

# Literature review

## 1. Domain review

There are 3 domains related to the project that will be discussed in this session. They are digital media, digital newspaper, and news aggregation.

### 1.1 Digital Media

According to (Maryville, n.d.) Unlike traditional media such as newspapers, magazines, billboards, journals, digital media is transmitted as digital data through cables and satellites that send signals to be translated into audio, visuals, text. When a digital device is used, digital media is also used. They can be podcasts, news videos, articles, ads, VR and graphics.

Digital media can be fit into six sub-categories. They are audio, video, social media, ads, news and literature. Audios consists of podcasts, digital radio and audiobooks. Digital radios such as Spotify, Apple Music and Sirius was subscribed by 10 million Americans. Lots of digital media outlets broadcasts visual such as movies like Netflix and VR surgical simulators in medical institutes. One of the most popular visual streaming sites is YouTube. Social media sites such as Facebook, Twitter, Tumblr, Instagram enables users to like, comment and talk about current trends of celebrities, politics. Taking advantage of partnerships and possible advertising space, many brands use digital media to sell their products. The advertisers have been using the native content and other methods to keep the consumers interested instead of using pop ups or auto play ads. The request to read books, newspapers, magazines still endured even when digital media rises. The popularity of resources site like Wikipedia, the rise of digital newspaper and e-book. Research from Pew Research Center indicates that 38% of US adults read news online.

According to (Das, 2018), there are 5 technological trends that will revolutionize digital media.

First is curation platform and content marketing. AI is playing a vital role in content managing from searching to curating. AI assist content marketing service by using social search so content managers can find contents that are compatible to the users and curate them fast and accurately. Tools such as BuzzSumo can improve and simplify the work of a digital agency in searching, tracking, filtering and analyzing the impact of the content.

Second is natural language generation and AI generated content. Content robot and AI can write good narratives with automatic storytelling and natural language generation. For example, Wordsmith of Automated Insight is a natural language generation that can create million narratives in a matter of millisecond from travel and hotel guides to weather forecast.

Third is chatbot and customer engagement. Even though chatbot have a vital role in customer service, it does not take over the job completely. Chatbots will instead simplify the jobs by providing basic information and performing easy jobs. For example, Facebook Messenger can provide automatic customer services and ecommerce instructions to the users.

Fourth is voice search and SEO. AI has become more advance in voice search. Because of the trend in using voice search, company should reconsider their SEO tactics by prioritizing voice search in either search engines or virtual assistants.

Last is augmented reality. AR can bring to life a true digital experience and many companies are using it in their products such as iOS 11 and ARKit. AR assists experimental marketing by enabling marketers to explain the unexplained and influence the customers. AR can also help buyers experience the product before buying to make informed decisions.

In Viet Nam, there are many companies use digital media for marketing purposes. These two images show the use of social media for marketing by Vietnamese companies and their satisfaction:

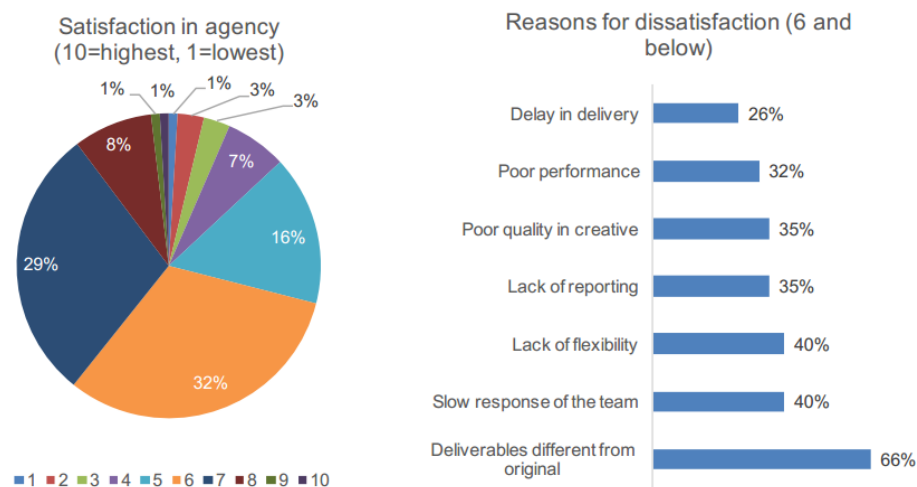


Figure 1 satisfaction of companies in digital media agencies

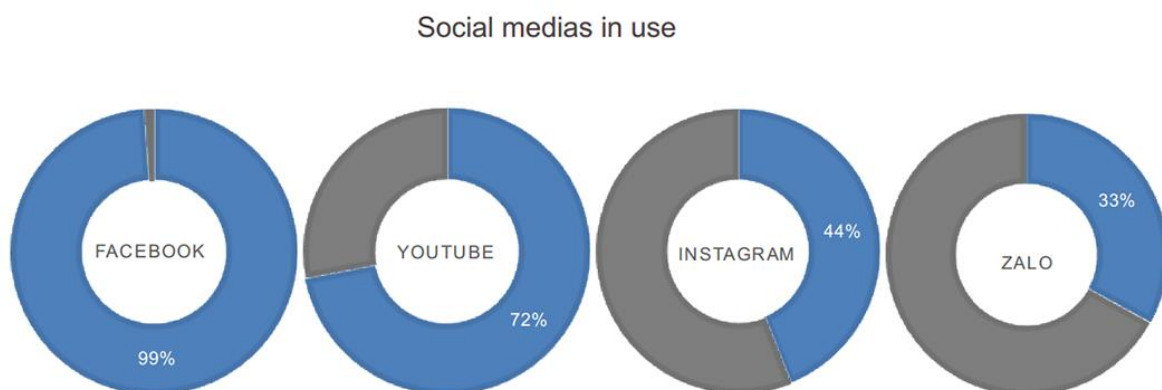


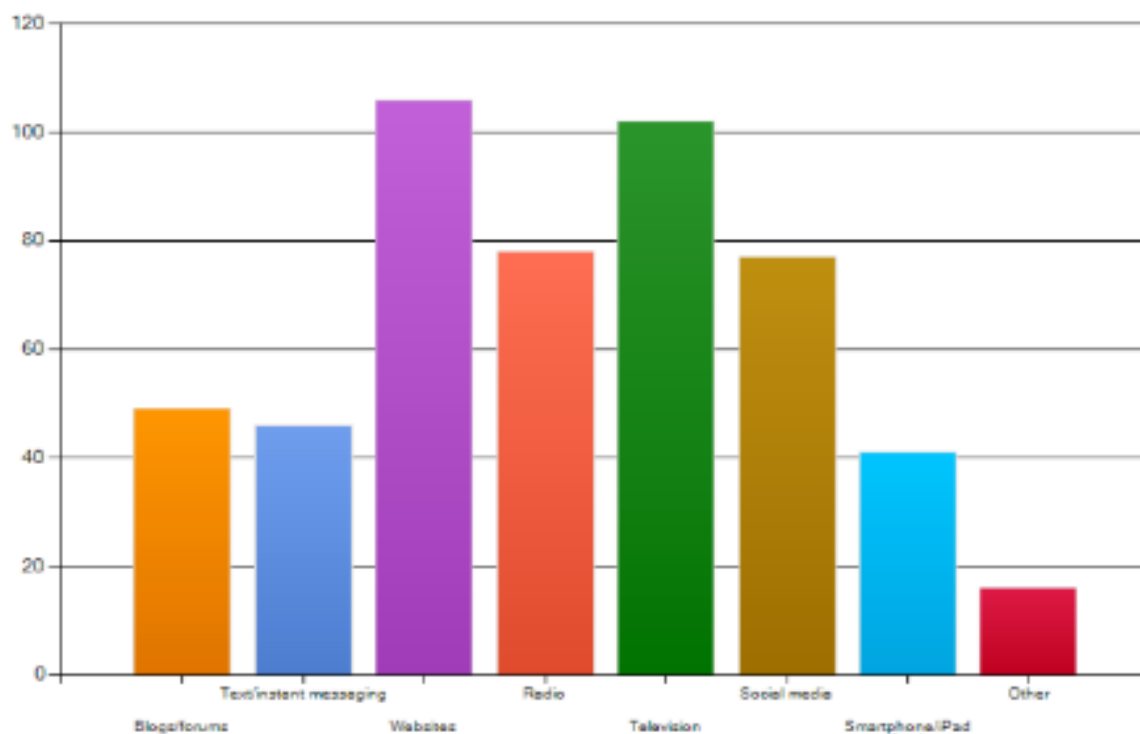
Figure 2 The use of social medias for marketing

The above images show that Facebook is the most popular social media for marketing in Viet Nam with YouTube comes second. Only 10% of Vietnamese companies' satisfaction with social media is higher than 8 whereas 71% is lower than 6. The dissatisfaction comes from the fee and impact on the companies' business.

## 1.2 Digital newspaper

According to (Everett, 2011), after the boom of Internet, newspapers businesses realize that they have become sluggish and needs to catch up with rivals with better technologies. Now, newspapers companies are using technology as a mean to attract readers.

Over the decade, technology has been influencing how newspapers distribute the news to the audience. The figure below shows types of technology used to view the news



*Figure 3 types of technology used to read news*

From the figure above, most people use websites and television to view news. The number of people use radio and social media for news is almost the same, at around 80%. Around 40% of people use blogs, messages and smartphone or iPad for news. The data shows that with the change and progress in technology, it is almost impossible for newspapers businesses to go back to the traditional methods.

Most people want to read free content instead of paid ones. Only 16% of the participants subscribe to a newspaper and 9% read paid news online. 17.4% of participants believe that digital news being free is an advantage against traditional news. However, 32.7% of the participants said that they prefer traditional newspaper to the online counterpart.

Even though the preferential of physical news, Times-News reported the subscription in them has decreased with the rise of online news. Furthermore, when Spokesman-Review charge readers to read online, many users refuse to subscribe. This shows that readers are hesitant to pay for online news when they are usually free and traditional newspapers are losing subscription because readers can find similar news for free online.

These are the usual read online newspapers in Viet Nam:

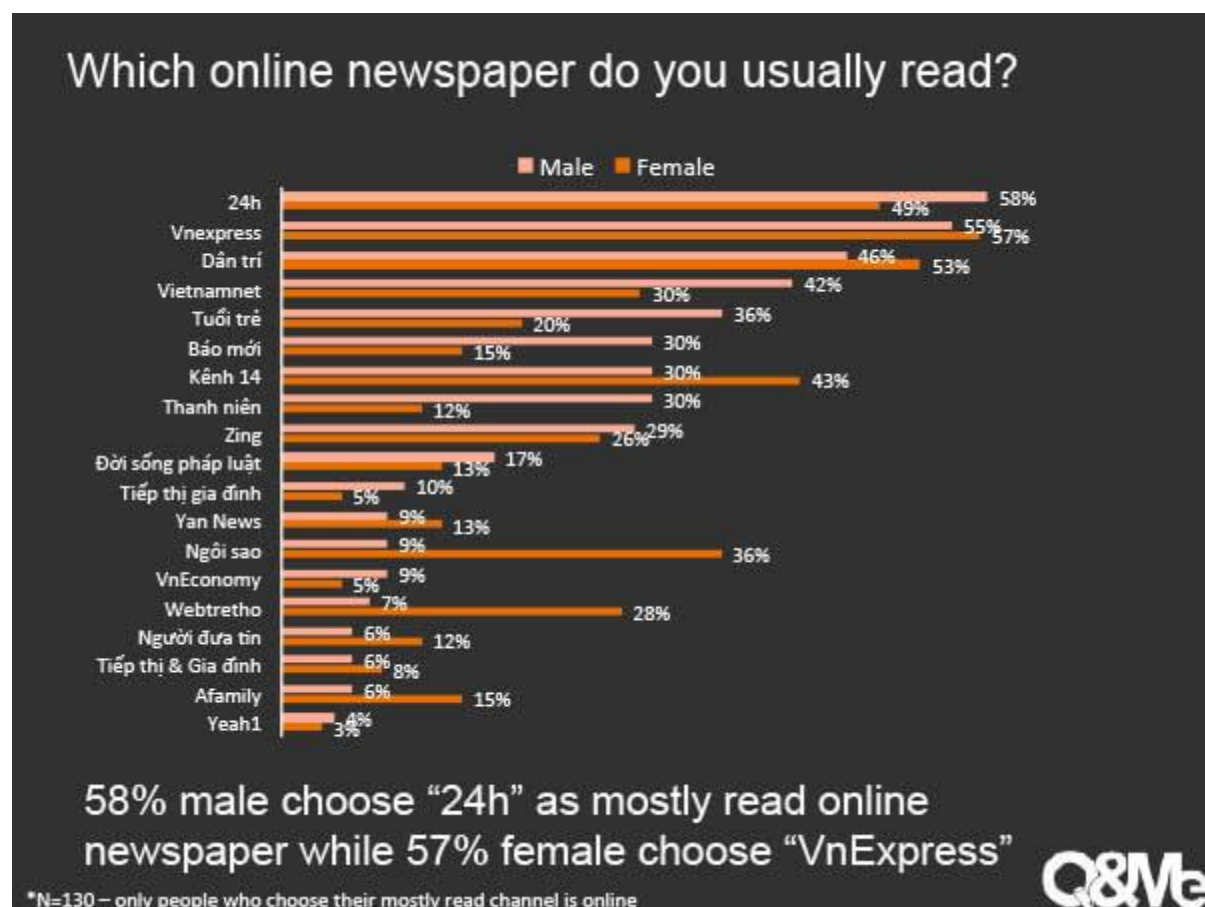


Figure 4 The usual read online newspapers in Viet Nam by male and female

### 1.3 News aggregation

According to (Hanff, 2016), News aggregators are online software or platform that collect news stories and information from other sources and arrange them in a specific manner. News aggregation is based on the concept of content syndication, where content created by an organization is distributed through another. At first, newspapers paid the sources to reprint the news. When technology advances, information travels faster and further, which change the

process of content syndication. Online journalism enables different types of syndication, particularly headlines and scoops. News aggregators deliver news through web-browsers or a standalone software connecting to the Internet.

When newspapers move their publish to the Internet, sections of printed papers become separated section in a website. Since there is no printing and distributing cost, the number of local editions can be expanded, which increase the geographic customization and demographic personalization. Stories can be expanded with photos and videos. News aggregators use RSS, a protocol to publish the news on the World Wide Web through publication of data and metadata tags. News aggregator can be news gathering organizations, intermediary websites and end users.

In Viet Nam, one of news aggregator is Bao Moi. It is a news aggregator site controlled by the computer. Bao Moi gathers news from 100 official digital newspapers. There are 5000 articles and stories gathered and categorized everyday by Bao Moi.

## 2. Technologies

### 2.1 Front-end technology

For front end, we will consider the following:

#### 2.1.1 WordPress

According to (WordPress, n.d.), WordPress is an open-source software that can be used to create website or blog. It provides users with beautiful design, powerful features and freedom to build and develop. The software is free and priceless.

39% of websites use WordPress. The websites are ranged from hobby blogs to big news site. These are the examples:

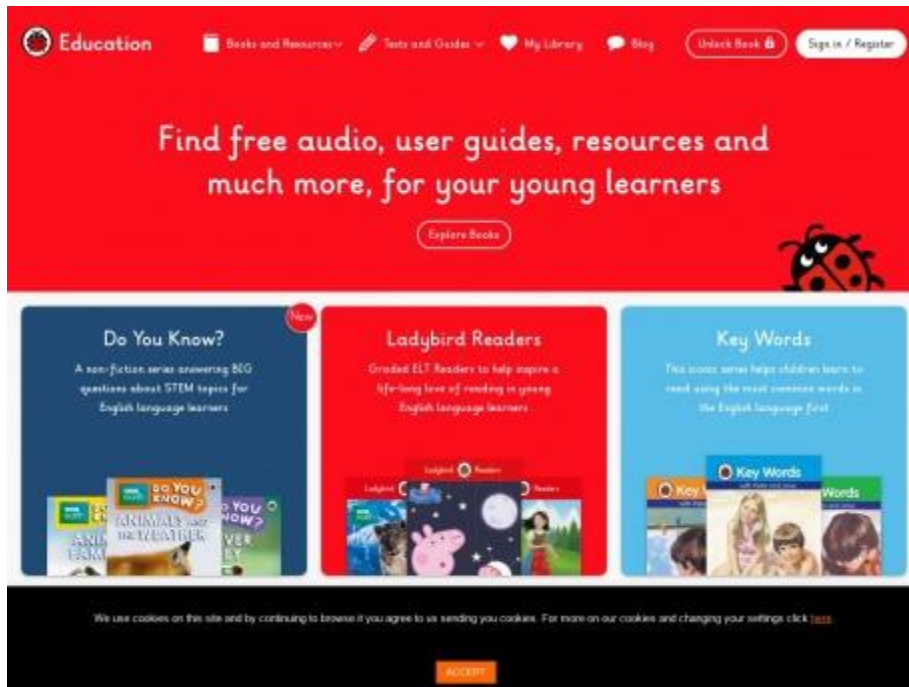


Figure 5 Ladybird Education



Figure 6 Vogue



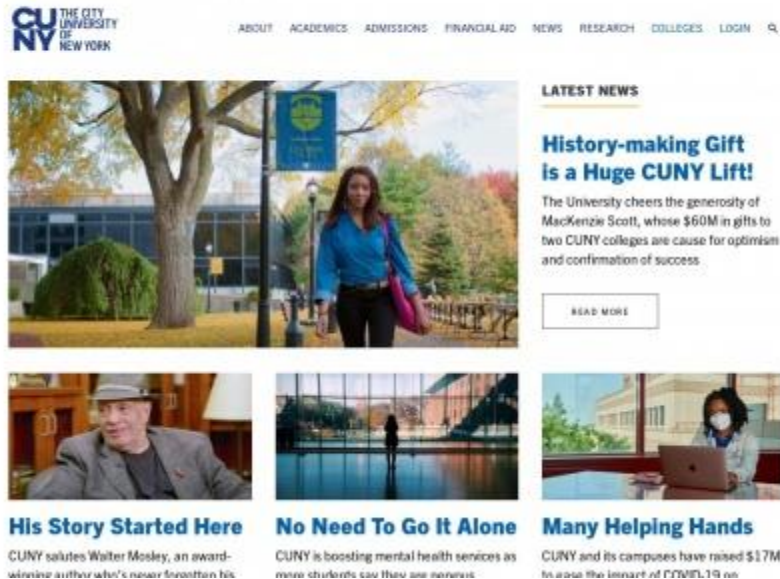


Figure 7 City University of New York

According to (George, 2019) These are the advantages of WordPress:

- Customizable design: WordPress has thousands of attractive themes, many of them for free so users can design their website however they want.
- SEO friendly: WordPress make SEO easy by simplifying the use of h1, h2, h3 tags and keywords in the URL. It also has supporting plugins such as SEO Ultimate, All-In-One-SEO-Pack, Platinum SEO Pack, Yoast WordPress SEO.
- Responsive mobile site: The website will automatically adjust its size according to the device
- Speed and efficiency: WordPress allowing you to build a website in at most a single day with content and pictures.
- Manage on the go: With WordPress, content is easier to manage. The management can be simplified if editors, authors and administrators are hired.
- Functionality: WordPress offers plugins and themes that make it easy to customize a website. Therefore, a WordPress website can be many types such as e-commerce, blogs, news site, job list or online communities
- Easy and accessible: WordPress requires no coding knowledge. You can choose a provided template or work with a professional web developer for a custom site. This will help users focus on other areas instead of web design.

According to (Cortez, 2020), These are the disadvantages of WordPress:

- Plugins are needed for more features: even though users can choose a template to build the website, they need to know the necessary plugins if they want to add desired

features. For example, if developers want to add Instagram feeds, they need InstaWidget. The plugins are either free or paid and some of them are outdated.

- Frequent theme and plugin update: Users need to frequently check for update of theme and plugins. This can distract from other tasks. If the updates are not checked, the webpage can encounter glitches and crash.
- Vulnerability: since WordPress is a popular, a website made from it can be hacked or spammed since it is the main target. Vulnerabilities can be exploited even if the user purchases security plugins for the site.

### 2.1.2 Angular

According to (Angular, n.d.), Angular is an application design framework and development platform used to create single-paged apps using HTML and TypeScript. It implements the functions of TypeScript libraries imported into the app.

The architecture of Angular relies on fundamental concepts. The basic building blocks of Angular is components. The components are organized into NgModules that collect codes into functional sets. An angular program is made from a set of NgModules. Components define views, which are a set of screen elements that Angular can choose and modify according to the program logic and use services that provide functions separately. Services can be injected as dependencies so the code can be modular, reusable and efficient.

Module, component and services use decorators, which mark their type and tell Angular how to use them. The metadata of a component class associate it with a template that combines HTML with Angular directives so HTML codes can be modified by Angular before rendering it for display. The metadata of a service class is necessary so components can be available through injection.

Angular provide router service to define sophisticated navigation path among the views of the program.

These are the benefits when using Angular:

- Functionality out of the box: the default setup provides users with many functions such as routings tools to fetch data, environment for developing and testing and the official library provided by Angular Team.
- TypeScript: Angular is built with this type of language. With it, the code become clear, which is helpful to spot bugs and errors.
- Consistency and productivity: Angular is a full-fledged responsive web design framework. There is one suggested way to create a component, service or module. This will create consistency throughout the code and let developers know how it is built. Once developers know how to create a component, creating another one is simple because they only need to follow the same structure.
- Maintainability: Update is easy with just the order “ng-update”. They do not need to worry about which features need to be updated or which version should be used.



These are the disadvantages of Angular:

- Performance: AngularJs is used to build SPAs. If they are complex, the performance can encounter lags and become inconvenient to the users.
- Steep learning curve: Because Angular is versatile, there are more than one way to finish a task. Therefore, many developers are confused. However, Angular tutorials and discussions are made to solve the problems.

## 2.2 Back-end technologies

In this section, I will compare the two back-end technologies to be chosen for the project.

### 2.2.1 Node.js

According to (Node, n.d.), Node.js is a back-end technology designed to build scalable network applications. It is an asynchronous event-driven JavaScript runtime. In the example below, many connections can be handled simultaneously. A callback will be fired every connection. If there is no more connection, Node.js will go to sleep.

```
const http = require('http');

const hostname = '127.0.0.1';
const port = 3000;

const server = http.createServer((req, res) => {
  res.statusCode = 200;
  res.setHeader('Content-Type', 'text/plain');
  res.end('Hello World');
});

server.listen(port, hostname, () => {
  console.log(`Server running at http://${hostname}:${port}/`);
});
```

*Figure 8 Node.js Hello world example*

These are the benefits of Node.js:

- Scalability: with Node.js, application scaling is easy whether it is horizontal or vertical. To make it different from other server-side tools using JavaScript, Node.js enable users to add different resources to single nodes
- Quick learning curve: Because Node.js is derived from JavaScript, it will be easy to learn to use it as a back-end app if users have experience in using JavaScript for front-end.
- Single language: because Node.js use JavaScript – a programming language that can also be used as front-end - , users do not need to switch language when developing a full-stack website, make it simple

- High performance: Node.js read JavaScript code through Google's V8 JavaScript engine. The engine compiles JavaScript into machine language, which increase the speed and efficiency. Furthermore, it is also faster because the environment is supported by non-blocking I/O operations

These are the drawbacks of Node.js:

- API instability: Node.js needs to be consistent with the API and its update. New versions of API lack backward compatibility, which means it requires more work to build a solution suitable with the API.
- Lack of library support: because Node.js is based on JavaScript, JavaScript's weakness is also Node.js's weakness. JavaScript lack a robust library system so developers will find it difficult to implement tasks such as XML parsing, ORM and database operations.
- Asynchronous model: An asynchronous model enables apps to be scalable, but it also makes Node.js harder to use than tools that use linear-blocking I/O programming.

### 2.2.1 Django

Django is the most famous Python Web framework that encourages rapid development and clean design. Python is compatible to every platform, open-source and scalable. It consists of components that helps developing website fast and easy. Django's main purpose is to simplify the development of complex database-driven websites.

These are the advantages of Django:

- Batteries included: instead of writing the code from scratch, developers can import packages to add simple functionalities. The packages are made by Django community members. This provides time for developers to focus on complex functions.
- Faster development: Django's design allow it to use multiple component, which enables the fast development. With this, corporations can make rapid MVP and focus more time on marketing the product.
- REST framework for APIs: Django uses REST framework, a Python library to build APIs for applications. The framework has modular and changeable architecture, which make API development simpler and more flexible.

These are the disadvantages of Django:

- Lack of convention: Unlike Ruby or Rails, Django has no convention principles that can be followed when developing websites. This makes it difficult for developers who are used to Convention instead of Configuration
- Not suitable for small projects: Django can confuse developers with its unique functionalities. Moreover, it requires a lot of coding, which needs time for server processing and bandwidth. Therefore, Django is only suitable for large projects or projects that needs scaling.

- Steep learning curve: even though Django is simple, it uses Python syntax, which makes it difficult.

## 2.3 Chosen technologies

In this section, I will choose the front-end and back-end technologies among those that were introduced above.

The chosen front-end technology for the project is Angular because:

- The project is built as a single- app, which is suitable for Angular
- Angular use TypeScript, which will help spotting the bug.
- Angular is known for its consistency. With it, developers can know how the code make up the app.
- Developers can update Angular with ng-update command.
- It is necessary for me to show my coding skills in the project, so Angular is chosen even though WordPress is easier

The chosen back-end technology for the project is Node.js because:

- Node.js only uses JavaScript, which is a familiar programming language. I have more experience in using Java Script more than Python, which is vital for Django. Therefore, I can learn to use Node.js better than Django.
- My project is a small, which is unsuitable for Django.

## 3. Methodologies

### 3.1 Waterfall

Waterfall is a method that divide software development process into multiple stages. A stage cannot be done unless the previous ones are completed. Each stage is designed to perform specific tasks.

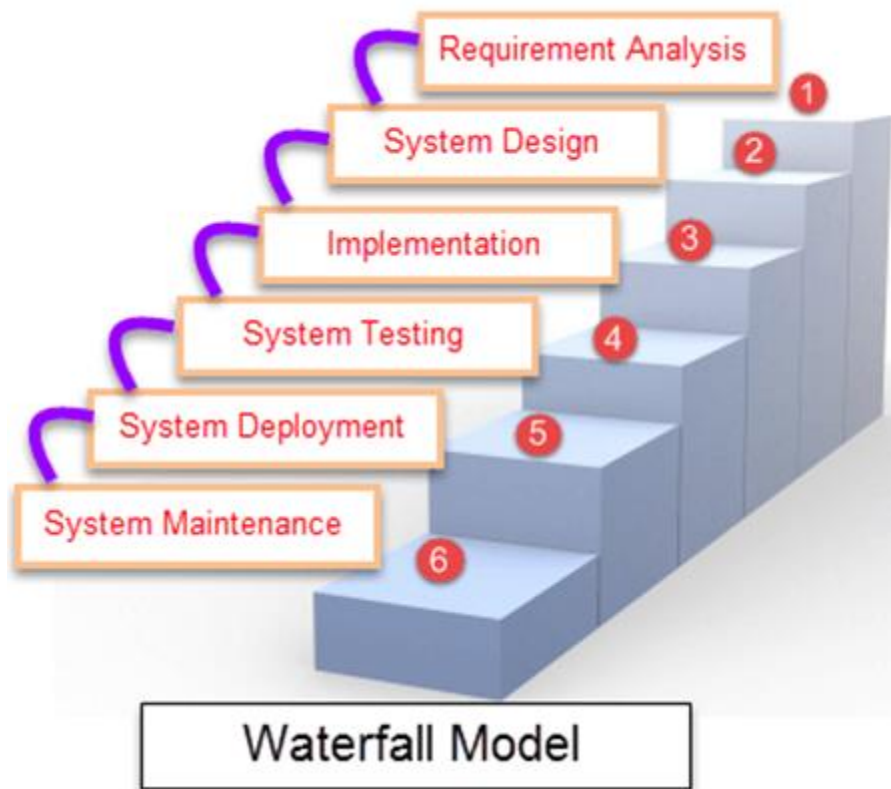


Figure 9 Waterfall model

These are the benefits of waterfall methodology:

- Suited for small projects where requirements are defined.
- A quality assurance test is done before each stage.
- Careful documentation is done at the end of each stage.
- There is minimal amount of client intervention in the project.
- Any changes are made during the development process.

These are the drawbacks of waterfall methodology:

- Errors can only be fixed during the stages.
- It is not suitable if the project is large or requirements can change.
- Documentation takes a lot of time.
- Customers' feedbacks cannot be included in the development process
- Small changes or errors may cause problems for the final product

### 3.2 Agile

Agile methodology is a method in which the software is developed in repeating, incremental cycles. This results in incremental releases with each of them built on previous functionalities.

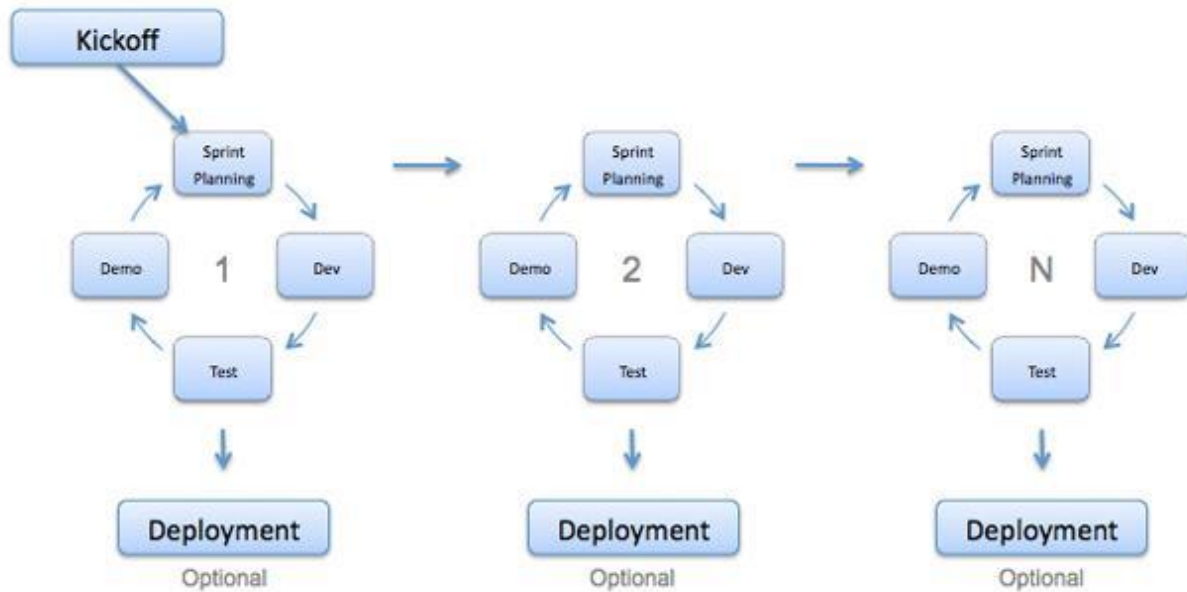


Figure 10 Agile model

These are the benefits of agile model:

- Working software is delivered frequently, which increase the customer satisfaction
- People and interaction is emphasized more than tools. Stakeholders can cooperate with each other better to finish a product.

These are the drawbacks of agile model:

- It is hard to assess the required effort at the start of each cycle, especially for large project.
- There is no emphasis on the design or documentation.
- Only experienced programmers can make decisions during the process.
- The requirements and outcome may not be clear.

### 3.3. The chosen model

For the project, I will use agile model because:

- The developers will have more interactions with customers to make the best product.
- The product can have late changes even after it is completed