thant, 2018.

According to figure 4,WordPress had four plans for subscription. Even at the free

version, users could publish and host their websites with WordPress domain names. Paid

subscription plans offered a new domain name or changing users' own domain names. Many free

and paid themes were available for all plans. Starting from the free version, users could embed

external plugins to WordPress. However, storing audio and video content on WordPress required

premium and business subscriptions. WordPress didn't have streaming and podcasting features available but users could use third-party plugin like Fireside and integrate it into a WordPress website. The recommended plans for our purpose were premium and business plans.

3.3.2.   Joomla

Joomla is a popular, free open-source content management system. It is used for creating websites and blogs, with over 2 million active websites at last estimation. It is noted for having a very flexible interface, but also being something of a middle of the road option between WordPress and Drupal when it comes to complexity and ease of use, being both less developer-focused than Drupal and less beginner-friendly than WordPress. All that said, it still possessed a very user friendly editor, and had a host of free training videos on its website. It was also noted for its e-commerce applications, considerable amount of multilingual support, ease of advertisement monetization and a user interface well equipped to handle large numbers of articles right out of the box.

It was hard to really consider any Joomla extension as "in-house," thanks to the open-source nature of the product, and in general the library of available extensions was just plain less well-organized and harder to search through than for some competitors. Significantly, while embedding youtube videos was quite simple, embedding facebook functionality required some form of third party extension, as did enabling a donation system. For most purposes, one would have to parse through various options for the desired functionality in order to find the best fitting one, and also to see what kind of price you needed to pay, if any at all, because both free and paid extensions often offered the same services, with considerable effort required to figure

out the differences between them, without even getting into the fact that many extensions could have weird compatibility errors between them.

Moreover, Joomla, notably, was completely free in its base form. However, if one wished to expand beyond the basic functioning of the system, extensions for Joomla were considerably more likely to require payment to use than for other options.

3.3.3.   Wix

The debate between Wix and Wordpress had raised rapidly these years. Wix provided a broad range of tools to manage the website, without specific request or needs, there was no winner or loser between these two. However, since WICN had requested certain types of change, comparison were made in this case. In terms of simplicity, wix provided a more vivid, rookie friendly interface where you could easily add or move icons or images.
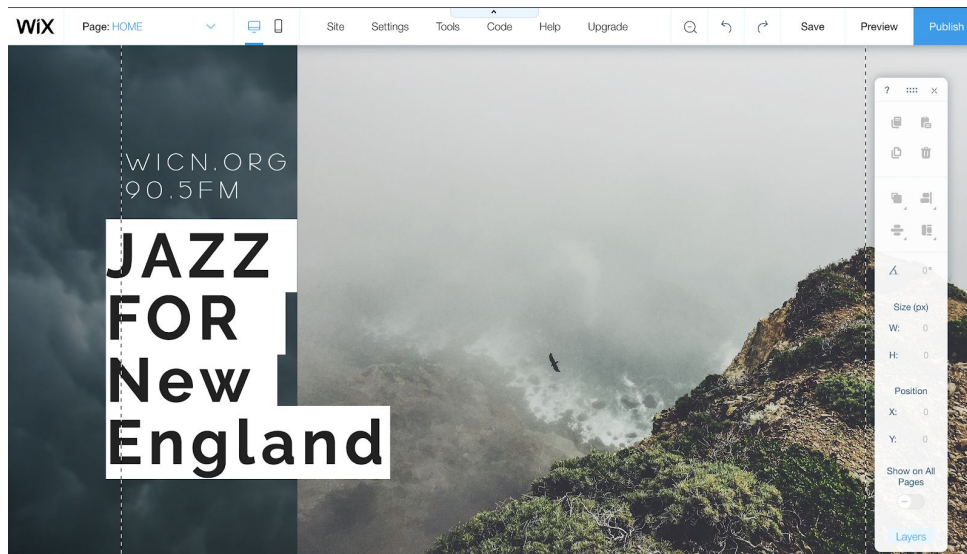

Figure 5: Sample homepage of newly built WICN's website using Wix interface. Adapted from wix.org, screen captured by Hou Xiaoqiu, 2018.

People without any programming skills could even build their website by using wix. Besides the technical part, wix provided a wide range of temple for customer who had no idea in how to stylize or format their website. By simply replacing the default image, users could create their unique website. By incorporating web composition and content creation using AI, Wix enabled the launch of a fully functional website within few minutes. The only thing a customer needed to prepare before building a website using Wix is to answer couple of questions.

Regarding features, Wix gave a pretty flexible choice in blogging and eCommerce. Other Add-on extension could be found at the add-on market. Users could either choose the free version or the premium version. All the add-on were relatively simple to introduce and control by the user themself.
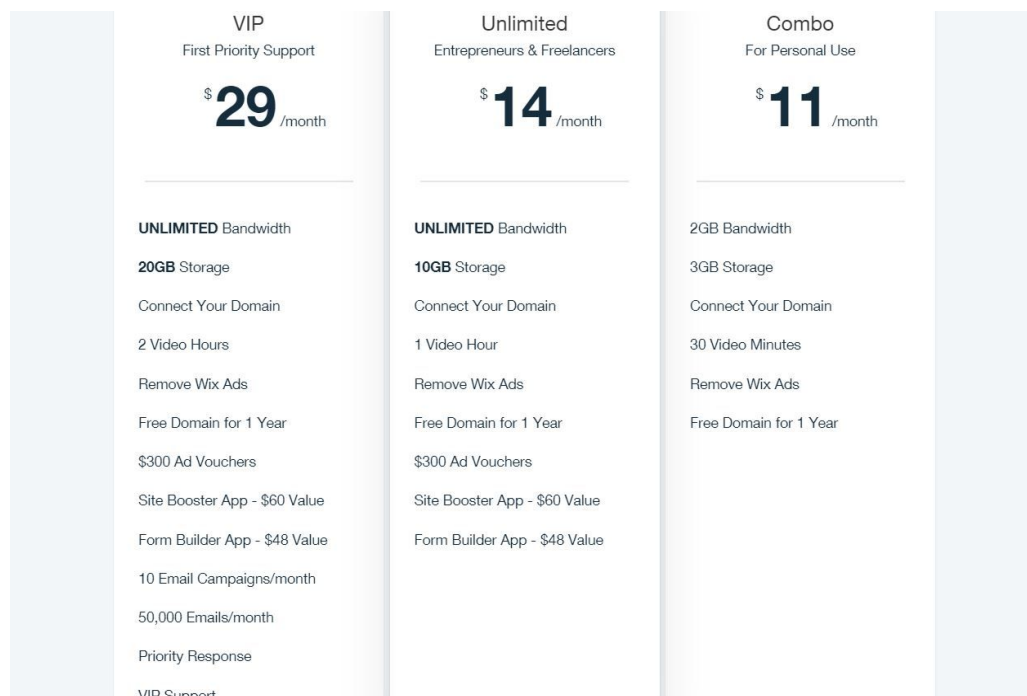

Figure 6: Wix subscription plans. Adapted from wix.org, screen captured by Hou Xiaoqiu, 2018.

Based on the plan you choose, different levels of storage and bandwidth limitations would be offered to the customer. Both monthly and yearly payments were accepted. A total of 5 plans were offered on Wix. Connect area charged $4.5 per month, Combo charged $8.5 per month, Unlimited charged $12.5 per month, eCommerce charged $16.5 per month, and the VIP charges $24.5 per month. Although Wix did offer a fundamental free website for users, noticeable drawbacks cannot be ignored. First, a Wix advertisement was presented at the top and bottom location of the website. Moreover, the domain of your website would contain the prefix of Wix (yourwebsite.wix.com). Regarding the basic plan, add-ons including google analytics, favorites, or eCommerce were not free. If you want to get rid of the advertising on your website, you had to upgrade to the Combo plan since the basic arrangement did not include these. In order to move redundant commercials, the customer would have to upgrade to the VIP plans.

In order to better compare the features of selected platforms, Figure 7 was listed below based on a wide range of selection criterias.

Criteria	WordPress	Aiir	Squarespace	Radio King	Joomla	Wix	Prepr	Drupal 8
Streaming options	🟩	🟥	🟥	🟥	🟥	🟩	🟥	🟥
Podcast hosting	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟥
Music playing system	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟥

Connecting to social media	Green	Green	Green	Green	Green	Green	Green	Red
Donation/Payment system	Green	Green	Green	Green	Green	Red	Red	Red
Admin panel	Green	Green	Green	Green	Green	Green	Green	Red
Mobile expandability	Green	Green	Green	Green	Red	Green	Green	Red
Analytics	Green	Green	Green	Green	Green	Green	Green	Red
Server Compatibility	Green	Green	Green	Red	Green	Red	Red	Green
Internal Storage	Green	Green	Green	Green	Red	Green	Green	Red
Advertisement	Green	Green	Green	Green	Red	Green	Green	Red
User Friendliness (5-star rating)	4.0/5.0	N/A	4.5/5.0	4.5/5.0	3.5/5.0	4.5/5.0	N/A	3.5/5.0
Admin Platform	Web, Mac, PC	Web	Web	Web	Web, Mac, PC	Web	Web, Mobile Device	Mac, PC

	360-9 60	1320	216	348	600-60 00	200	3829	0
Cost ($/year)								

Key	Meaning
Green	Yes
Red	No or Require Self-implementation
Light Green	Required Features
Light Purple	Additional Criterion

Figure 7. CMS Criteria Comparison Chart (Aiir, 2018; Drupal, 2018; Joomla, 2018; Prepr, 2018; RadioKing, 2018; Squarespace, 2018; Wordpress, 2018; Wix, 2018)

Our team also researched the top U.S. radio stations to find out which CMSs the best radio stations use. According to an article about the best radio stations in the US, the top five radio stations are KCMP 89.3 FM, 103.5 KISS FM, KUSF, WFMU 91.1 FM, and KEXP 90.3 FM (Jason, 2018). On these radio stations' websites, we could not find any information on their CMSs. Those stations, are also operated by larger organizations such as iHeart Radio that are relatively wealthy. We learned later on that these radios hire web agencies and CMS vendors for expensive, fully customized CMSs (Fishman, 2016). Triton Digital, one of the top CMS vendors for broadcasters, use a customized version of Wordpress for clients. We also asked WPI

professor Lane Harrison (See Appendix. 3) who had experience with Drupal and Wordpress for

suggestions on CMSs to explore. He told us that many radio stations use Wordpress. Considering

our scenario, he suggested that we recommend Wordpress to WICN.

3.4.   Prototype design according to customer requirements

After communicating with WICN's employees, the final decision regarding platform

was made. The team planned to build the functional prototype afterwards. To do so, we divided

it into three stages: wireframing(paper prototyping), implementing, and testing. In

wireframing(paper prototyping), the layout of the newly built WICN's website would be

designed without any implementations. Our team scheduled a meeting with the WICN radio

station. A questionnaire was sent to the WICN faculty ahead of time including color and layout

preference, navigation bar, social media linkage preference, and unnecessary context movement.

A total of five radio or music themed templates using WordPress were also sent additionally to

provide a visualized image. The detailed questionnaire and supplement can be found at Appendix

1.

The hosting of the website had also been discussed during the meeting with two

available options presented. One was using WordPress web-based mode and the other was using

WPI server. Detailed comparison based on several selected citierias was listed in Figure 8 below.

Criteria	WordPress web-based	WPI hosting
Financial	Business plan required 25$ per month	Free

Installation and Maintenance	Do not require	Require
Customer support	Yes	No, only forum community
Future migration	Offers service called Guided transfer.	Unknown
Maturality	High	Just starting out

Figure 8: Detailed comparison based on selected criteria between Wordpress web-based mode and WPI hosting mode. Generated by Hou Xiaoqiu, 2019.

3.5.   Recommended Steps for Prototype

From the Design meeting (See Appendix. 1) with WICN's staffs including David and Amanda, our team gathered information on the basic content layouts, design features, and later from David's email, we received responses for theme. Before the meeting, we also generated a list of design questions (See Appendix. 1) approved by the Institutional Review Board. Based on the resources we have and our knowledge in Computer Science, we recommended the following steps for implementing a functional prototype.

1. Setting up WordPress

2. Purchasing the Theme that WICN desires

3. Installing and Applying the Theme to WordPress

4. Redecorating the Theme and applying plugins

We recommended the above steps to be proceeded in the timely order to achieve the fully

functional prototype website for WICN. In between carrying out these steps, discussion with

WICN is strongly suggested to keep WICN's vision for its new website. The detailed description

for each step is explained below. Please note that at the time of carrying out this paper, the first

step is already complete but due to time constraint, the instance can be expired at some point in

the future.

1. Setting up WordPress

The first step of implementing the new website is setting up its Content Management

System. We also showed that there are two modes WICN can choose for WordPress. In this

project, we recommend using WPI hosted WordPress for implementation. The installation will

be taken care by Server Administrator from WPI and the basic instance of WordPress will be

available. At the time of writing the paper, the server administrator who helps us in setting up

WordPress is Toto Ermal and his contact email is toto@wpi.edu. Before asking the Server

Administrators to set up a WordPress instance, please confirm the version of WordPress with the

theme WICN chose. Different versions and updates of WordPress can break plugins and theme

from time to time. Use the latest version of WordPress only if it is compatible with plugins and

theme. After confirming the WordPress version with server administrator, he will ask for the

domain name for the website. Please do not use "wicn.org" for testing website. The domain

name can be changed later after all the implementations have completed. A generic but

conventional name such as "wicn-dev.wpi.edu" can be used for a certain period while

implementing. The administrator will also give an admin domain which a developer can make

changes to the website.

At the time of writing this paper, our team has already completed the above procedure. We are providing this as a necessary step if the instance is expired at the time of implementing. The domain for the prototype can be found at http://wicn-dev.wpi.edu. The admin domain is available at http://wicn-dev.wpi.edu/wp-admin/. We cannot hand out password here for security reasons. Please contact Toto Ermal for password and further assistance. Please note that the Server Administrator is also subject to change.

2. Purchasing the Theme that WICN desires

At the design meeting (See Appendix. 1), our team gave David Ginsburg and Amanda Carr a certain number of days to come up with their desired theme from the five themes we provided on the meeting. David replied us that WICN will be using OnAir2 for the main theme of upcoming website. OnAir2 is not developed and maintained by WordPress itself or its community. It is a theme developed by a company named Qantum Themes. OnAir2 can be purchased online at themeforest.net and it has a price tag of $59. Please refer to Qantum Themes for WordPress compatibility before purchasing the theme.

Figure 9: OnAir2 on themeforest.net. Adapted from Qantum Themes. (2017, February 21).

Onair2: Radio Station WordPress Theme. Retrieved from

https://themeforest.net/item/onair2-radio-station-wordpress-theme/19340714

3. Installing and Applying the Theme to Wordpress

   After purchasing the theme comes the installation. Upon purchasing the theme, please

remember to download the theme package as "Installable Wordpress file only" as shown in
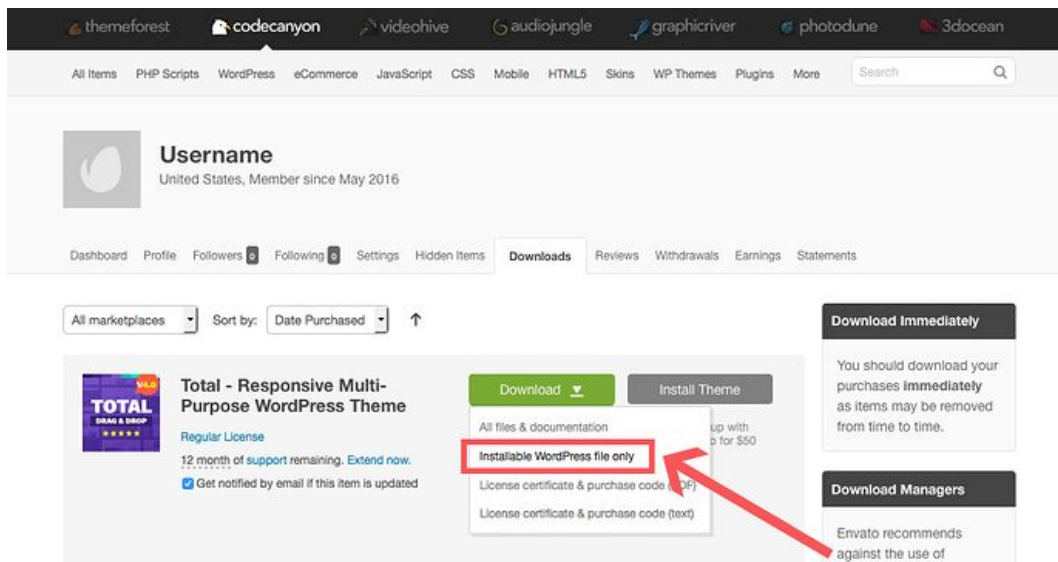
Figure 10 below. Unzip the zip file after downloading.

Figure 10: Downloading WordPress Theme. Adapted from WPExplorer. (2017, March 23). How

to Install Your ThemeForest WordPress Theme. Retrieved from

https://envato.com/blog/install-themeforest-wordpress-theme/

   In this paragraph, we will give a set of instruction on how to install custom theme directly

from the users computer. Uploading the theme will require logging into the WordPress admin

domain. After logging into the domain, there will be a WordPress dashboard with menu on the

left side. Navigate to Appearance>Themes. Upon clicking Themes, there will be a currently

installed theme and other free theme option. On the top just beside the heading "Themes", there

is a button called "Add New". Click that button and Theme market will appear with heading

"Add Theme". Beside that heading, there is a button called "Upload" and upon clicking that

button, folder input will be requested. Click "Browse.." to find the downloaded folder and after

uploading the folder, proceed installation with "Install Now". Figure 11 provides a visual of how

to upload and install on WordPress. When the installation has completed, the installed theme will

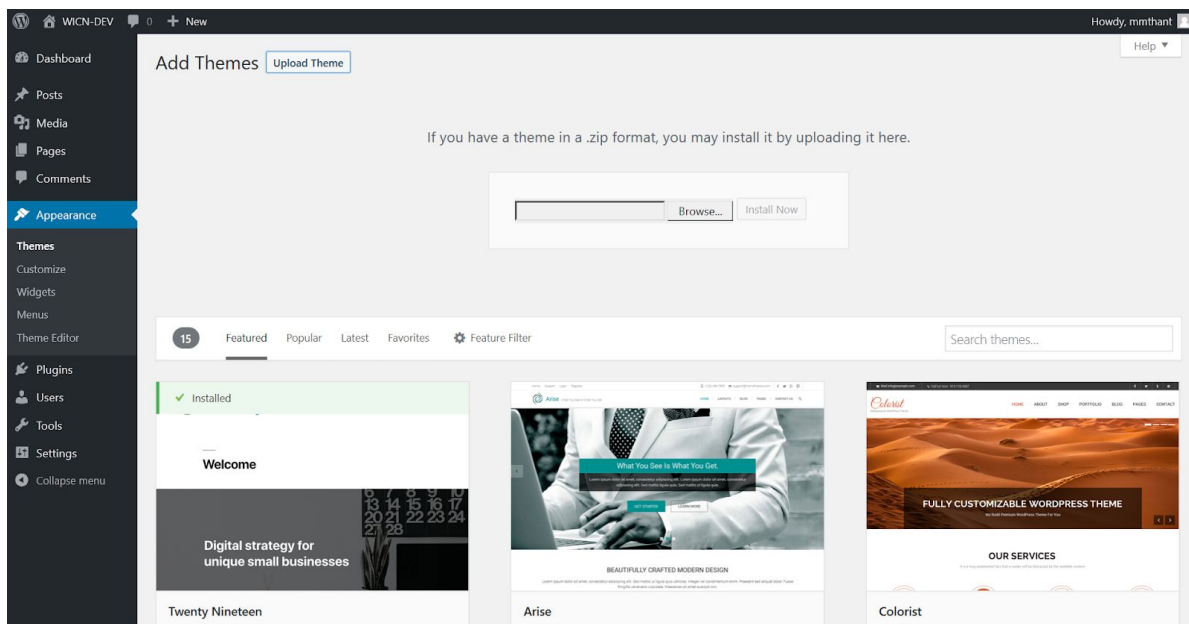show up under Themes section and click "Activate" to use it.

Figure 11. Uploading theme folder. Adapted from wicn-dev.wpi.edu. Screen captured by Myo

Min Thant, 2019.

There is a potential issue when installing the theme. Depends on the theme whether it is in WordPress database or not, WordPress will ask for a File-Transfer-Protocol (FTP) domain, username and password to install the theme. In that case, there are two options. The first one is to ask the WPI server administrator for the above information. The second one is to use an FTP/SFTP client such as FileZilla to connect to a Virtual Machine where the WordPress instance is created and to transfer the downloaded theme folder to that Virtual Machine. Finally, install the theme folder from the FTP client the same way as we mentioned above.

4. Redecorating the theme and applying plugins

We cannot use the original theme that comes with OnAir2. Instead, we will need to add changes to the theme. We suggest that students or users who are going to implement WordPress site should have prior knowledge of editing custom themes. When customizing themes, please go to Appearance>Customize and customize the theme to WICN's requirements. For design requirements, please refer to the Appendix 1. In Appendix 1, we have acquired enough resources to build a design prototype without including functionalities.

After building a design prototype, please confirm with WICN to settle on the final design. If WICN has reached the final design decision, plugins can be installed and tested. The main plugins that will need to be installed are StreamGuys, Facebook, Youtube, and Paypal. StreamGuys embeddable media code can be found in Appendix 2. For Facebook and Youtube, embeddable codes can be extracted depending on the posts and videos uploaded to Facebook and Youtube. Copy and paste those embeddable codes on the WordPress editor of the page you are editing. Paypal plugin can be found and installed on WordPress plugins editor but require Paypal username and password to use the plugin. These are basic plugins required to get the website

working according to requirement. We do not have suggestions for additional plugins such as google analytic to keep track of users traffic, and google search engine.

After installing the plugins, the next step is to customize the radio player. The information on how to customize the radio player is in Appendix 2. WICN requires us to customize the radio player to be more attractive than the one currently on wicn.org. The radio player should also display song metadata and this need to develop further custom plugin to extract song metadata from WICN. Currently displaying song metadata is optional.

4.   Conclusion

Considering the future development of Worcester's local radio station WICN, the redesign proposal was conducted by the team based on scientific research and reliable comparisons. We conducted research by talking with WPI professors and staff members, contacting personnels from WICN's related services and other radio stations and reliable online sources. We came up with various content management systems which could provide potential solutions to WICN. Based on our research and testing of those systems, we recommended WICN to use WordPress hosted by WPI for reliability, support and user-friendliness. Along with the requirements from WICN's staffs, we generated a list of steps that are sufficient to build an actual prototype.

Through our meeting with the WICN radio station, another problem has also driven our attention. With the raise of digitalized platforms including spotify or ITunes, the future for these traditional radio stations doesn't seem optimistic. To quote a Gordon Borrell speech from last year: '*Twenty-plus years into the digital revolution, the radio industry is struggling to hold onto*

longtime listeners and advertisers while attempting to puzzle out how best to build out their

digital offerings. '

Recent research has reported that an average decline of 4% in the forecasts will appear in the upcoming years. The major problem presented in the radio station industry is to find a way to integrate digital media and raise its annual income. Back then, there was a huge resistance against the appearance of digitalied music in the radio industry, but soon they figured out that what a radio station really needs to do is not just offering radio spots for advertising but to balance between all the marketing tools it has. Some desperate radio stations were putting so much effort on holding up their so called 'old audiences' that they forgot that what really needed to be done was to attract more 'new audiences'.

Personally, we feel that people that work in the field need a more objective and clear view for the future for the radio station. There is a huge possibility that the radio station will be serving as massive broadcasting or marketing tools of which the radio channel itself might just become only one small part. And for those stations who haven't started expanding their business, it might not be too late to start looking for these in the field.

Besides the transformation and expansion of business, other proposals regarding the New technology of using Digital Audio Broadcasting (DAB) which allows multiple channels to broadcast on one frequency also sounds solid. The use of DAB opens a new era for broadcasting since geographical location of the audience won't be limited.

5.   Reference

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Appendix

Appendix 1

Detailed questionnaire with answer regarding prototype building

Good afternoon and thank you for your time. We have explored a variety of radio station websites and have identified many distinctive features that may be implemented into the future WICN's website on the Wordpress platform. Our goal today is to present these features to you and gain a sense of your thoughts about them toward the goal of making our recommendations for website designs more comprehensive.

Layout & Color

Wordpress allows us some flexibility to control the layout and colors of each website by using templates. The images, you're looking at, represent radio station websites that have unique layout and color schemes, which we can use to derive a new layout that is appropriate for the WICN's website.

- Do you have primary color preference for your new website?

  WICN: We do not have any color preference. We will take any suggestion that can make our website looks attractive

- Do you have secondary color preference for your new website? Please list at least two secondary colors.

  WICN: We do not have any color preference. We will take any suggestion that can make our website looks attractive

- How many pages (e.g. Home, About, Contact Us, etc) do you intend to display on your

  new website? Please list their names and purposes.

- How do you want your radio player to be displayed?

  WICN: We want radio player to be at the Home page. We do not want pop-up radio

  player.

More on layout options we will be asking more specific details within each page. If you do not

have any idea ahead, do not worry about it. We have supplements to give you a brief idea.

General,

- How do you want your navigation bar to be looked like? (Please select one)

1. Minimalist and Separated with other contents   2. Modern and Blending in with content

  WICN: We want Navigation bar to be separated with other contents. Navigation bar

  which is not separated gives a lot of negative space to users and it would not look

  attractive displaying on mobile in our opinion.

- What information will go into your footer section? Please tell us your ideas. Generally,

  most websites have

1. Logos and mottos,

2. Contacts,

3. Links to social media pages,

4. Links to sponsors,

5. Links to other info non-related to main websites such as careers and offers,

6. Copyrights information, and

7. Terms, Policies and miscellaneous infos that are directed towards end users

WICN: We want footer section to be reflective of our whole website just like

iHeartRadio. In our opinion, users could easily navigate to which page or tab they want at

the footer section.

Home page,

- How do you want your radio player to be displayed? (See Appendix B for more details)

1. Pop-up   2. Separate Tab   3. On the home page

WICN: We want radio player to be at the Home page. We do not want pop-up radio

player.

How do you want your content to be displayed?

1. Centered   2. Fit to the width of browser

WICN: According to the trends right now, we believe it is the best that we go with fit to

the browser width.

- What types of content or content sections will be displayed on Home page? Please tell us

in order. (E.g News>Top Songs, Calendar)

WICN: We want News section to display with slideshow animation like in current

WICN's website but with more design elements. We will then display the following in

order.

On Demands>Live Music/Events>News>Calendar>Membership>Support/Donate

section

- What colors will be used on each content section?

WICN: We do not have any color preference. We will take any suggestion that can make

our website looks attractive

About us,

- How do you want to show all your sub-sections for About us page?

1. Drop-down list   2. Side-bar   3. Header pages

   WICN: We will still be using drop-down list but we will eliminate as many tabs as

   possible and combine them into one whole page. Tabs other than History, Overview and

   Board of Directors will go in footer section.

- Do you prefer to present the 'about us' section more visually or through context?

   WICN: We prefer visual attraction.

Programs,

- How do you want to layout the Program schedule?

1. A simple text layout   2. Calendar   3. An ordered list

4. WWOZ

   WICN: We prefer calendar style like in WWOZ.org

Contact,

- Do you want an email option in your contact section like the current WICN's website?

   WICN: Yes.

Donation

- How frequently do you want to display your donation sign

1. Only on the home page   2. Every single pages   3. Designated pages(please

specify)

   WICN: Only on home page with a designated icon or button but it should use elaboration

   and visual attraction.

Blogs and News,

- How do you want to show your news section on the home page?

1. Slide-show   2. Featured news and more info   3. Thumbnails

WICN: Slideshow style like in WWOZ.org

Potential references

- Comparing to other radio station website such as WWOZ and KRTU, would you want to have the same or similar look on specific page or overall design?

   WICN: WWOZ

- What do you like or dislike about the layout of these websites?

   WICN: We do not want an additional sidebar navigation like in WWOZ and please refrain from designing text-heavy menu like in KRTU.

- Do you have any favourite design features from above two websites?

   WICN: We like navigation bar, slideshow style, news section, calendar, colors, and button layouts from WWOZ. We like how clean and informative radio player like in KRTU.

- Other than these two websites, what other website do you find to be more attractive?

   WICN: As of now, we do not have one in mind.

Themes

- Have you looked up any radio station theme or template before?

   WICN: No.

- If you have done so, what theme do you have in mind?

   No valid answer.

If you don't have any favorite theme, we have searched for popular themes that might be

compatible with Wordpress. However, they come with price tags. Here are five of them.

David: We chose OnAir2 after meeting with Amanda Carr.

OnAir2
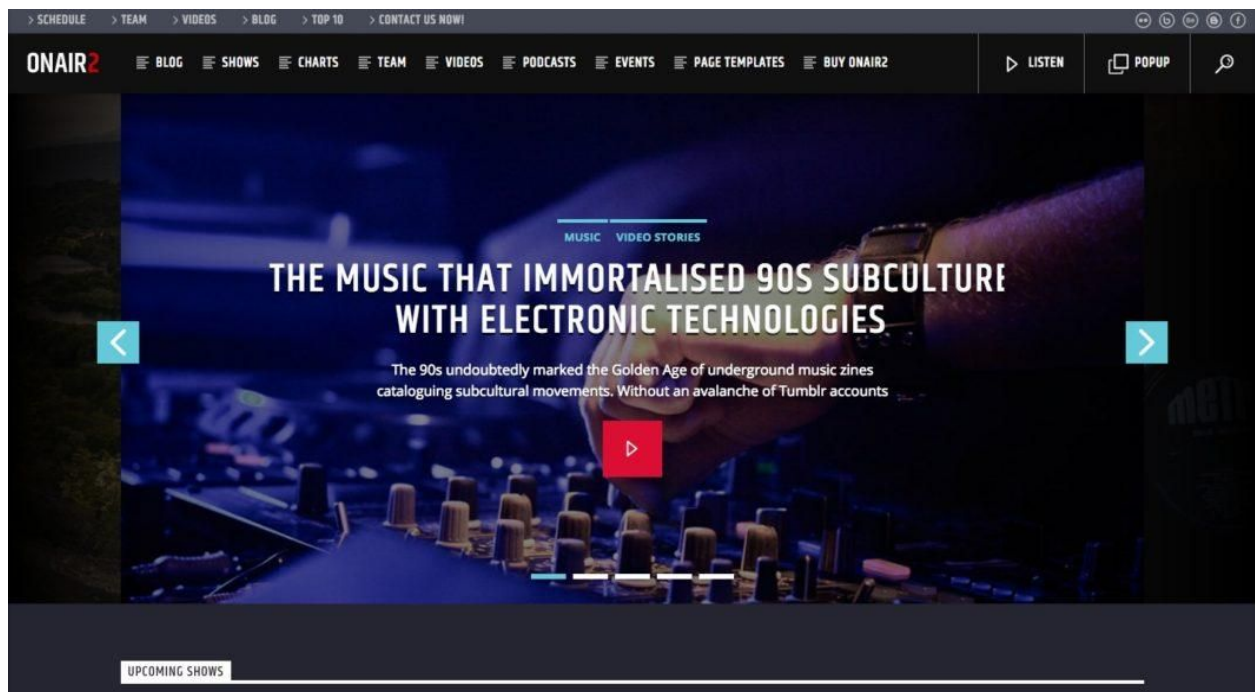
Figure: OnAir2 demo, source: colorlib.com

OnAir2 is the most popular ones among the wordpress themes. It is created by QantumThemes.

OnAir2 has the price tag of 59$ but it is purchased and used by more than 2000 users. It has the best

user rating among radio station themes. Live demo is also available for you to check out. For live

demo and more info on OnAir2, please check

https://themeforest.net/item/onair2-radio-station-wordpress-theme/19340714?s_rank=1

A+ Radio
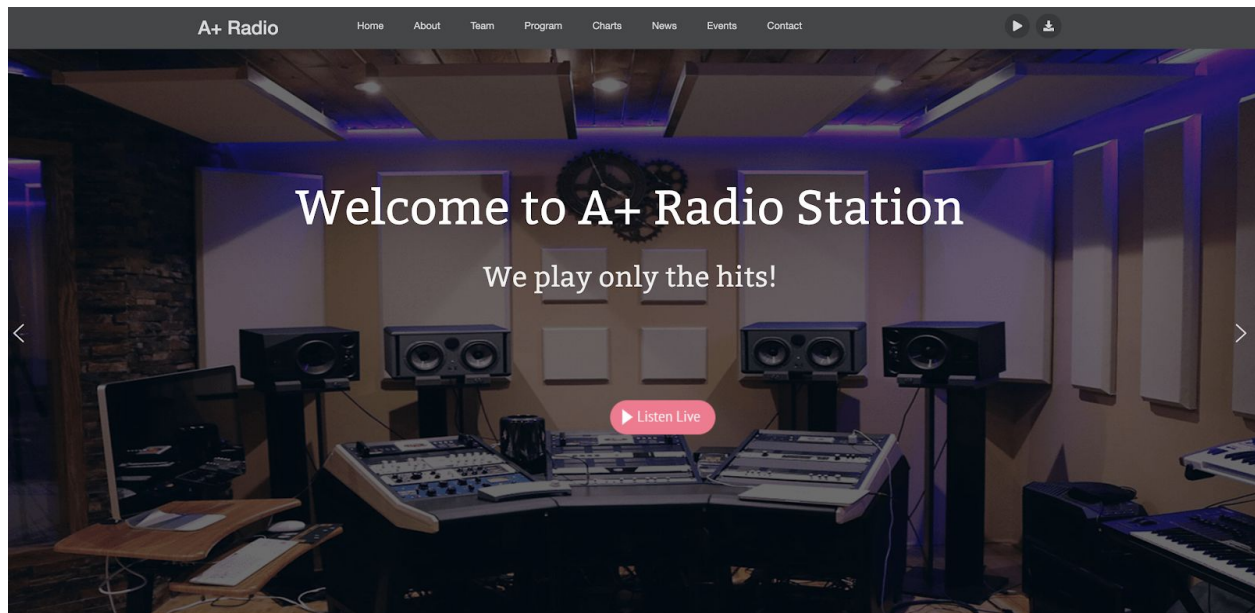
A+ is a fairly flexible theme, which seems to be quite interesting if you don't mind a very vertically spread out front page. It was created by JSquareThemes. Priced at $29, seems to be significantly less popular than some others, so we can't give a very good estimate for quality beyond what we can see in the demos. Preview can be found at https://jsquare-themes.com/demo/alphaplus-radio/
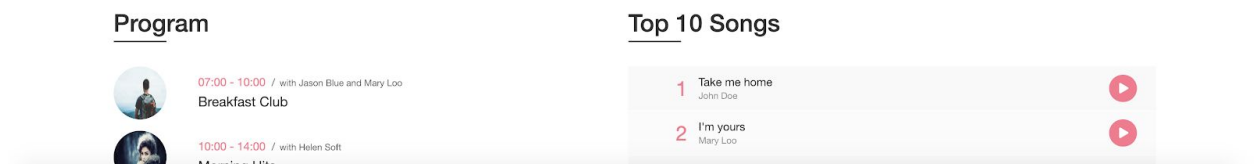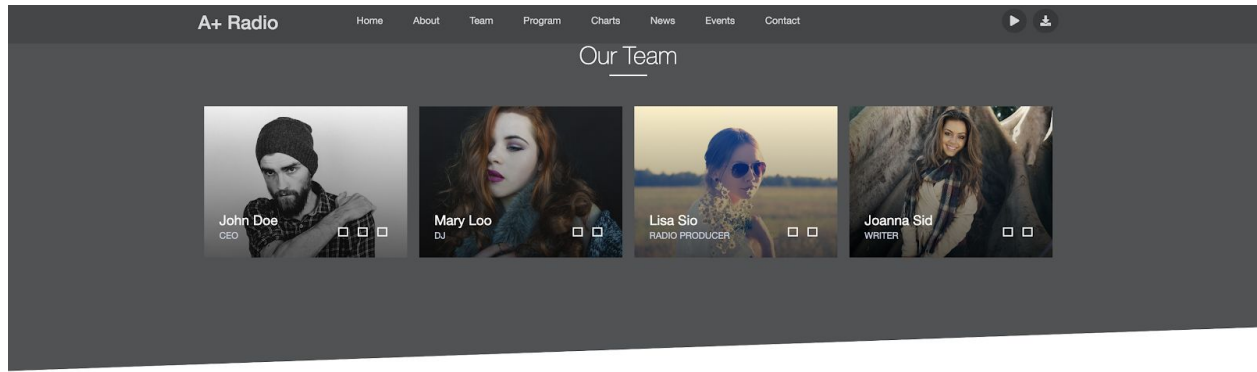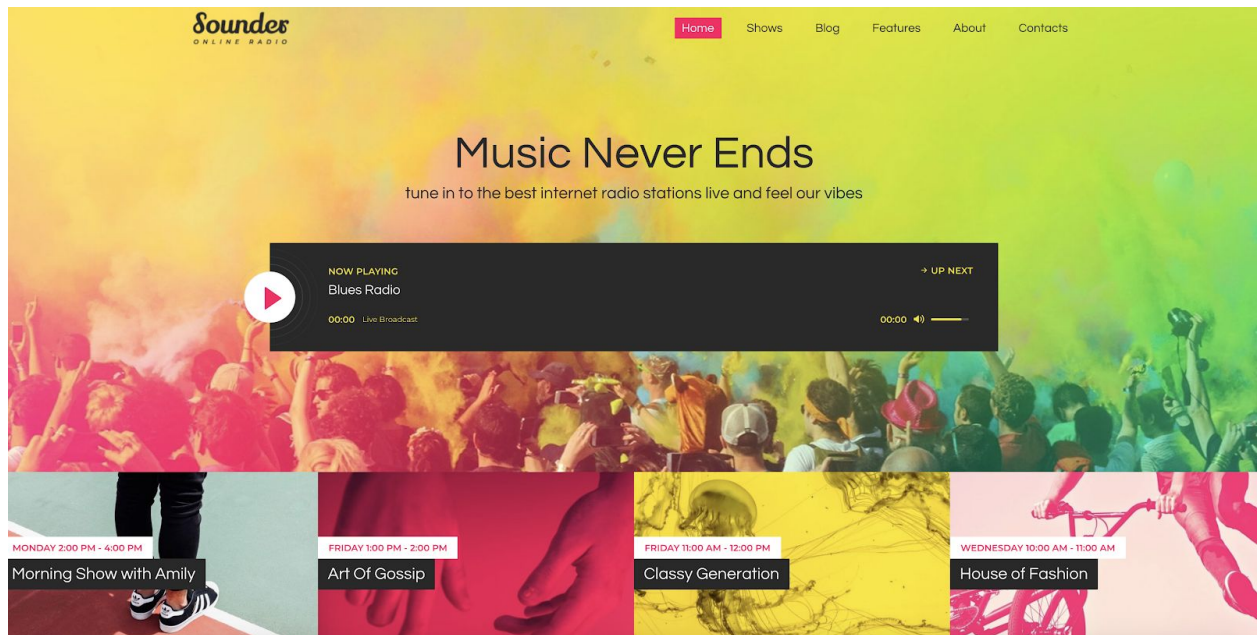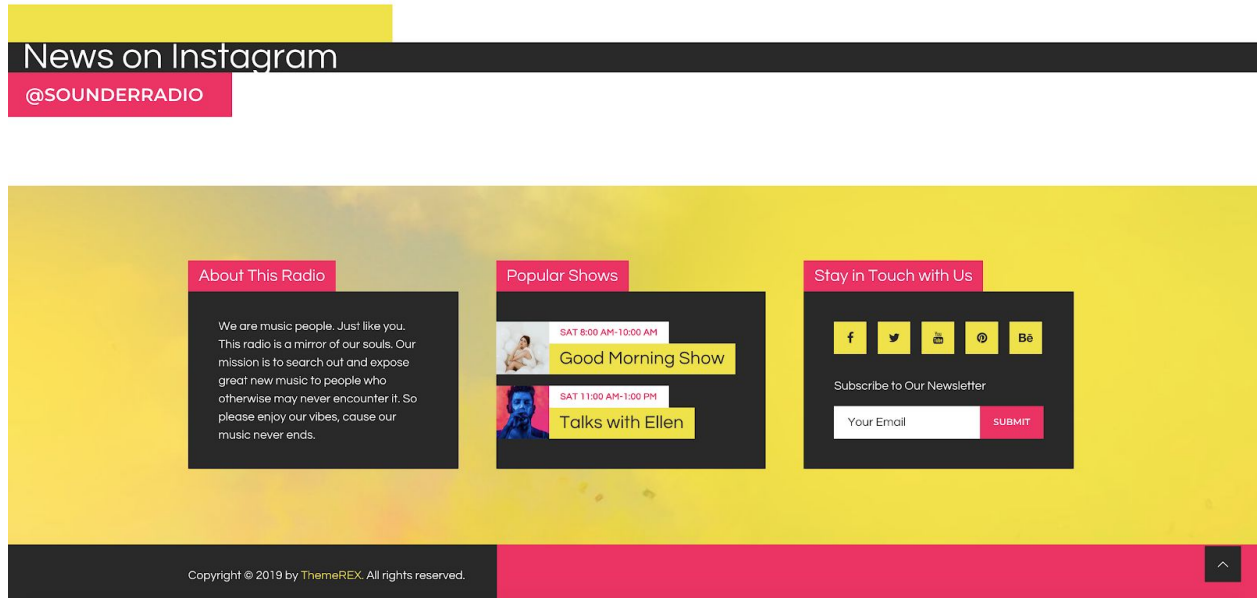
Sounder

Sounder is a radio focused theme made by ThemeREX which is, again, not nearly as popular as some others, with only 100 sales compared to the 2.4 thousand of OnAir. The color scheme is

definitely customizable, and it is priced at $53. Preview available at

http://preview.themeforest.net/item/sounder-online-radio-wordpress-theme/full_screen_preview/21871

681

Music Play
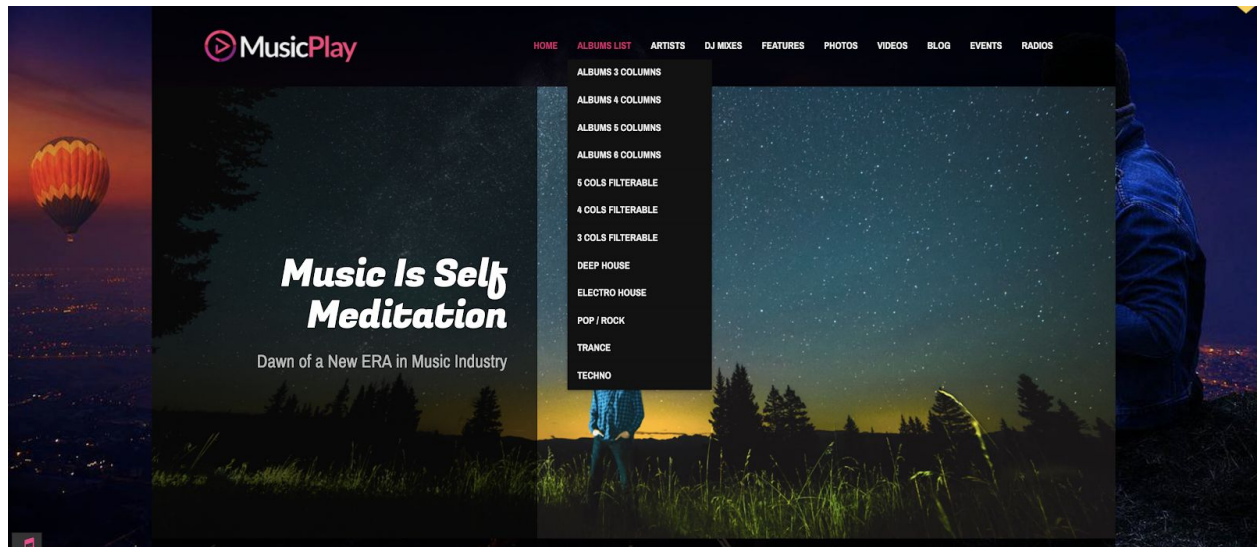
MusicPlay was created by AivahThemes, and seems fairly popular, maintaining an average

rating of 4.67 out of 5 across 197 users, and total sales of 1,583 customers. It is focused on music

creators as well as radio stations, and has several tools for representing music built in. Much of the

layout is customizable, as well as colors and background images. It is priced at $52.

Preview available at http://www.aivahthemes.com/preview/?theme=musicplay
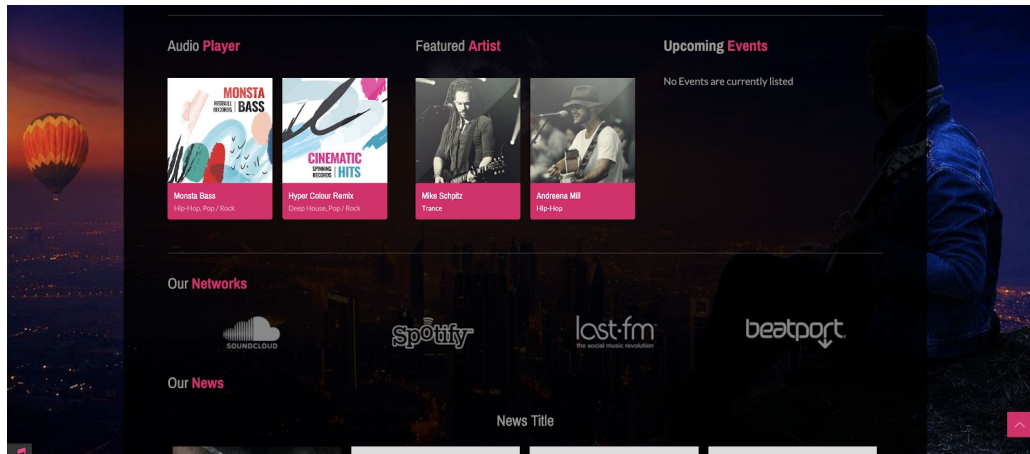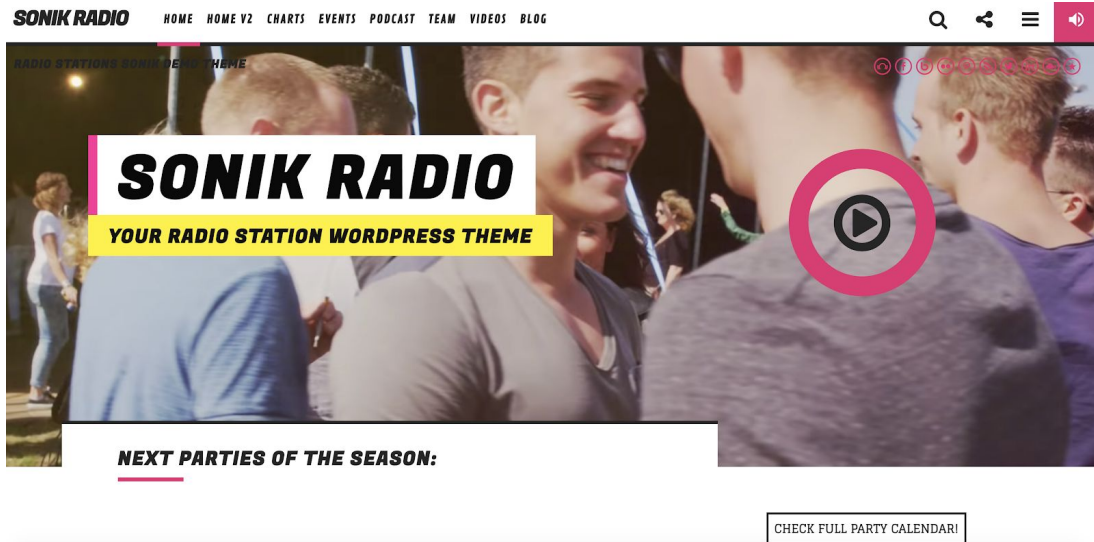
Sonik

Sonik is a reasonably popular theme with a style designed specifically for radio stations. It was created by Qantum Themes and is priced at $59 for our purposes. It is a little less popular than MusicPlay, and significantly less than OnAir2. Font and color customization available, as well as a variety of customizable templates for radio schedules and players.

Demo available at http://qantumthemes.xyz/sonik/demo3
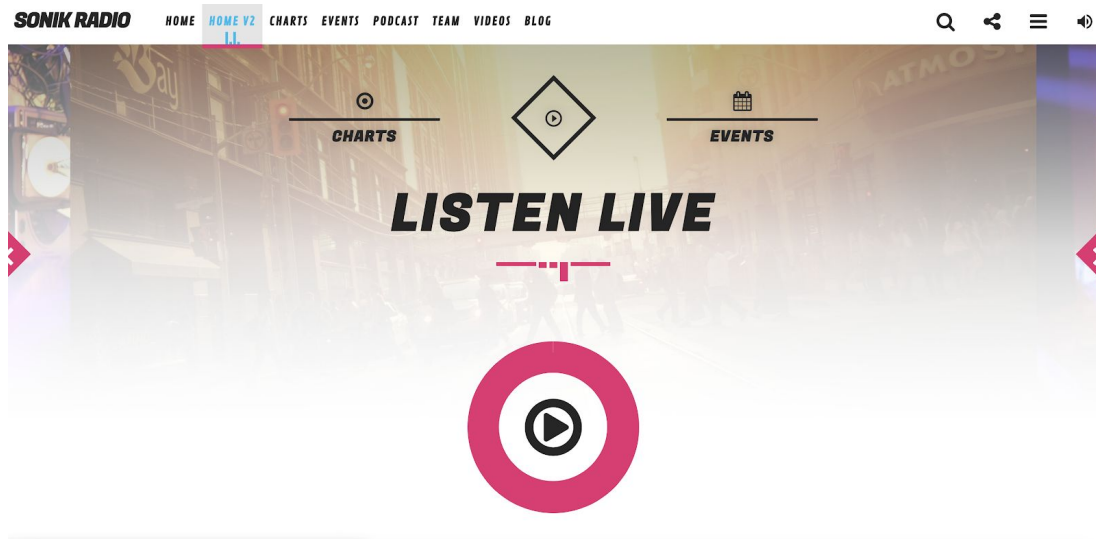
Vice:
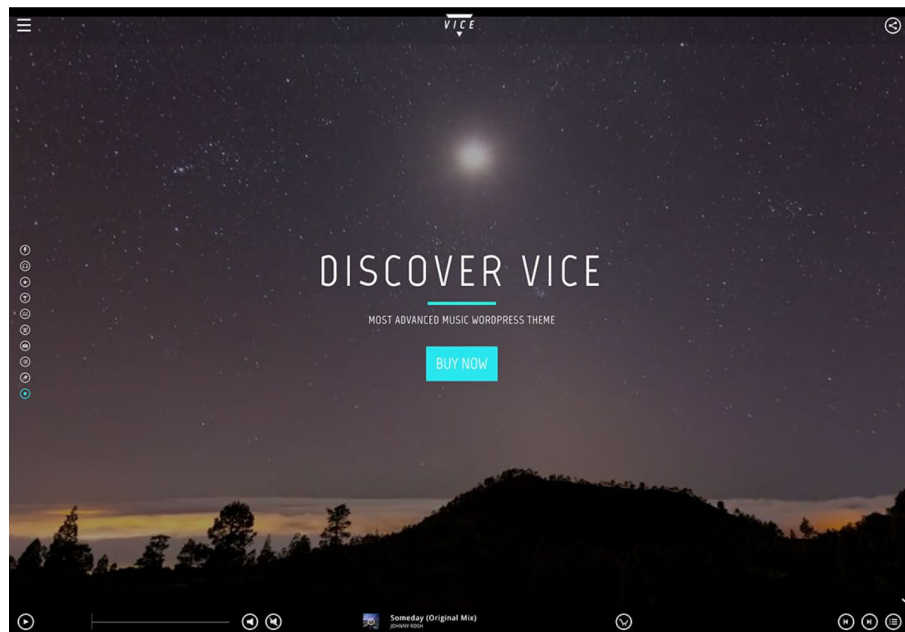
Loads of useful features and settings and a unique music player integration, with a playlist function that can feature entire albums. The auto-play setting remains entirely optional. In addition, site owners will be able to open limitless Radio Station Channels. You can set the order of tracks by priority or at random. For novice customers, several informative video tutorials are also available. They can guide you through the installation process, and the production of new releases.

Demo available at:

http://preview.themeforest.net/item/vice-music-band-dj-and-radio-wordpress-theme/full_screen_preview/10067870?clickthrough_id=1399289337&redirect_back=true&ref=cirvitis

FWRD
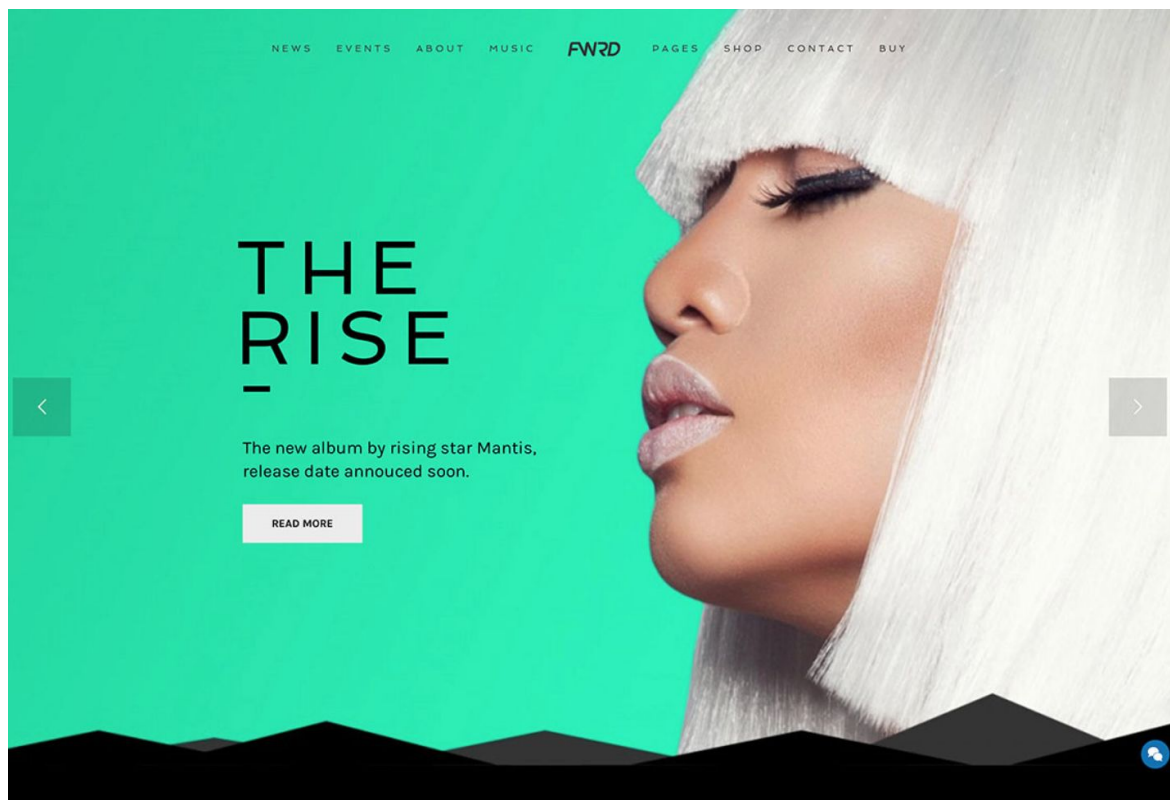
Visually attractive to customers. Video, Parallax backgrounds and accessible Audio player can showcase some of the season's greatest hits. At any time, you can upload tracks and MP3s, sort playlists, or include reviews and lyrics. You can feature the player on all pages, and not just in the homepage. This is made possible by some excellent personalized widgets.FWRD includes the WooCommerce premium plugin, which allows you to design a reliable online store.

Demo available at:

http://preview.themeforest.net/item/fwrd-music-band-musician-wordpress-theme/full_screen_preview/12087239?ref=cirvitis

Appendix 2

StreamGuys forwarded info:

SGplayer customization can be accomplished by extending the existing SGplayer CSS rules.

The desktop version of the SGplayer can be found here:

http://player.streamguys.com/wicn/sgplayer/player.php

The desktop CSS file can be found here:

http://player.streamguys.com/wicn/sgplayer/include/css/sgplayer.css

To customize the desktop layout, host an override CSS file containing any rules you'd like, and

send StreamGuys the URL to the file. We'll adjust the player configuration to include the WICN

hosted CSS file.

The mobile version of the SGplayer can be found here:

http://player.streamguys.com/wicn/sgplayer/mobile.php

The mobile CSS file can be found here:

http://player.streamguys.com/wicn/sgplayer/include/css/m.sgplayer.css

To customize the mobile layout, host an override CSS file containing any rules you'd like and

send StreamGuys the URL to the file.

We'll adjust the player configuration to include the WICN hosted mobile CSS file.

Appendix 3

Email with Professor Lane Harrison

Introduction: My team and I are working on a project related to implementing a CMS for the WICN radio station. Currently, our team is exploring platforms in terms of cost-benefit and features.

Question: We would appreciate your input regarding a few factors:

- Wordpress' reliability
- Other CMS recommendations
- Admin Panel Options
- Streaming and podcasting service in Wordpress or alternatives CMS
- Expandability to mobile devices

Response From Lane Harrison: I actually think Wordpress is the perfect option for what you're describing.

I have seen it used by users without an extensive background in web programming, and I have seen it used as part of podcasts.

You might look at Fireside for podcasting specific features, but I have only heard of it-- I have never used it.