Microsoft Flow

Third Year Group Project: Final Report

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1. INTRODUCTION

Microsoft Flow is a newly developed software service by Microsoft. It acts as a platform that enables automated workflows to be setup across different services and applications. Flow helps users automate essential but repetitive tasks[1] so that they can utilise their time more efficiently.

The primary requirement of this project was to explore the Flow platform and its capabilities. The team and Microsoft agreed to meet this requirement by focusing on enhancing users' online shopping experience through the creation of new workflows on Flow. The team has worked hard to provide users with a streamlined and more convenient online shopping experience through the integration of many services like cloud storage, image recognition, text analysis and social media. This report contains a detailed illustration of the initial research and brainstorming, design development, testing and considerations, as well as suggested future work for this project.

1.1 Project Organisation and Management

After the initial research and brainstorming process, tasks are delegated to each member with some focus on technical aspects such as research on API (Application Programming Interface)[15], coding and implementation of workflows on Flow while others focus on non-technical aspects such as team management, problem definition, market research, competitor analysis, deliverables, and documentation. Members have a mix of technical and non-technical responsibilities, a detailed assignment of responsibilities for each team member can be seen in Table 1.

Member	Main Responsibilities
Jie Wu	• Communication with Client and Supervisors • Coding + Flow Implementation • Product Demonstration • Writer - Main Report & Summary Report
Minghe Wen	• Coding + Flow Implementation • Brainstorming • Presentation Slides • Writer - Blog for Microsoft • Writer - Summary Report
Virgram Mohan	• Image Recognition Service Research and Selection • CloudSight API Technical Research • Presenter - Presentation and Demonstration • Writer - Main Report
Bicheng Huang	• Brainstorming • Outline technical problem, design specifications and client requirements • Facebook API Technical Research • Writer - Main Report
Mengyang Le	• Brainstorming • Developing Brainstormed Ideas • Criteria and Idea Selection • Facebook API Technical Research • Writer - Main Report
Yumeng Sun	• Brainstorming • Team Management and Organisation + Taking Minutes (See Appendix [A]) • Product Operation and Examples • Structure Outline - Report and Presentation • Writer - Main Report & Summary Report

Member	Main Responsibilities
Mubarak Alimi	• Brainstorming • Market Research and Competitor Analysis • Technical Documentation • Presenter - Presentation and Demonstration • Writer - Main Report & Summary Report
Ivan Savelev	• Brainstorming • Developing Brainstormed Ideas • Presenter - Presentation and Demonstration • Writer - Main Report

Table 1 - Roles and Responsibility

The team worked with a detailed timeline that can be seen in Figure 1. This Gantt Chart was created using the Smartsheet[2] software. Tasks were frequently modified and added as the team progressed. The team had a flexible and organised schedule with each member completing corresponding tasks either on time or beforehand.

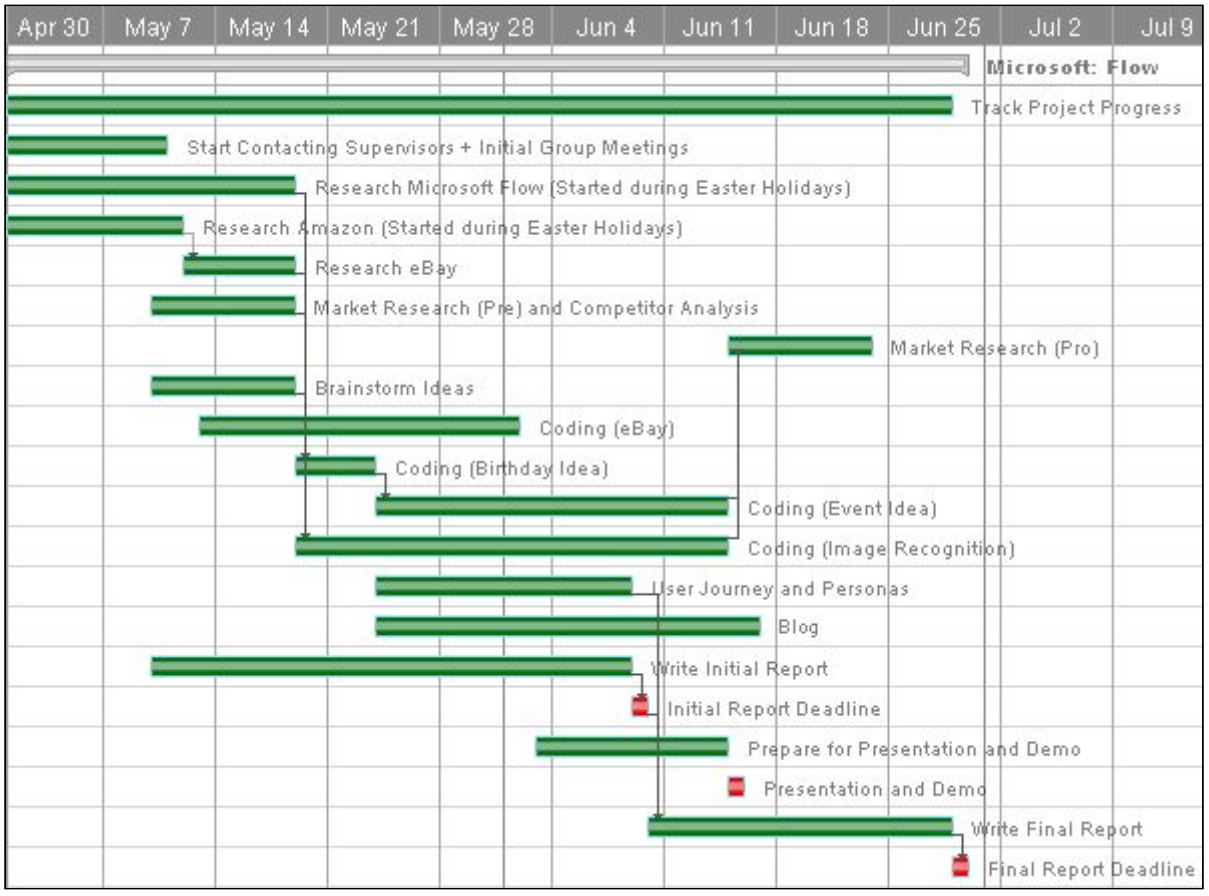

Figure 1 - Gantt Chart

1.2 Market Research and Competitor Analysis

Automation apps for services and applications represent a relatively novel market. As shown in Appendix [B], this market predominantly consists of a number of automation applications that are relatively unknown to the average smartphone user. In a broader spectrum, there are numerous other automation applications[3]. When we began narrowing down the market to Microsoft Flow's competitors, we noticed a smaller group work using similar principles of workflows. Such automation applications include IFTTT, Workflow, AutomateIT and Atooma.[4] Table 2 shows a brief analysis of these aforementioned competitors.

Competitors	Description	Advantages	Disadvantages
Workflow (for iOS)	*Personal automation tool, enabling you to drag and drop any combination of actions to create powerful workflows for your iPhone, iPad, and Apple Watch.*	• *Works using principles of Workflows.* • *Award-winning application allows combination of several steps across several applications.* • *Includes Music applications.* • *Over 200 commands available.* • *Also available on Apple watch.*	• *Compatible with iOS 8.0 or later on iPhone, iPad and iPod Touch only* • *Frustrating initial workflow setup process* • *Requires an iOS app store account to gain access to Workflow*
IFTTT	*Web service that connects the other services you use every day like Evernote, Gmail, or Dropbox* [5]	• *Easy to use.* • *Works on the simple concept of "If this, then do that".* • *Has a vast library of pre-built resources which can be used or edited to suit your needs.* • *Available on multiple platforms*	• *Does not allow you to execute complex tasks.* • *Limited functionalities* • *Third-party integrations can be a little unreliable at times.*
AutomateIT	*Ideal automation application for those who love flow diagrams and know how to work with flowcharts to get a logical task done.*	• *Has a simple user interface* • *Free to use.* • *Straightforward to use.*	• *Android only* • *Limited functionalities* • *Cannot combine multiple triggers*
Atooma	*Allows you to program activities that you would otherwise do manually.*	• *Has a simple user interface.* • *Free and easy to use*	• *Android only* • *Can only manage 5 if-do actions per flow* • *Cannot edit some workflows*
Macrodriod	*Task automation and configuration application that focuses heavily on usability with a simple, attractive User Interface and logical step by step process.* [6]	• *Easy to use.* • *Simple UI* • *Can create custom plugins*	• *Android only.* • *Can only use a limited number of third party applications for the free version.* • *LImited functionalities.*

Table 2: Competitor Analysis

Other automation applications on both Android and iOS operating systems include Skiplock, Call recorder, Llama, RepetiTouch and CheatSheet.[4]

Although the above services have their pros and cons, the most important takeaway is that none of them currently have online shopping functionalities implemented on their platforms. Therefore, there is no close competitor to this project specifically.

2. DESIGN SPECIFICATIONS

2.1 Initial Designs

The following initial designs are developed from results of brainstorming amongst the team's members. Initially, Amazon was the online shopping platform considered here since it was suggested by our clients, Microsoft. However, after encountering various technical and non-technical difficulties detailed in Section 3.1.4, this is changed in the final design.

2.1.1 Gift Recommendation from Friends

The first idea was designed for users who have troubles deciding on gifts to buy for their friends, colleagues or family members on their birthday. Figure 2 shows an overview of this idea. This functionality connects the user's Facebook friends' information with Flow. Once the user has a friend's birthday coming up on Facebook, Flow is automatically triggered and sends messages to mutual friends of the user to enquire about gift recommendations, it then extracts keywords from replies. Subsequently, these extracted keywords are used to perform a search on Amazon.

Figure 2 - Gift Recommendation from Friends Flowchart

2.1.2 Automated Gift Suggestions

The second idea was also designed to enhance the user's smartphone experience by aiding them in the general sense of selecting gift items. Due to its nature, this idea is slightly similar to the Gift Recommendation from Friends idea in section 2.2.1. For this idea, when a specific event is coming up, its name gets automatically analysed and searched on Amazon and users are able to receive messages about information of relevant gifts. Though similar, the idea differs from the previous idea in the sense that it is less personalised and works better for events such as Mother's Day, Wedding Anniversaries etc. Figure 3 shows a rough interpretation of this idea.

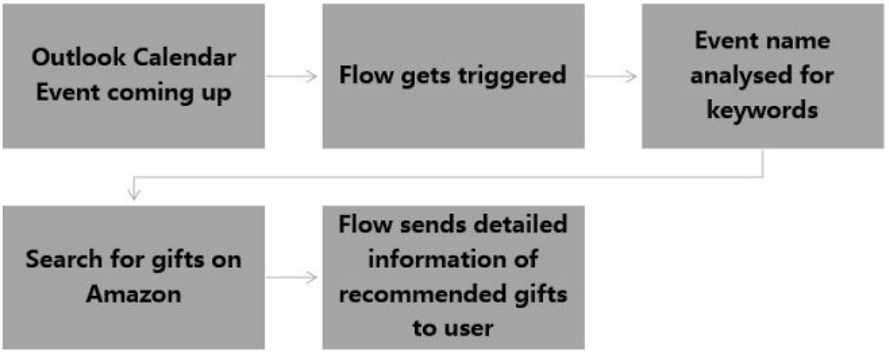

Figure 3 - Automated Gift Suggestions Flowchart

2.1.3 Product Recognition

This idea makes it much easier for users to find what they are looking for when shopping online. The user simply takes a picture of the item he wants and similar items from Amazon are automatically suggested. Once a user takes the

photo of the item, Flow gets triggered and the picture gets automatically uploaded to Dropbox. This picture is then sent to an image recognition service.

Image recognition services have the capability of analyzing pictures and generating descriptions for these items. Flow then extracts keywords from the description and searches them on Amazon. As before, the user will then receive an email about the gifts' information. Figure 4 provides an overview of this idea.

Figure 4 - Product Recognition Flowchart

2.1.4 Missed Phone Call

Before the team and Microsoft agreed to focus on exploring Flow's usage for online shopping, some ideas were previously generated. Figure 5 is an overview of one of many ideas that were unrelated to online shopping.

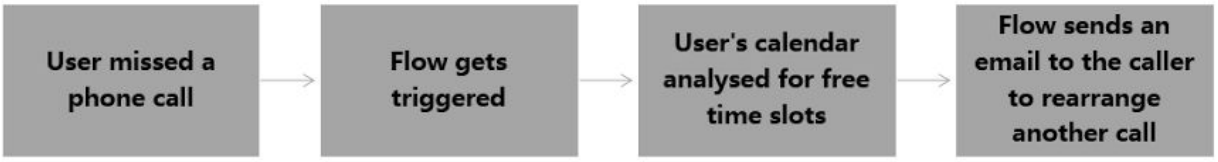

Figure 5 - Missed Phone Call Flowchart

2.1.5 Event Gift Recommendation

In this final idea, Flow connects to Facebook, Azure Cognitive Service, Amazon and an email service to automatically provide users with gift recommendations for certain events. For example, you get invited to your cousin's tenth birthday party on Facebook. By clicking the "going" tab, Flow automatically sends you an email with a shortlist of popular children's gifts from Amazon. Figure 6 provides an overview of this idea.

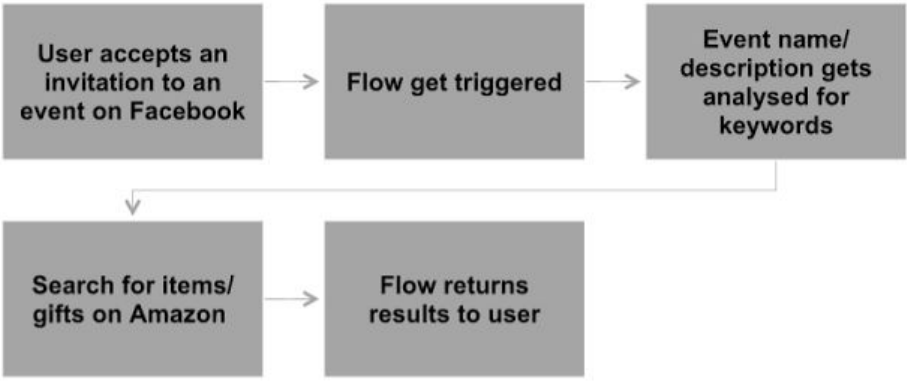

Figure 6 - Event Gift Recommendation Flowchart

2.2 Idea Selection

The general purpose of Microsoft Flow is to increase users' efficiency in daily life. In order to select preferable workflows, the team chose a set of criteria to analyse and evaluate each idea in terms of ease of use, market feedback, technical feasibility, process challenges and limitations. Table 3 shows the evaluation results of each idea with respect to each criteria.

ONE TO TEN RATING SYSTEM		Criteria (weights shown in brackets)					Results		
		Ease of Use (1)	Limitation (1.5)	Process Challenge (2.6)	Market Feedback (2.8)	Technical Feasibility (5)	Raw Score	Weight Score	Rank
Options	Ask Friend to Select Gifts	6	6	6	8	7	33	88	3
	Automated Gift Suggestions	6	5	6	8	7	32	86.5	4
	Product Recognition	7	8	7	7	8	37	96.8	2
	Miss Phone Call	6	5	5	7	6	29	76.1	5
	Event Gift Recommendation	8	8	7	9	8	40	103.4	1

Table 3 - Idea Selection Matrix

Through this process, it is clear that the Product Recognition and Event Gift Recommendation ideas were eventually selected for further development and implementation.

2.2.1 Criteria Selection

Technical Feasibility --- Since Flow is a software based platform, it is crucial to look through the API of related third-party applications and services to consider how realistic it is for the team to implement each idea.

Market Feedback --- This is very important as it reflects the level of interest the target audience has with regard to each idea. Furthermore, the team can adjust and improve the workflows further according to the market feedback. This, in turn, improves customer satisfaction.

Process Challenges --- This is a pre-estimated analysis of the degree of difficulty regarding what has to be done in order to implement each workflow in real life. It encompasses both the technical (programming) and market-related hurdles to overcome. For example, if the OpenAPI file requires excessively sophisticated programming, the team will consider the idea challengeable.

Limitations --- It is also important to consider the limitations for idea selection because it evaluates possible drawbacks of each workflow if it is eventually implemented.

Ease of Use --- The team aims to design workflows that are user-friendly. They should be simple and clear to setup. Moreover, after the initial setup, users have to be able to utilize the automated service with ease.

2.2.2 Rating the Ideas

The process of rating each idea was done with a scale of 1 to 10 and these ratings are used to grade each Flow idea successively.

Technical Feasibility --- If the API of applications or services can provide all the functionality needed, we would give it a relatively high mark. Eg. Through research and studying APIs, we found that the API of eBay and CloudSight provides most of the functionalities required for Product Recognition. Thus, we marked it 8 out of 10 for Product Recognition.

Market Feedback --- If the the flow idea is favoured and welcomed by our client or the target audience, we would mark it with a high grade. Eg. The Event Gift Recommendation idea: Our client's feedback was very favourable towards this flow idea as it saves a lot of time on selecting the gifts . Hence, we gave it 9 in terms of market feedback.

Process Challenges --- This measures the level of difficulties would be incurred on the process, if it is relatively hard, we gave a low mark for the idea. Eg. We graded this criteria with 7 for Product Recognition idea as the OpenAPI file of this idea is relatively easy to write.

Limitations --- If the Flow idea has many drawbacks, we gave it a very low mark. Eg. For Automated Gift Suggestion, the major limitation here is its similarity to our first idea of a Gift recommendation flow. Hence, it was given a lowly rating of 5 out of 10.

Ease of Use --- If the setup and usage process of a workflow was deemed easy and clear, it was given a high grade. Eg. For Event Gift Recommendation, the users only need to login the account of Facebook and email to utilize the workflow. Therefore, we decided on a grade of 8 out of 10.

3. TECHNICAL IMPLEMENTATION

3.1 Design Development

A workflow on Flow consists of a trigger and a series of actions, when a trigger event happens, it will trigger the workflow and the following actions will be executed in their specified order.

In order to implement the ideas on Flow, the team not only need to utilise existing triggers and actions on Flow, but also need to connect web services that are not currently on Flow to the platform. This is done by using the API (Application Programming Interface) provided by such third party services. For an API to work, an HTTP request[10] must be made to an said API. It then returns a response from the web services provider to the request sender, thus allowing communication between different web services.

An OpenAPI[] file needs to be written in JSON[] programming language for each API in order to implement its functionalities to Microsoft Flow. The OpenAPI file essentially describes the API in a way that Flow can understand, and acts as a Custom Connector that connects the web service to Flow.

Once the ideas are selected, the team started investigating the existing triggers and actions on Flow, to determine which functionalities are already there, and which need to be implemented additionally by building Custom Connectors.

3.1.1 Product Recognition

Dropbox

For product recognition flow, there are triggers for Dropbox, Google Drive, Microsoft OneDrive and other cloud storage services on Flow already, these triggers will be able to initiate a workflow when a new file is uploaded to them. Dropbox was chosen because it is one of the most widely used cloud storage service, such that potential users are highly likely to have existing Dropbox accounts.

CloudSight

Although there is a pre-existing image recognition functionality with Azure Cognitive Service Computer Vision, the team discovered that it is not the optimal choice to use in our design, so other image recognition services needed to be considered. Based on our research shown in Appendix [C], the team concluded on using CloudSight[], which returns outputs better suited for eBay search because it gives more specific details about items, such as brands. This means a Custom Connector is needed for CloudSight.

eBay

Considering that there were no online shopping services connected on Flow (and various other automation app competitors), these also need to be implemented by means of creating Custom Connectors. The action needed from online shopping services is searching items in their catalogue, and getting a list of results. The team initially chose Amazon as the most suited online shopping platform for this design. However, due to reasons discussed in Section 3.1.4, eBay is implemented instead.

Notification Email

Flow has various email services integrated such as Outlook and Gmail, and can send customised emails to specified email addresses. This is used as the chosen method to return eBay search results to the user.

3.1.2 Event Gift Recommendation

Facebook

There are a small number of Facebook triggers and actions on Flow. However, none of them offers the functionality needed, which is to trigger a workflow when the user accepts a new event invitation. Therefore, this needed to be included on Flow's platform by creating a Custom Connector.

Azure Cognitive Services

There are many services under Azure Cognitive Services that are integrated on Flow by Microsoft, one of them is Text Analytics, which can extract keywords from paragraphs. This is used to extract keywords from Facebook events descriptions. The keywords will then be used to do online shopping searches.

Etsy

For this design, an online shopping platform that focus on gifts is preferable, since the design is aimed at recommending gifts for events the user is attending. Thus, Etsy was also chosen and similarly to eBay, this also required a Custom Connector to implement its services to Flow.

3.1.3 Development and Testing Process

After determining the third-party web services that need Custom Connectors, the team started developing these. Due to the modular nature of a workflow as seen above, the development process is also done in a modular way. Although each action is different, the development and testing procedures are similar. Our process is shown in Figure 7.

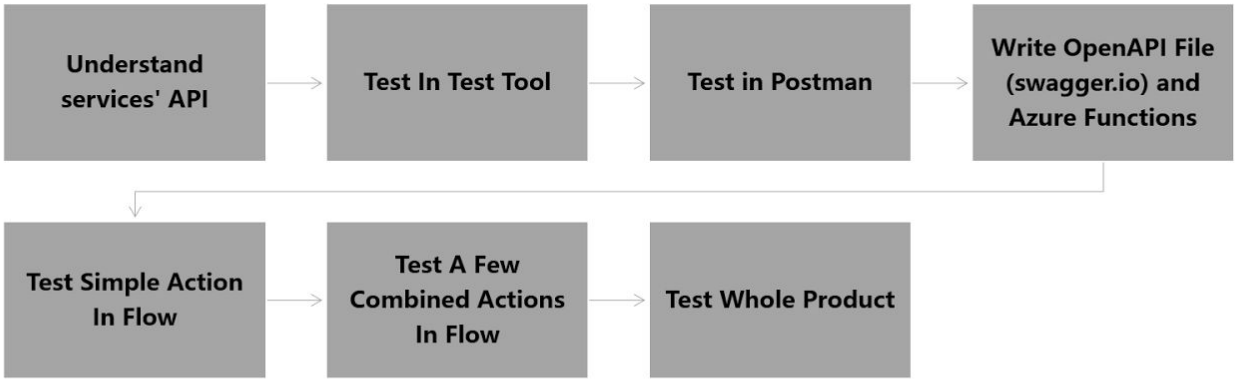

Figure 7 - Overall Testing and Development Process

Most web services provide documentations on their APIs to help developers understand and utilise them. More supportive services, such as Facebook, even provide test tools for developers in order to easily interact with their APIs. Test tools don't require complete understanding of some aspects of the APIs, such as authentication. These are designed to test the core functionalities of the APIs, i.e. the test tools are the first step to validating the team's understanding of the APIs.

Additionally, a software called Postman is used for testing. Postman is a graphical interface that allows easy configuration of HTTP requests. The team made use of this to test APIs and gain a more complete understanding, since it requires configuring details like authentications that are not needed in test tools. Once the team can successfully interact with an API using Postman, it means the API is understood and an OpenAPI file can be produced.

However, there are many technical difficulties that hinder usage of an OpenAPI file in connecting them to Flow directly. Therefore, Azure Functions were used as an intermediary step to make the connection possible. This was the main technical challenge of the whole project

3.1.4 Technical Challenges and Solutions

Azure Functions

Since Flow is a new platform, it has a number of limitations in terms of the type of API it can connect directly with an OpenAPI file. Only a selection of industry standard authentication methods are supported and there are also a few bugs that prevent Custom Connectors from being implemented correctly. Furthermore, because every API is provided by its own web service provider with their own unique practices that differ from the industry standard, most APIs cannot be connected to Flow directly. This is where the Azure Functions come in.

Azure Function is a server-less architecture provided by Microsoft that can host 'functions' acting as miniature web services. Azure Functions support a wide range of programming languages and the team choose to use Python. Since the applications on Azure Functions are written from the ground up by the team, there is a lot more flexibility. The functions can be written in a way that is compatible with both third-party and Flow's limitations. So when a Custom Connector is created for the function, it will be able to take input from Flow, make requests to other APIs, get responses, process data, and pass data onto Flow.

Dropbox

Although there is an existing Dropbox trigger on Flow, this trigger can only pass the actual file and the file's relative path to Flow via Dropbox. This was troublesome because CloudSight only takes either public URL address or the image file as an input and the method Flow uses to pass image files is not supported by CloudSight. Thus, the team faced a choice between finding a way to generate a public URL address of the input image and finding an alternative method to pass the image file to CloudSight indirectly. Both solutions involve the use of Azure Functions as an intermediary.

Both solutions were also considered and developed simultaneously but generating public URL solution was successful first. It was achieved by making use of a Dropbox API action that does not exist on Flow called 'Create Shared Link', which is essentially an action implemented by writing an OpenAPI directly. However, the 'Shared Link' created still did not work with CloudSight, so an additional Azure Function was written. The function takes the Shared Link as input and modifies it to a format that can be accepted by CloudSight as a public URL address. The function then passes the new URL back to Flow, so Flow can pass it further to CloudSight.

CloudSight

CloudSight API uses an authentication method called API Key. Each application using CloudSight API is offered an API Key by CloudSight's server and the API Key is used to authenticate every request an application made to the server. The API Keys provided by CloudSight are all formatted with a "space" character in between. When implementing CloudSight, Flow rejects the API Key as a result of this space character, raising an unexpected error. After consulting the Flow Dev team from Microsoft, we realised it was due to a bug in Flow's architecture design.

Another challenge we encountered was the uncoordinated way CloudSight API operates. It intrinsically divides one image recognition procedure into two HTTP requests: Firstly, the application POSTs an image or image URL to CloudSight's server which returns an image token to the application as the response. Then, the application makes a GET request with the token to CloudSight, which returns the status of the image recognition process. The recognition process takes 10 seconds on average, and will only return the image description when the status is 'Completed'. Therefore, to get the result as quickly as possible means sending multiple GET requests within regular time intervals, until one request returns with a 'Completed' status. Doing these on Flow is crude and can affect user experience.

To solve these two problems, an Azure Function is written by the team such that it takes the public URL address of the image, make a POST request with the URL and correct authentication. Because the request is between Azure Function and CloudSight as opposed to a Flow and CloudSight, the 'space' bug is avoided. The function then gets the image token from CloudSight and performs the GET requests in repeat at fixed intervals until it receives the image description. This way, the image description is then passed to Flow and CloudSight only appears as one action on Flow with intuitive input and output. In the meantime, we reported the bug to Microsoft and helped with fixing it.

Amazon

There are several other limitations in regards to implementing Amazon service on Flow. Amazon's API is outdated and does not use the new industry standard used by Flow. For instance, Amazon uses HMAC-SHA256 signatures to request

authentication which is not compatible with Flow, the response payload is formatted in XML but Flow only accepts JSON. All these issues can be combated by utilising Azure Functions, however, the major challenge faced is logistical.

An Amazon Associate Account is required to apply for a Product Advertising API Developer Account, which grants access to the API. (See Appendix [F]) To sign up for such an account, a URL of the application or website in which the API is utilised must be provided. The team provided the Flow URL, which did not get approved, and as a result Amazon were contacted for help but no positive response were received. After communicating with Mr. Lee Stott, our client representing Microsoft, we decided to switch to work with eBay and other online shopping services instead.

eBay

The eBay API uses OAuth2 to authenticate applications. Although OAuth2 is an industrial standard, eBay performs the authentication in an unconventional way, as shown in Appendix [D]; its server requests for a RuName (eBay Redirect URL name) from the application, which is automatically generated when the application is created. But Flow has a default and non-editable redirect URL which gets sent to eBay's server. Due to the dissimilarity between these two, the authentication will fail and eBay's server will be unable to generate the authorization code and access token, which are essential for an application to perform actions on eBay.

This issue was resolved by redirecting the authentication process to an Azure Function Proxy. Azure Function Proxy is a subset of Azure Functions, the proxy is able to automatically rewrite the redirect URL and sends the correct RuName to eBay's server when set up, as shown in Appendix [E]. Hence, when creating the Custom Connector, instead of configuring the OAuth2 to eBay's server, it is set to Azure Function Proxy first.

The above is the first iteration of the solution for this problem; it was used before the team gained proper understanding of Azure Functions. Because the above solution used Flow as the OAuth2 authentication interface and due to Flow's limitation, it requires the user to input his/her eBay account and password in order to gain permission to perform actions on eBay. Realistically, this is not the best practice from a security aspect because our design only performs an 'item search' action on eBay, thus, should not require user permission.

The new solution is implemented by writing another Azure Function. The function requires an Application token from eBay directly which is used for authentication, in order to remove the need for users to give permission to Flow. The function takes the keywords from Flow and searches them on eBay. It then passes the search results back to Flow.

Etsy

The team connected another shopping platform to Flow, called Etsy. This was achieved through a similar method as the second eBay solution mentioned above, by creating an Azure function that handles the authentication, takes keyword inputs from Flow and returns results. The only difference is Etsy API uses API Key authentication method instead of OAuth2, but the function can process the authentication without any problems.

Notification Email

Displaying the results to the user in a clear and informative fashion is an important aspect of the designs. In order to achieve this, the search results from online shopping services are gathered together and formatted using HTML language, which is the programming language used in website design and can also be used to design emails. Since all the search results are retrieved using functions we wrote for the online shopping services, the HTML formatting is implemented in the same functions. By doing this, it reduces the clutter in the Flow interface, since it does not add additional actions to Flow.

Facebook

Many ideas from the team's brainstorming session need access to a user's friends' profile in order to recommend gifts to the user for their friend's birthday. But due to Facebook's strict privacy policies, for an application to access a user's friends' public information, it has to request for "Extended Permissions"[14] from the user. But only applications with Facebook's approval have the ability to make these requests. Generally, this approval is only given to trusted organizations and services with exceptional reputations. Misuse of this approval can lead to potential legal issues. Hence, due to the sensitive nature of this problem and limited time, it is decided to use Facebook event information instead, of which the usage is less strictly regulated.

This requires a trigger for a workflow every time the user accept a new event invitation .To make such a trigger, the team were required to build a Webhook between Facebook and Flow. The way webhook functions is that instead of

Flow making HTTP request to Facebook to check updates, Facebook sends new information to Flow automatically by making HTTP request. However, Flow only supports basic webhook setup and Facebook's webhook setup process requires an additional verification step. Therefore, Azure Functions is used again. A new function is written that sets up webhook between Facebook and Azure Functions with the verification process, so Facebook is able to post new information to the function every time there is change to the user's event list. The function then will check if the change is a new acceptance of an event, if yes, it will pass the information to Flow through another webhook between Flow and the function.

3.2 Considerations

3.2.1 Industrial Design, Ergonomics and Manufacturing

During our procedure of implementing our designs, we had to consider a couple of key points. From the users' perspective, Microsoft Flow must ideally be near instinctive. In the final designs, this is achieved such that the users are only required to install Flow on their device and login with their Facebook, Dropbox and Microsoft accounts, and the rest is all automatic.

From the manufacturing point of view, we had to keep the costs and resources to a minimum but since a majority of the coding for Azure functions were done by the team, our expenses were to a minimum and is detailed in Section 3.2.2.

3.2.2 Costings

The main cost components of the projects are Cloudsight and Microsoft Azure Text Analytics. These two services charges different prices depending on the amount of requests sent to them. The details are as shown in the table below:

CloudSight	Number of requests per month	500	2,000	7,500	30,000	-	Overage rate per 1,000 request
	Price per month	$0	$99	$299	$899	-	$30.00
Azure Text Analytics	Number of requests per month	5,000	100,000	500,000	2,500,000	10,000,000	Overage rate per 1,000 request
	Price per month	$0	$150	$500	$1,250	$2,500	$0.25

Table 4 - Cost breakdown of services used

There are also costs associated with the use of Azure Functions, however, these are negligible since the free allowance for using Azure Functions is high. There are 1 million executions and 400,000 GB-s of execution time per month for free. The storage cost of the Azure Functions files is $0.10 every month due to the lightweight nature of the developed functions.

Based on the above information, only $0.20 of cost is induced during the development of the project, which was covered by our client on their Azure Platform in the form of free credits. Storage of the Azure Function files is the sole reason for the $0.20 cost, since all the testing did not exceed the free allowances of all the other services we used.

Projection of future costing is difficult since it hugely depends on the amount of potential users. If we assume each workflow gets used 5 time per month by a single user on average, and the user base is 10,000, these will result in a cost of $1649.10 per month. However, if the user is able to provide their own CloudSight and Azure account, due to the low data traffic per user, the cost will be free.

3.3 Final Designs

After pivoting the original ideas along the way due to miscellaneous technical challenges and limitations, the team finally decided to work with the two modified designs, *Product Recognition* and *Event GIft Recommendation*. Compared to the original designs, the final designs replace the use of Amazon API with eBay and Etsy APIs.

Furthermore, we decided to use the user's events information, which requires lower level of privacy permission from the user.

3.3.1 Design I – Product Recognition

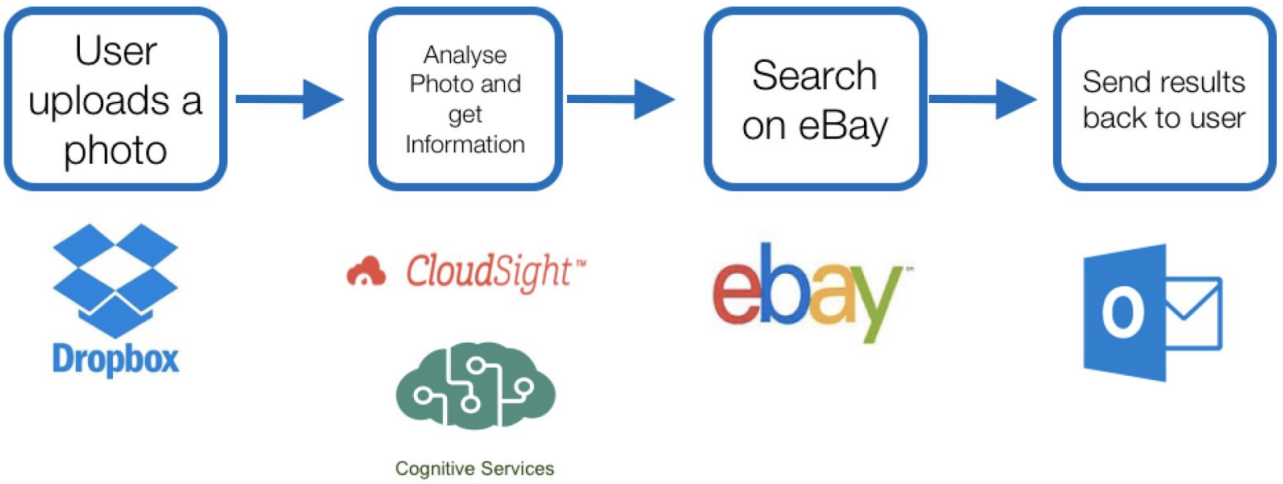

Figure 8: Product Recognition Final Design Flowchart

This workflow helps the user recognise items in an image, then searches similar products on eBay and sends back the results to user by email. In this Flow, the user takes a photo and upload to Dropbox in order to trigger the Flow. Flow then sends the photo to Cloudsight with the aim of performing photo recognition and subsequently, perform a search on eBay. The user then receives an email with the information of the suggested products on eBay.

We believe this design has a wide range of user cases and can solve several practical problems in regards to online shopping. For example, a user can use this workflow to search for similar products to the he/she likes when window shopping or trying to organising an album on their smartphones. This design would significantly save time for users in these cases since the commencement of the entire workflow only depends on one action, that is uploading an image.

The detailed procedures of this design is shown below:

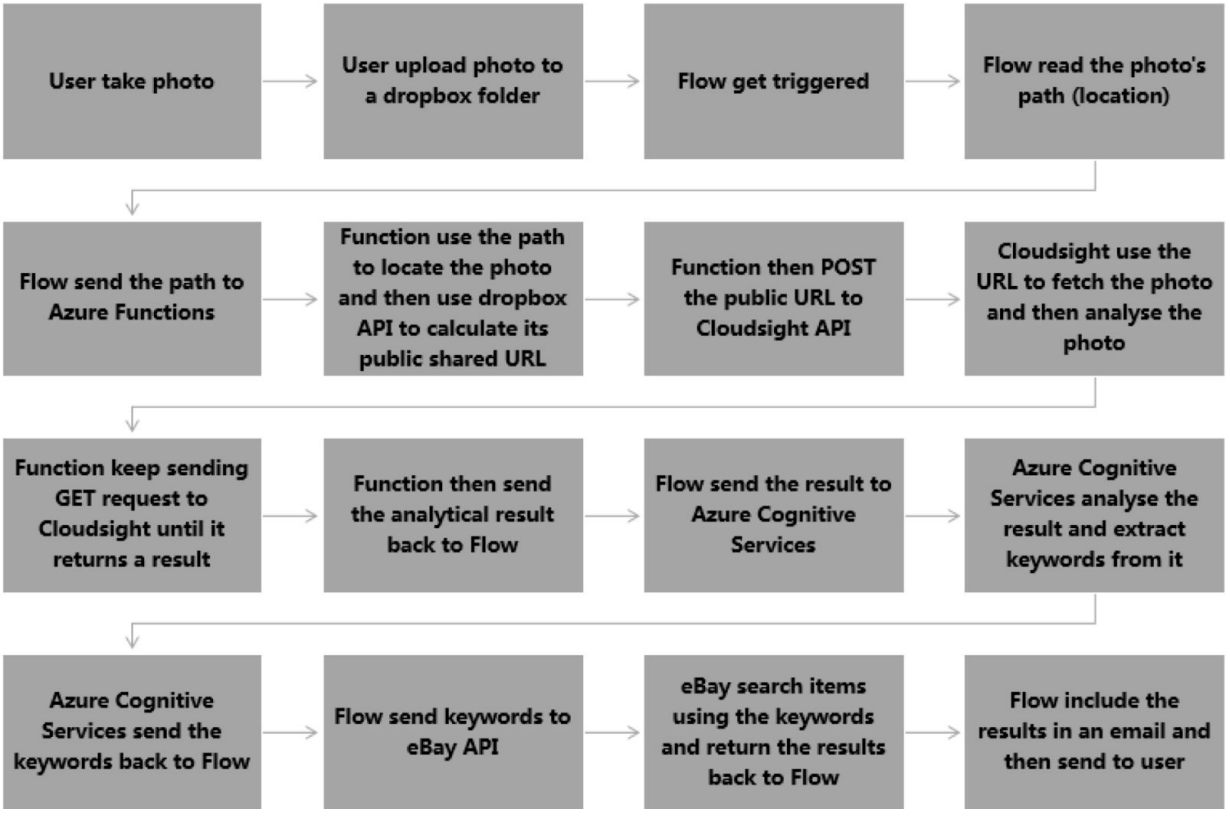

Figure 9: Product Recognition Technical Flowchart

3.3.2 Design II – Event Gift Recommendation

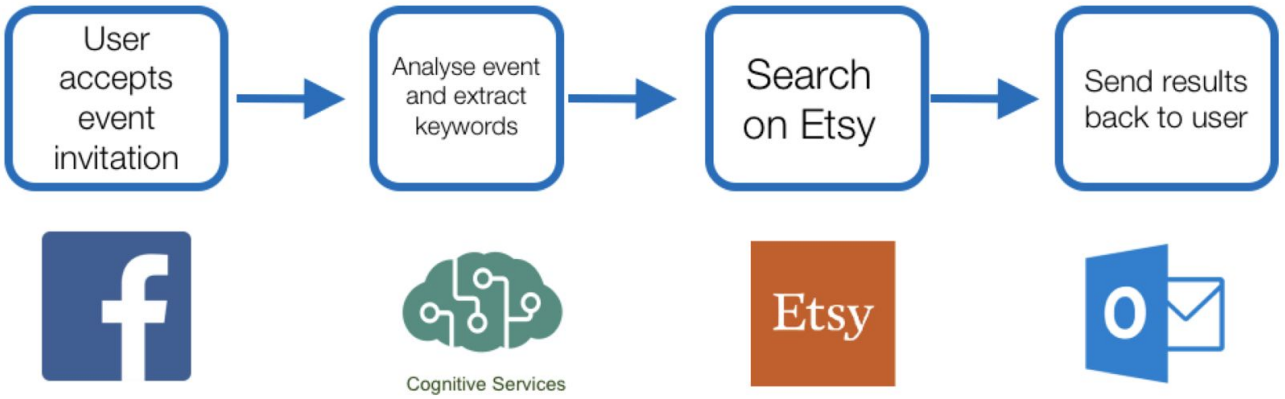

Figure 10: Event Gift Recommendation Final Design Flowchart

This workflow recommends products to user when they accept an event invitation on Facebook. In this workflow, when the user is going to an event, shared via Facebook, Flow obtains details of the event, analyses its description through the use of Azure Cognitive Services and uses the results to search for gifts on Etsy, which is another online shopping store focusing on gifts. The user then receives an email with a list of recommendations available on Etsy.

Once the user selects "going" on the Facebook account, no extra actions are required to operate this workflow. He/she automatically receives an email including the information of similar, shortlisted products, given that relevant ones are available on Etsy. This design basically essentially eases the selection process in terms of gift items. For example, Flow will send an email suggesting the user to buy a picnic blanket on Etsy when a user accepts a picnic event on Facebook or a birthday card if he or she is going to a birthday party. The team decided to use Etsy API instead of eBay since it is a better solution for gift shopping.

The detailed procedures of this design is shown below:

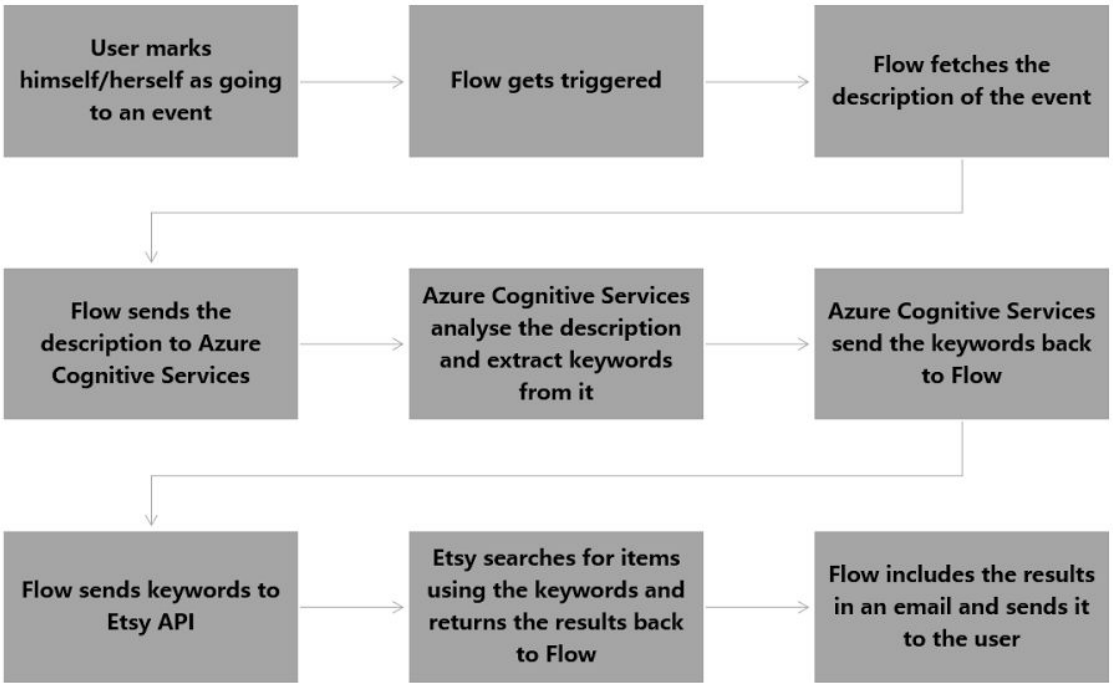

Figure 11: Event Gift Recommendation Technical Flowchart

4. OPERATION ANALYSIS

4.1 Meeting Client Requirements

Both the Product Recognition Flow and Event Item Recommendation Flow are functioning as designed. Thus, the team has met their client's requirements.

The team has explored the usage of Flow in the area of online shopping through the initial brainstorming process and the development of two fully functional ideas. The feedback from Microsoft and our target audience were both positive in response about whether the team's designs will successfully meet client requirements. The following subsections will discuss the feedback we received.

4.1.1 Microsoft Feedback

The team received positive feedback from the Audience Marketing Manager for Microsoft UK's Developer Experience and Evangelism (DX) Group, Emily Byle, after she was present for our group presentation and demonstration. The Program Manager (PM) of Microsoft Flow, Jon Levesque is also excited about the team's progress. Jon expressed interest to the team's industry supervisor, Lee Stott, about arranging a webinar for the team to demonstrate the usage of the Flow platform to a wider audience. This proves that the team has successfully demonstrated the capability of Flow by creating useful workflows using the platform and exceeding the expectations and requirements of Microsoft for this project.

Emily's Email to the Team after the Presentation and Demonstration

Hi team,

I just wanted to say what a fantastic job you all did yesterday. It isn't easy presenting after the majority of teams, but you presented really well, stayed calm throughout the demos (which is always a challenge) and answered the questions perfectly. I also loved that you s**howed how easy it is for others to set up their own Flow.**

You have worked really hard over the past few weeks and have dealt with any issues you faced in a professional manner. My only advice would be to outline the team structure at the beginning of the project, to ensure the client knows exactly how you are operating as a team, but you have genuinely been great to work with. You should be really proud of yourselves ω

Next steps: Keep in touch via the Slack group and we will organise further check ins if needed to support you with the next stage of the development.

Once you are finished for summer, **it would be great to get a blog from you to showcase this on our Developer Blog page**. However, I will leave Lee to reach out nearer the time, as he is the blogging king!

Have a great weekend!

Thanks,
Emily

Emily Byle
Audience Marketing Manager
Developer Experience and Evangelism (DX)
DX Group, Microsoft UK Ltd

Jon's Email to Lee Stott

"Wow Lee, This is incredible!

How long did it take the team to do? Are these scenarios now live and active? I would love to help amplify this across our channels and if you are interested, we should talk about your team doing a webinar for the greater flow audience on these scenarios.

Thanks so much for sharing this with us!"

Jon Levesque
Senior Program Manager
Microsoft Flow

4.1.2 Target Audience Feedback

While the two workflows were being developed, the team collected feedback from our cohort group of 76 participants, ranging from ages 19-30 as shown in Appendix [B], without sharing the details of each idea. Results showed a relatively positive indication on whether the designs can benefit and help increase the convenience of online shopping for users. This shows that the team has generated ideas that can successfully meet the requirements of improving users' online shopping experiences. The results from the survey are as shown below:

Survey Questions and Results

Event Item Recommendation

Our first idea uses Flow to automatically keep track of your social events and makes recommendations (e.g. Gifts, shortest route to event's location, e.t.c). How would you rate this idea in terms of convenience for you?

Average (star) Rating: **3.79 out of 5**

Product Recognition

Another one of our ideas includes implementing an image recognition application on Flow to simplify how we search for products in online stores. How beneficial would this type of service be to you?

Average Rating: **6.2 out of 10**

4.2 Operational Capability

While the operation of our services still face some limitations, which will be discussed in section 4.2.2, both designs have reached a sufficient level of operational capability.

4.2.1 Testing Protocols

We used the following testing protocols to determine the operational capability of the designs:

	Testing Protocols
Product Recognition Flow	Whether Flow gets notified when user upload a new image
	Whether the image is recognised correctly and keywords extracted properly
	Whether eBay returns the related products
	Whether Flow works without bugs
Event Gift Recommendation Flow	Whether Flow gets notified when user event updates
	Whether the event description is analysed correctly and keywords extracted properly
	Whether eBay returns the related products
	Whether Flow works without bugs

Table 2 - Testing Protocols

4.2.2 *Analysis of Operational Capability*

As mentioned earlier, a workflow is a sequence of individual actions. Due to this modular nature, it is clearer to analyse the operational capability of each services used in the designs:

	Intended Functionality	Current Performance	Limitation
Dropbox	Trigger Flow when new image is uploaded and provide the image to Flow	Can notify Flow when user upload an image to a specific folder; can provide image file through shared URL	User need to login to Dropbox twice on Flow due to technical limitation
Facebook	Trigger Flow when user join new event and provide event information to Flow	Can trigger Flow when user join new event and provide event informaiton	None
Cloudsight	Recognise items in an image and output results	Can recognise item most of the time and provide fairly accurate analytical results	Perform badly at providing specific product models and some brands; sometimes cannot recognise image
Azure Cognitive Services	Analyse text and highlight keywords	Can highlight desired keywords most of the time	Sometimes extract keywords that are not suitable for item search on eBay
eBay	Search items and return results	Can return results given keywords are provided properly	Catalogue is limited; some functionalites of current version of API are only available in US marketplace
Azure Function	Act as intermediary step between actions	Can send and receive HTTP requests, work perfectly as intermediary step between actions	None

Table 3 - Operational Capability Analysis

As shown above, all the services we implemented in our designs have achieved a sufficient level of operational capability. The whole workflows are then tested using user personas as shown below:

4.2.3 *User persona testing*

Image	Keywords	Similar Item returned by Flow
 [?]	blue inflatable round swimming pool	 [?]

 [?]	pair of black platform lace, heeled shoes	 [?]

Table 5 - Product Recognition Examples (eBay)

Product Recognition - Pool

Working adults tend to have a busy schedule, leaving them with less time to shop. Imagine David, parent to a young girl. He sets up the Product Recognition workflow to simply his shopping experience.

On a weekend, he attends a family reunion at a relative's house. One day after the reunion, he looks through the photos he took on the occasion and remembers how much his kid enjoyed playing in his relative's ground pool. He simply uploads the photo, in the top-left cell of Table 5, to a preassigned Dropbox folder.

Flow sends the photo for image recognition and text analysis, performing a search on eBay with the results in the top-center cell of Table 5. Flow eventually sends an email containing similar items to David. He finds what he is looking for, top-right cell of Table 5, in the email and follows the provided link to buy the item on eBay. The pool arrives and David can now spend the weekend accompanying her daughter when she plays in her new ground pool

Product Recognition - Shoes

Julia is a high school girl who loves shopping. However, most items in the shops she visit with her friends are too expensive for her to buy. She sets up the Product Recognition workflow in hopes of finding similar items that are more affordable on eBay.

One day, Julia was having a chat in a nice cafe with a few of her friends. She sees one of her friends wearing a pair of heeled shoes that she really likes. Since she already had the workflow set up, she took a photo of her friend's shoes, and uploaded the photo, in the bottom-left cell of Table 5, to a preassigned Dropbox folder.

Flow sends the photo for image recognition and text analysis, performing a search on eBay with the results in the bottom-center cell of Table 5. Flow eventually sends an email containing similar items to Julia. She finds what she is looking for, bottom-right cell of Table 5, in the email and follows the provided link to buy the item on eBay. The shoes arrive and Julia can now wear the new shoes the next time she meets with her friends.

Event Gift Recommendation - Birthday (Etsy)

Patrick is a university student who frequently receives Facebook invitations to all sort of events. However, he finds choosing the right gifts and bringing the right items for his events really difficult. He sets up the Event Item Recommendation workflow in an attempt to solve his problem.

One day, he receives an invitation for a course mate's birthday, see Figure 12. He clicks going and Flow is triggered. Flow extracts the event description for text analysis, performing a search on Etsy, that specialises in selling handcrafted items, with the keywords in Figure 12. Flow eventually sends an email containing similar

items to Patrick. He finds 2 gifts that are suitable in the email and follows the provided link to buy the items on Etsy. On the day of the event, Patrick gives Cindy a necklace together with a birthday card.

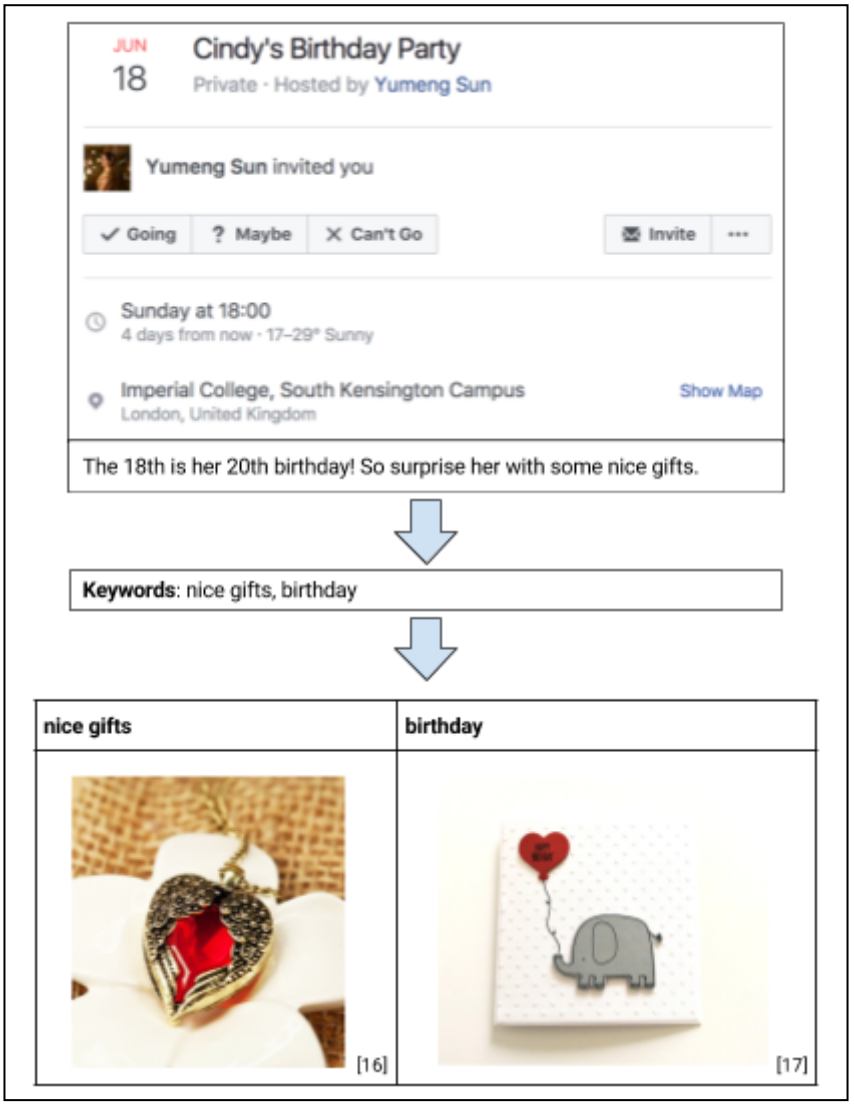

Figure 12 - Event Item Recommendation Example (Etsy)

As shown by the personas above, both of our designs can return relative results in a short time frame with minimum user input. Therefore, both designs can be considered operational.

4.2.4 Operational Limitations

A comprehensive analysis of the operational limitations for workflows are shown below, where key points are emphasized in more details compare to the limitation by services showed in Section 4.2.2.

Azure Text Analytics

As this text analysis service is not built specially for online shopping purposes, some keywords extracted are unsuitable for eBay search, often causing unrelated items to be emailed to the user. This is a difficult limitation to overcome. The team hopes that as automation of online shopping services becomes more common in the future, more suitable text analysis services will be available.

Product Recognition

Due to technical limitations, users have to login to Dropbox twice while initially setting up the workflow. Once for the built-in functionality on Flow for Dropbox, triggering on upload of file, and the second time for the functionalities of Dropbox on Flow created by the team, creating and modifying a shared link suitable for

CloudSight. This inconvenience will no longer be an issue once Flow integrates these new functionalities into their platform.

As discussed previously, CloudSight is the image recognition service most suitable to the team's needs. However, it tends to return long results, causing a search on eBay directly based on CloudSight's results return no items that matches all words. Therefore, the team had to follow the CloudSight implementation with Azure Text Analysis in the workflow to extract keywords. Hence, the limitations caused by Azure Text Analytics will apply. The team hopes that as automation of online shopping services becomes more common, more suitable image recognition services will be available in the future.

Furthermore, as the team has implemented the eBay functionalities based on their new API, the items recommended to users are limited to the US eBay catalogue. This will no longer be an issue once the new eBay API has passed all testing and starts to get implemented in other countries' eBay services.

Event Gift Recommendation

Many users might use this Event Gift Recommendation workflow for gift recommendation, it is obvious that there is too little information in event descriptions for the gift recommendation to be personalised. However, as discussed under technical challenges, Facebook's strict privacy policy has deterred the team from accessing the information of the user's Facebook friends. This limitation can be solved once Microsoft approaches Facebook for access of further information. Since Microsoft is a reputable company, Facebook should have no problem with granting Microsoft access to extended information. This will allow the implementation of the Automated Gift Suggestions idea, which was discussed in section 2.1.2, to be possible. Thereby, making more suitable and better personalised gift recommendations possible.

As the same text analysis service is being used as in the Product Recognition workflow, the limitations caused by Azure Text Analytics will also apply here.

5. EXTENSIONS AND FUTURE WORK

Progress of the project has been depicted by the Gantt Chart shown in Section 1.1. For future work, according to the limitations listed above, the following are the main objectives planned:

- Implement other online shopping services such as Amazon to expand product catalogue.
- Use Microsoft LUIS (Language Understanding Intelligent Service) to train a better model on text analysation which extract keywords more accurately.
- Use Microsoft Custom Vision to train an image recognition model focusing on product models and brands.
- Explore the potential of using Facebook friends' information for more personalised gift recommendations.
- Implement other ideas that can enhance online shopping experience with Flow.
- Give a webinar on how we tackled our project.
- Finish Writing a Blog and publish it on Microsoft community website.

6. CONCLUSION

Overall the team believe the project to be a resounding success. Our clients were thoroughly satisfied and their requirements thoroughly exceeded. We have created two workflows that showcase the capabilities of the Flow platform and in the future could be the basis of automating online shopping and making daily life easier. During the work on this project our team managed to not only fulfill the requirements set by Microsoft, but also improve the Flow platform itself. But most importantly during the course of our project, the team have not only completed and enjoyed our given task, but also been able bonded together and have also undoubtedly obtained new skills.

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8. APPENDICES

8.1 Appendix A - Meeting Minutes

Meeting Minutes

03/04/2017:

Group meeting: Introduction

- Ice-breaking between members of Flow group
- Introduction to Microsoft Workflow
- Discussed and agreed on timeline for project and arrange meetings with supervisors

05/04/2017:

Meeting with External Supervisor (Lee Stott)

Confirmed Requirements

- Connecting Amazon API with flow; with specific features
  - Understand Amazon API
  - “Own a service with a rest API”
  - Write swagger (JSON) custom API
  - mobile App Dev (non-essential)
- Adopt different pipelines using different templates
- Node.JS and Python (essential)
- Amazon API in XML
  - Machine Learning and AI in latter stages (extra feature to determine trends within flow)

Next

- Individual research
- Meeting with Lee very Friday 11am

08/05/2017:

Briefing on individual research

Next

- Everyone to do individual research and come up with some ideas

09/05/2017:

Meeting with Academic Supervisor (Andrew Holmes)

- Introduce project to Academic Supervisor
- Provide contact between supervisors
- Brainstorming session (after meeting with Holmes)
  - Split workload and assign roles - refer to Role.docx
  - Brainstorming document: Brainstormed ideas

Next

- Meeting with Lee on Friday
- By Sunday everyone should have something done, maybe meet on next Monday to discuss?
- Holmes will be joining us every other Friday starting next Friday

12/05/2017:

Meeting with External Supervisor (Lee Stott)

- Problem: Amazon Associate (API) account only worked for a few hours

- Comment: Good background research done on Amazon
- Technical support: davidgristwood on slack
- Current development platform: Postman (working with Flow see link)
- More details on Slack

Next

- **Work on eBay instead** - eBay is more open
    - Similar Flow ideas can be used
    - Can continue working on Amazon if time permits
- New Vision AI (cognitive service, useful) - see link document on Drive
- Instagram - develop more actions and triggers (can write a swagger for Instagram - future work)
- Look at XML to JSON document - see link document on Drive
- Have something done by Sunday, meet next Monday to check progress

15/05/2017:**Internal Progress Check Meeting**

- Changed to eBay (still XM
- L)
- Ideas based on eBay - ok, can add more, should try to understand how eBay works first…
    - See: Microsoft flow template ideas.docx document - in subfolder **ebay** on Google drive
- Market research survey
    - Now - feedback survey (after user has used Flow for a while)
    - We need - survey to target audience who have yet to use Flow, to collect data on their preferences and interest about such an automated service
- Image recognition - compare relevant APIs
- Swagger - in progress
- Technical challenge - postman

Next:

- Get something done before Wed, to discuss with Lee

17/05/2017:

Meeting with External Supervisor (Lee Stott)

- Swagger working (eBay) - some technical problems connecting with Flow
    - Received response from Flow, problem should be solved already
- First meeting with Emily Byte
- Brainstormed ideas - shared some with Lee
- Survey (preliminary market research) needs more response

Next:

- Get swagger working with Flow
- Image Recognition - still needs work
- Birthday Idea (good) - connect to Facebook
- Get some ideas working (one by one, or 2 by 2 at most)
    - Something to showcase after this project (demo)
    - Get 1 idea working well first, then do a survey (market research)
    - Criteria matrix
- Survey (on the ideas) - scenario based
- Technical documentation on Friday 11am

19/05/2017:

Progress Check (+ Documentation) Meeting

- See Documentation (Technical) document in the eBay folder
- Simple connection to eBay connected to Flow.
    - Works (Click and obtain phone notification)
    - Still needs to dissect information obtained from eBay to implement other ideas

22/05/2017:

Progress Check Meeting

- Basic manual search function working:
    - Able to extract different information from each item (object) - it was a problem with the Swagger
    - Able to extract different items from each search result (array of items)
    - Simple manual search on eBay can now be done on Flow returning either a certain number of notifications or emails containing the items from the search
        - Challenge: Need to have the specified number of items all on a single notification/ email
    - Can consider automatic buying of item after approval - looking at eBay Order API
- Birthday idea: looking at Facebook's API - using Facebook to find birthday gift recommendations
    - Challenge: Currently can access user's information (likes, birthday etc.) Need to access friends' information.
    - Can also use other social media platforms
- Image Recognition: CloudSight chosen - Swagger needs writing

24/05/2017:

Meeting with Lee, Emily and Holmes (EEE 503)

- First face-to-face meeting with both (industry and academic) supervisors
- Multiple items can now be sent in the same email/ notification
- Facebook: cannot get permission to access friends' profile
    - Discard birthday idea
    - Work with **event idea**
        - maybe use cognitive text analysis instead (see Slack for cognitive link)
        - Several searches suggested by email, search selected through email, search done by eBay...
- Image Recognition (Cloud Sight): works on postman but still needs to be connected to Flow - might be a problem with the dynamic response time, also a problem with authorization (space is not accepted in the key)
- Things to include in the report
    - Problem Statement
    - Idea Generation and Selection
    - What we did
    - Future Extension
- Good to have: **GitHub** with ReadMe.md that can be used by students working on the project in the future
- Create 4 different personas, how they are going to use your product (user journey) - for demo
- Automatic check-out via email

- Make a **website**

31/05/2017:

Progress Check Meeting

- User journey - outlines completed
- Technical - Both ideas now work on Postman. But we are facing some problems with running it on Flow.
- Summary Report - Planned out. First draft by Sunday.

01/06/2017:

Meeting with Emily Byle

- Also met Will
- Introduction about team, project and progress from scratch
- Technical problem with authorization - both ideas
    - Cloud Sight - the space in the key… Format of header is strange.
        - Try to solve problem by using a proxy - Azure function.
        - There is a bug with Flow
    - Facebook - OAuth 2.0 for Flow only gets User Access Token but need to send the App Access Token

05/06/2017:

Progress Check Meeting

- Image recognition idea is partially working with image URL, still working on uploading image
- Summary report writing discussion
    - Market research & competitor analysis
    - Operation and limitations
    - Criteria matrix - done
- Coding ongoing
- Work on presentation after summary report is done

08/06/2017:

Meeting with Emily and Will

- Image recognition works will uploading image to Facebook
- Facebook - still having problems, especially with extracting event details
    - Do more research on the documentation
    - Might need to contact Facebook
    - Discussed problem with Will
- Summary report - content mostly there, still needs some work
    - The draft is way too long. Needs to move some stuff to the Appendix + trimming!
    - Mainly checking grammar and Flow of report - new document started for Final Version
    - Cover page, Content Page and References are not included in the page count.
    - Deadline is tomorrow evening!

12/06/2017:

Progress Check Meeting

- Summary report submitted on 09/06/2017

- CloudSight basically working
    - Uses Dropbox - some swagger files written to create link to use by CloudSight
- Facebook information extraction still needs work - event description
- Working on presentation
    - Technical for detailed design and demo
    - Non-technical for other contents and slides etc.
    - Structure and work distribution confirmed

13/06/2017:

Meeting with Emily and Will

- Basic presentation structure completed - ran through it with Emily and Will
    - Suggestion to talk in overall for the services connections
    - Talk more about using Azure functions to solve technical problems
- Emily will be there for the presentation
- Send summary report to Emily, Lee and Will
- Write a **blog**?

Presentation Preparation

- Decreased number of speakers
- Slides and figures

14/06/2017:

Presentation Preparation

- Finalise presentation slides (email slides by 11:59pm)
- Make changes to Flow, improve design and ease of use etc.
- Record video in case demo does not work tomorrow
- Rehearsal

15/06/2017:

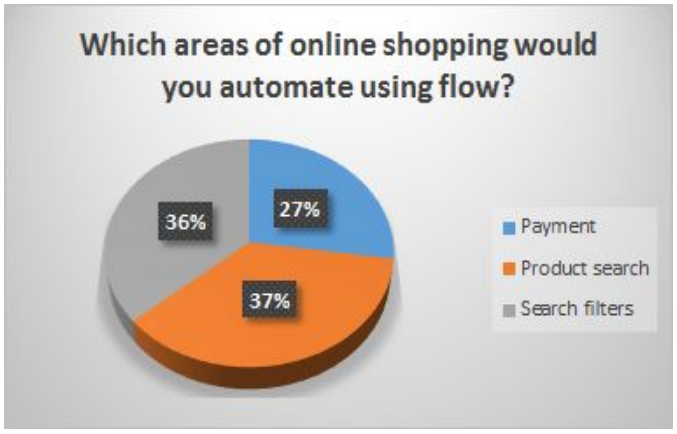
- Final presentation and demo preparation + rehearsals
- Presentation and Demonstration

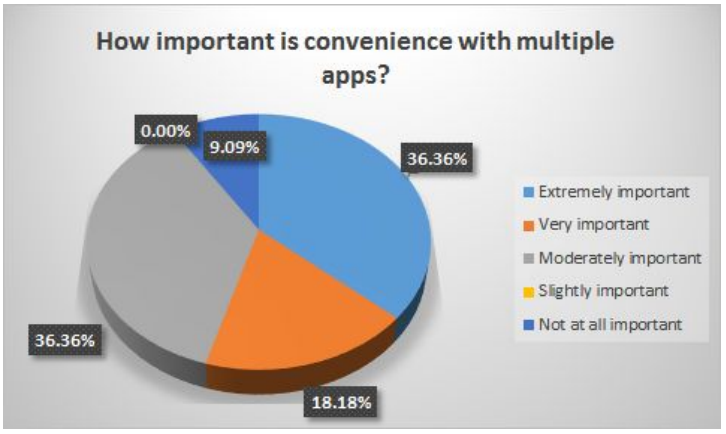
18/06/2017:

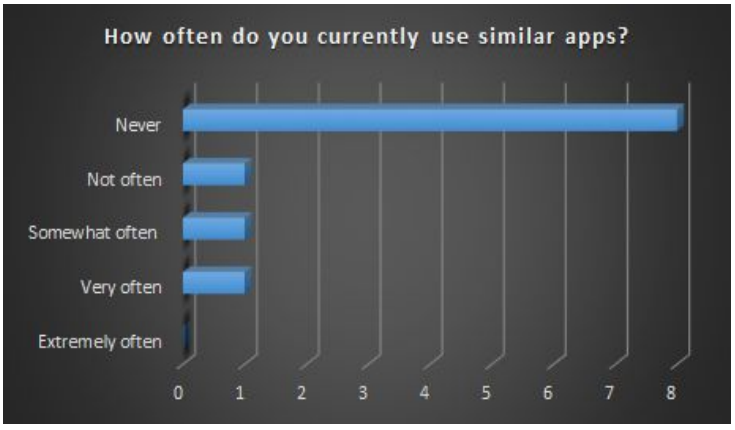
- Report structure more or less decided
    - Switch Market Research and Team Management
    - Switch Testing (can switch to development process) and Challenges
    - Add in service used between Challenges and Testing?
- Everyone start writing
- Submit draft to Emily and Lee before deadline, make changes according to their comments before submitting the final version if
- Page limit? Word limit? Emailed to ask. - done (20 pages)
- Last formal meeting, rest of the project to be done remotely via Facebook Messenger
- Don’t forget personal portfolio

8.2 Appendix B - Market Research and Competitor Analysis

During our brainstorming process, the team organised a small survey, using a small cohort group of 11 Imperial College students from ages 18-24, to better understand the needs and preferences of our users. The results are shown in the figures below. Note that despite the novel market, the demand for automation services is very high with only 9.09% of the sampled population responding with negative feedback.







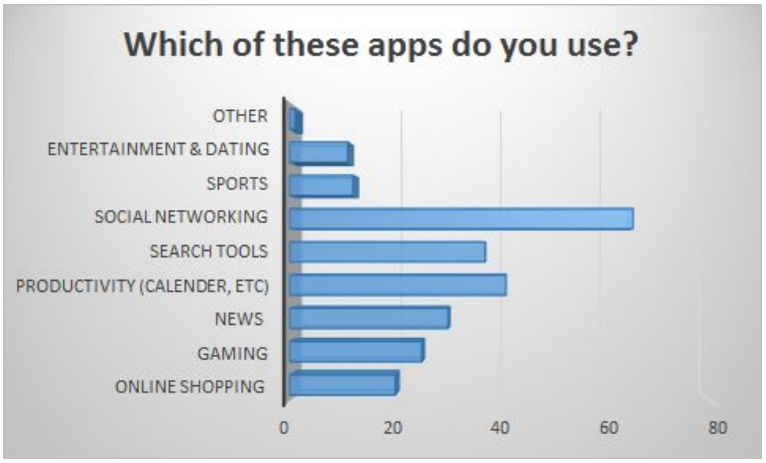
Pie chart (top left) prompted our idea of creating workflows that generate suggested gift items. As you can see, product search and their filters are two steps in online shopping that are generally seen as repetitive, thus providing a need for automation. Thereafter, the team has focused on automated item search and recommendation during the following brainstorming process.

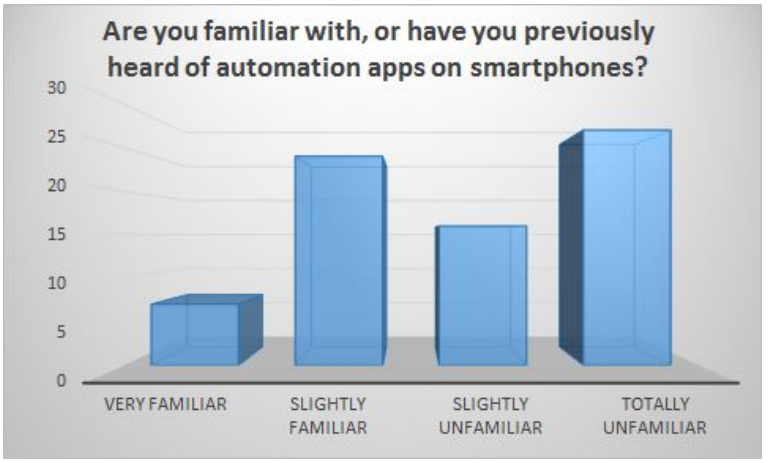
Also note that additionally, Flow's competitors have yet to implement their services in the area of online shopping. Therefore, the use of automation for online shopping is a new initiative and there is a lot of potential for development.

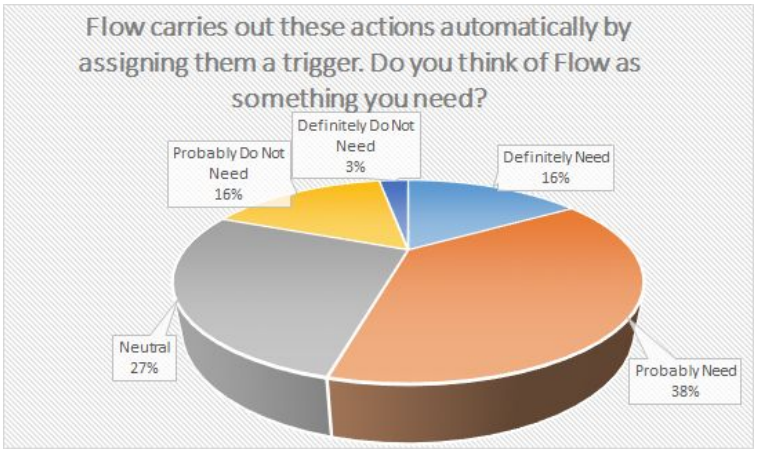
Pie chart (top left) also showed a demand for the automation of product search and search filters during online shopping.

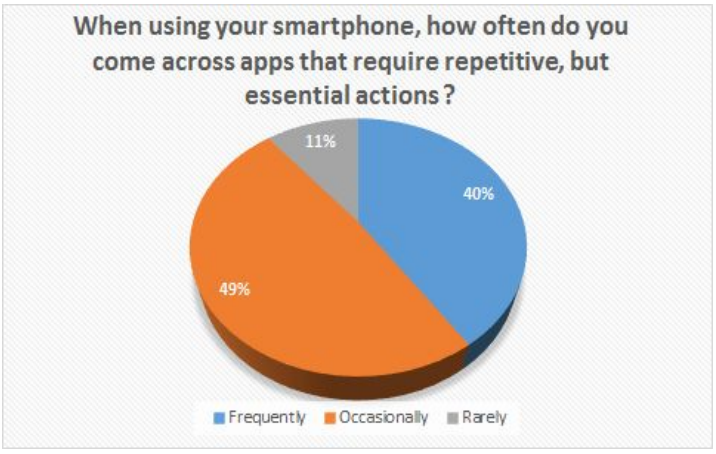
Shortly after our chosen ideas underwent their design process, the team collected feedback, using a secondary survey, from a cohort group of 76 participants, ranging from ages 19-30, in order to gain feedback and any relevant additional data.

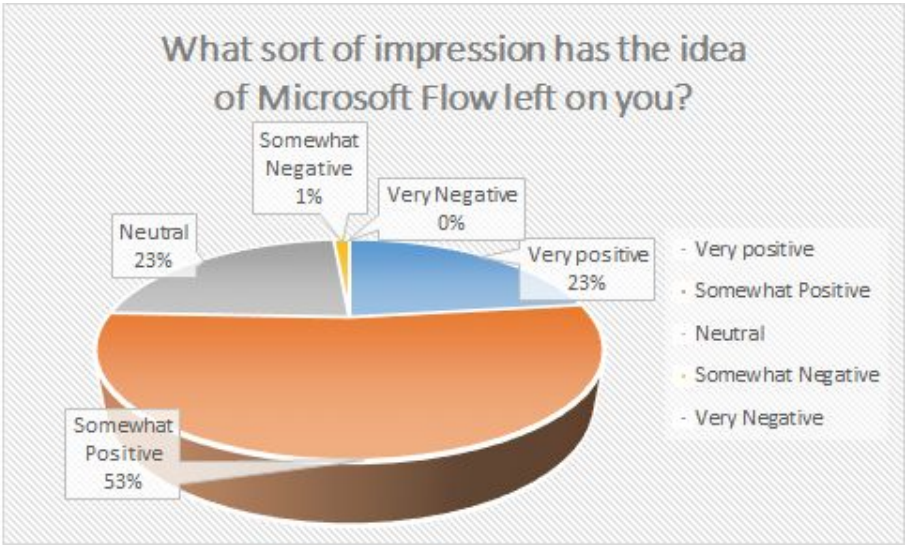
Results of this are portrayed by charts on the following page.











From these figures, we can conclude that we have met our client's expectations based on the level of positive feedback obtained.

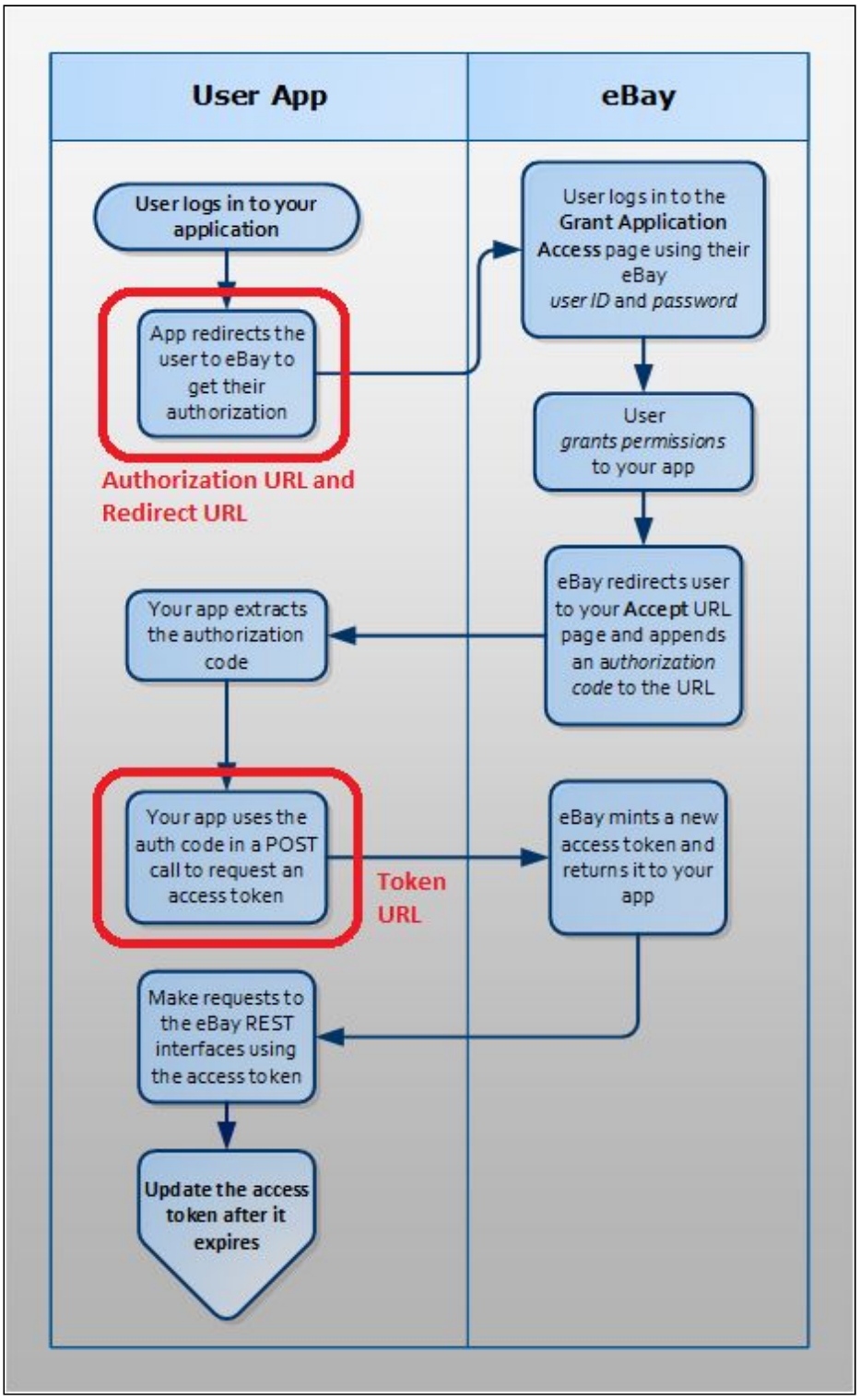
8.3 Appendix C - Cloudsight

Our plan was to implement reverse image search on eBay where the user would take a picture and flow would return the items on eBay related to that picture. To implement this, we required a Vision API which returned “keywords” when an image is sent to it. For example, if an image of a cat is sent to the API, the API would return keywords such as cat, animal etc. For our project we required the API to return keywords that included the brand of the item the user was searching for, for example, “A Nike trainer” or “A chanel handbag”.

Picture Sent	Microsoft	Google Vision	CloudSight
	"person", "outdoor", "road", "sitting", "board", "feet", "shoes", "riding", "street", "small", "top", "foot", "young", "table", "black", "city", "man", "red", "white", "laying"	Blazer, Nike, Nike Blazers, White, Sneakers, Foot, Hat, Grey,	grey and white Nike high top sneakers
	"person", "outdoor", "cellphone", "phone", "woman", "holding", "talking", "using", "looking", "man", "wearing", "standing", "street", "black", "hand",	Chanel, Handbag, Museum of Bags and Purses, Bag, Chanel 2.55, Wallet, Fashion, Leather,	person holding black quilted channel flap bag
	"footwear", "indoor", "table", "sitting", "pair", "green", "bench", "top", "shoes", "cake", "decorated", "desk", "wooden", "white", "made", "computer",	A Bathing Ape, Adidas, Sneakers, Shoe, Sneakers, Adidas Originals, Military camouflage	unpaired white green and brown camouflage Adidas NMD R1

As you can see from the above results, the data returned by the CloudSight API matches our criteria perfectly and hence we decided to use it in our project.

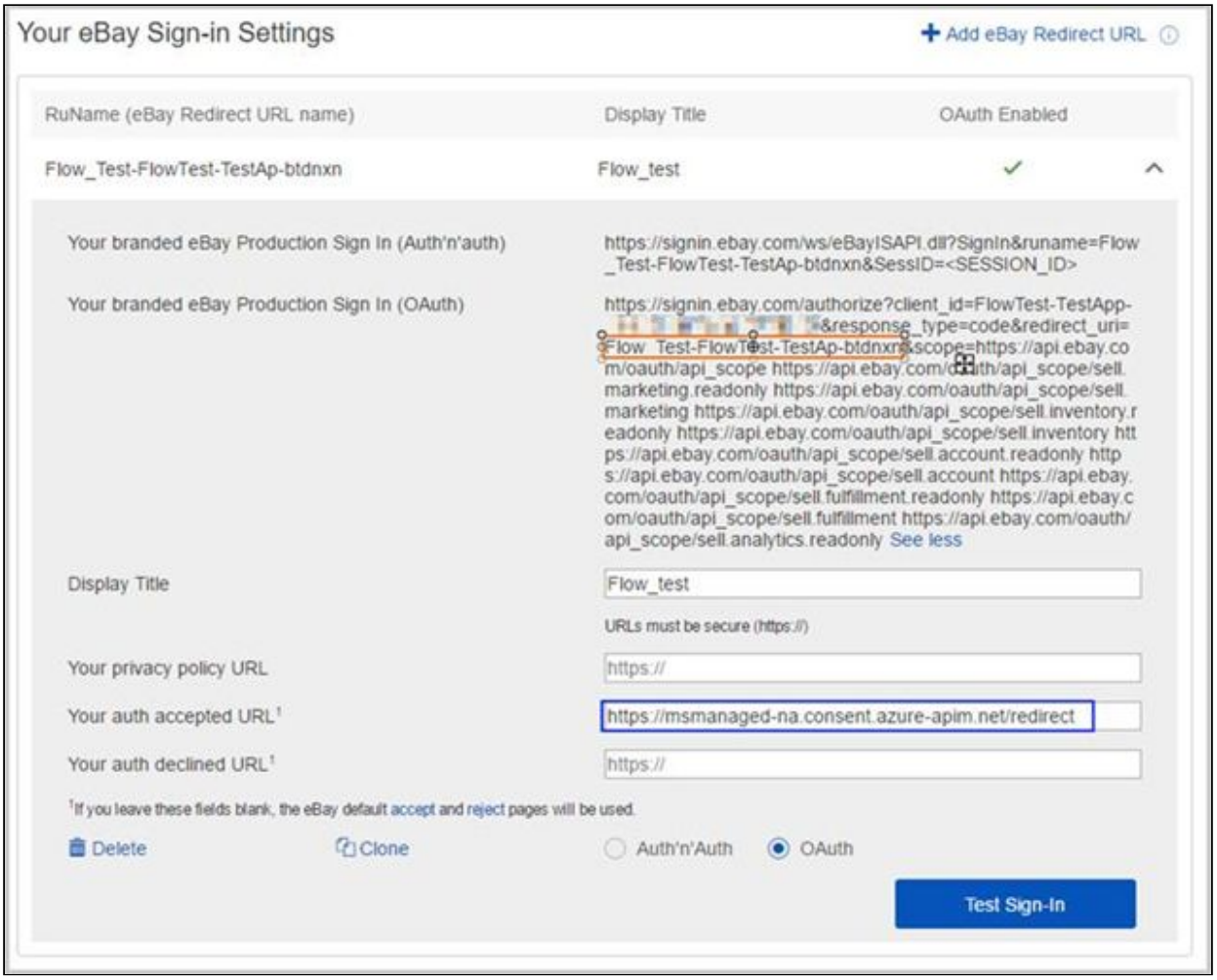
8.4 Appendix D - eBay Authentication Process

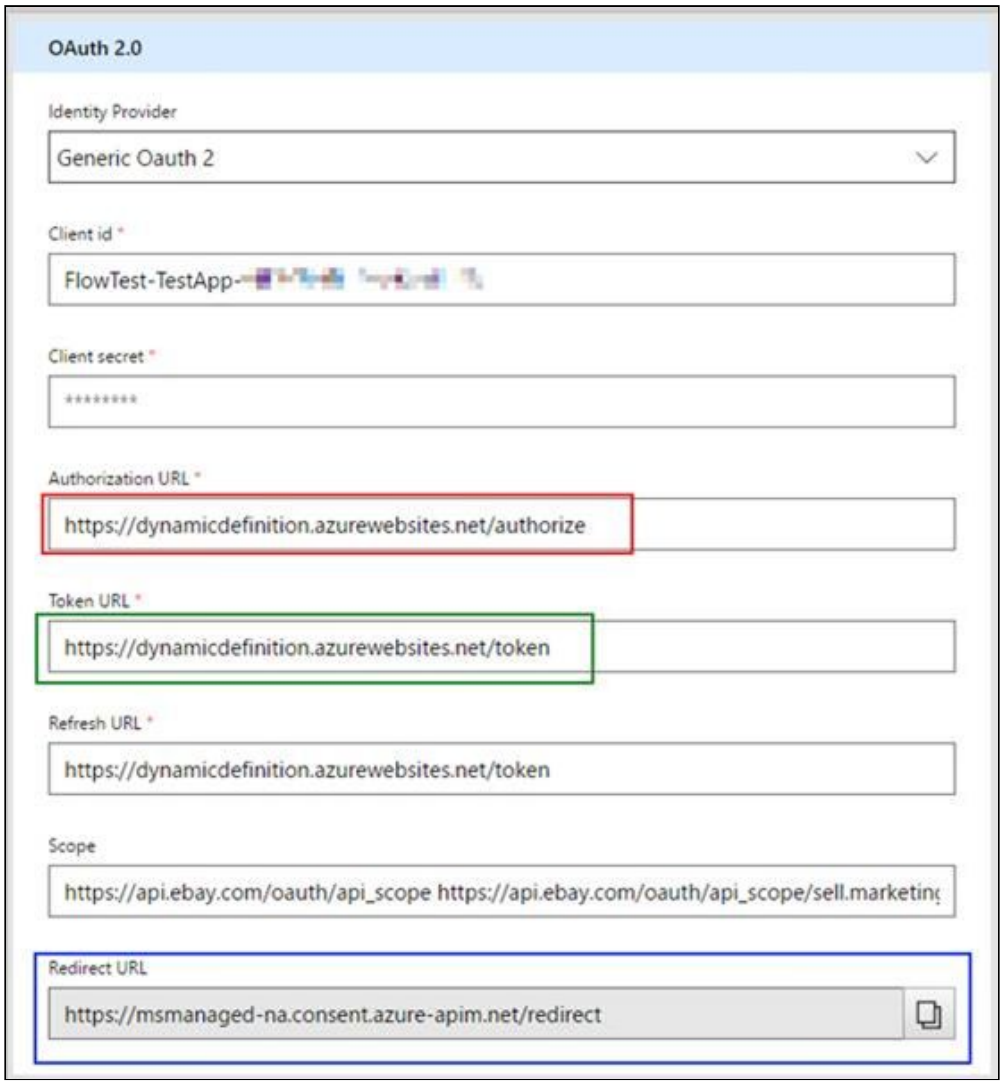


8.5 Appendix E - eBay Authorization: Proxy Setup Guide

eBay has peculiar practices with OAuth, hence this requires some minimal customization to setup correctly.

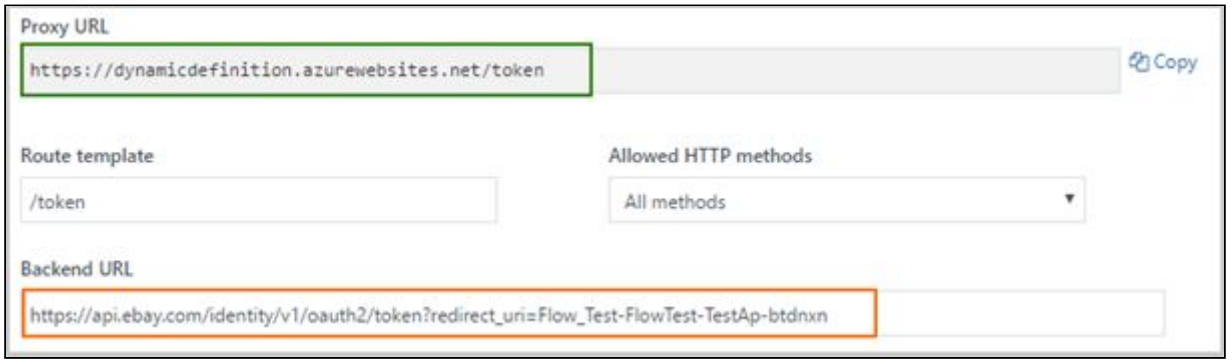
Firstly – we setup the eBay auth provider in the eBay portal, as shown below. WE makes use of the redirect URL from the custom connector UI, for the accepted URL field.



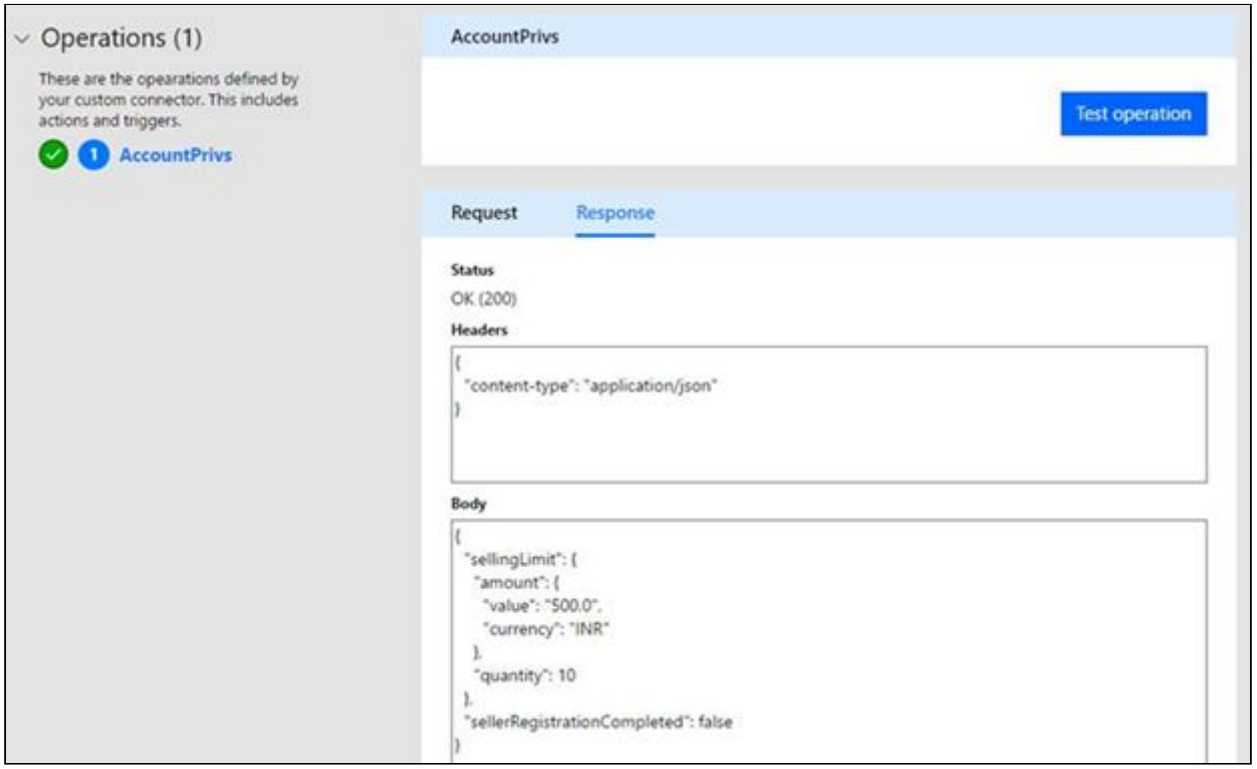


In the Authorization URL and Token URL fields –we setup an Azure function proxy to help rewrite the Redirect URL, whose value is in the Sign in URL provided by eBay.

Here is the Azure function proxy setup;

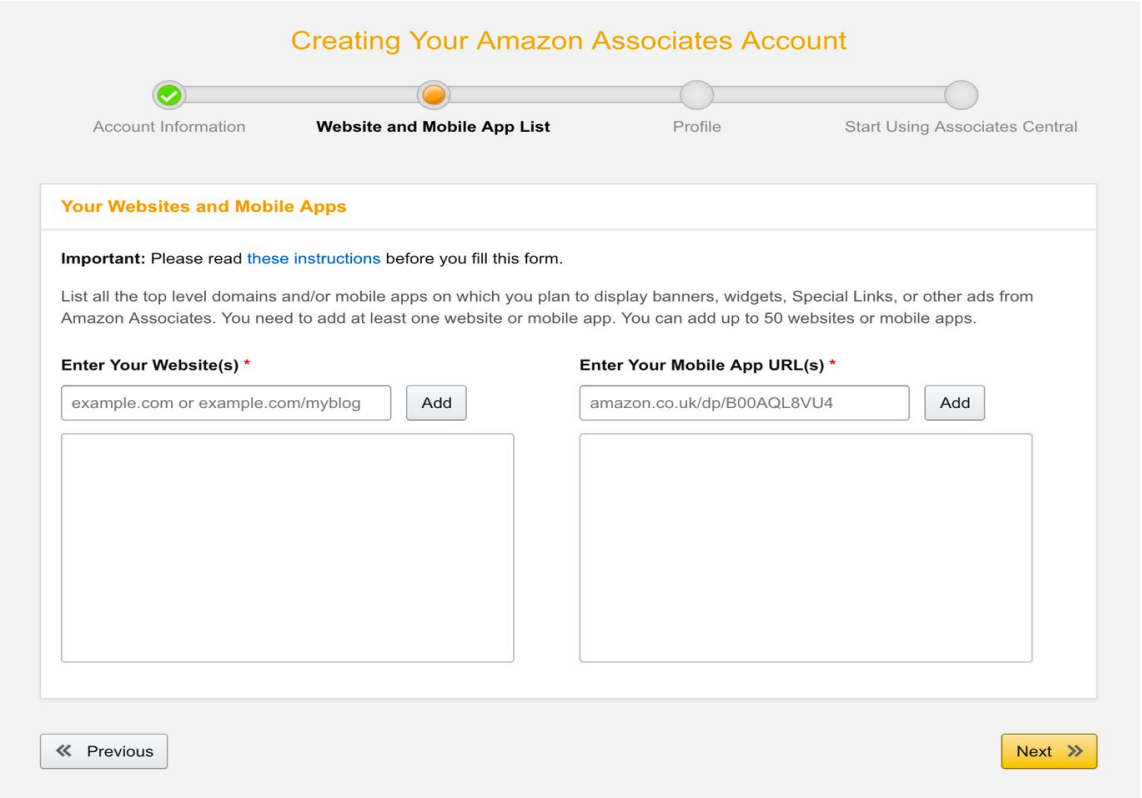


After this setup we were successfully able to create a connection and get account privileges.



8.6 Appendix F - Miscellaneous Challenges with Amazon Product Advertising API

An Associate Account is required to apply for a Product Advertising API Developer Account, which grants access to the API. To sign up for such account, a URL of the application or website in which the API is utilised must be provided. We provided the Flow URL but did not get approved. We then tried to contact Amazon for help but got no positive response.



After communicating with Mr. Lee Stott, our client representing Microsoft, we decided to switch to work with eBay instead, since eBay API provides a larger amount of services and is more compatible with Flow.