



Dublin City University  
National Institute for Digital Learning  
Open Education /DCU Connected

Module title or code: HS2 User Experience Design  
Assignment number: 3  
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#### Table of contents:

Part A	
Introduction	p. 2
Leading a virtual team effectively	p. 2-3
Challenges faced by virtual team leaders	p. 4
Awareness, workspace awareness & technology limitations	p. 4-5
Conclusion	p. 6
Appendices	p. 7-9
Bibliography	p. 10-12
Part B	
Introduction	p. 13
<b>Audio and Video conferencing</b>	<b>p. 14-15</b>
<b>Document, Task and Project Management</b>	<b>p. 15-17</b>
<b>Team Communication</b>	<b>p. 18</b>
<b>Workflows</b>	<b>p. 19</b>
<b>Time Tracking and Calendars</b>	<b>p. 20-21</b>
<b>Conclusion</b>	<b>p. 22</b>
<b>Appendices</b>	<b>p. 23</b>
<b>Bibliography</b>	<b>p.24</b>

## Introduction

“The cornerstone of effective leadership is self-mastery.”- (Patricia Aburdene, social forecaster and author of Megatrends 2000). Corporate activity has become more global with an increasing emphasis on team collaboration and virtual teams, work can be conducted anywhere, anytime in real space or cyberspace. (Casico and Shurygailo, 2008) Advances in information and communication technology (ICT) have allowed these teams to work over different geographical locations and time zones however not without challenges and possibly cultural differences. (Zhang and Lowry, 2008) Effective leadership is essential to the success of virtual teams (Hambley, O’Neill and Kline, 2007). In the course of this literature review, I will look at the research around what makes an effective team leader and the challenges they face in terms of *technologically mediated communications, team collaboration and supporting technology* and finally, *awareness of self and workspace awareness*. What are the implications for collaborative software and the adoption of them by effective team leaders.

## Leading a virtual team effectively

Group dynamics is a system of behaviours and psychological process that occur within a social group. Grasping a firm understanding of group dynamics and how a team develops is essential for an effective team leader. Teams have been destroyed by individuals incapable of managing ego and control needs. (Lafasto and Larson, 2001) Bruce Tuckman (1965) describes four stages of group development that have been widely adopted 1) Forming, 2) Storming, 3) Norming and 4) Performing, at a later stage upon review of studies he added a fifth ‘adjourning’ (Tuckman and Jenson 1977) see appendix 1. Other theorists presented ideas of the 4 stages however there was no fundamental change to the theory for example Peck M. Scott (1987) describes 4 stages in terms of community development as 1) Pseudo community, 2) Chaos, 3) Emptiness and 4) Community. In the book *‘leading through collaboration’* Glason, J., (2005) describes 1) Compliance, 2) Discord, 3) Introspection and 4) Generative engagement. As an effective team leader you must successfully navigate all of the above phases facilitating team development. (Glason, J., 2005) A study of virtual team leadership was performed by Hambley, O’Neill and Kline (2007) qualitative data was analysed from comprehensive interviews with 9 team leaders across 6 organisations from this data four overarching teams emerged: 1) Leadership critical in virtual teams, 2) Virtual team meeting effectiveness, 3) Personalizing virtual teamwork, and 4) Learning to effectively use different media. One of the questions asked was ‘Did virtual team members meet face to face (F2F) prior to working on a project and if yes, do you believe it impacted on the project?’ Three themes emerged from these questions, that meeting F2F was especially important at conception of a virtual team, not meeting F2F impacts on trust development, comfort level and the degree of rapport

amongst team members and the third theme was the significance of F2F meetings amongst the team, if economically feasible see results in Appendix 2. Another interesting question - Q.5 'To be effective in a virtual setting what does a team leader need to do? And Q.6 'Describe examples of effective leadership in a virtual team?' the results of both these questions can be seen in Appendix 3. Five themes emerged from the results of this question 1) the ability to build a virtual team, 2) virtual team leadership skills, 3) virtual team meetings, 4) virtual team management. The study group emphasised that providing role and expectation clarity was of top importance and second to this was encouraging regular communication and establishing various channels to support it and so on. Top of the list was the importance of establishing regular one-on-one's with followers (maintaining good relations), establishing regular virtual team meetings and ensuring an effective meeting (typically teleconference). It is worth mentioning here that sometimes even if a team lead is appointed, you can have emergent team leaders, team members usually consider emergent leaders based on perceived amounts of communication, intelligence, and encouraging and authoritarian behaviours. (Wickham and Walther, 2007) In their study of assigned and appointed leaders they found that by the end of a group task out of 6 groups, not all appointed leaders were viewed as the actual group leader. Frequent communication is emerging as one of the most vital cues in virtual groups, associated with increased trust and an affinity for online colleagues. (Walther and Bunz, 2005) Leaders need to fit several roles for a group and Computer Mediated collaboration (CMC's) need to support them in that endeavour. Establishing rules and norms for groups to follow has been shown to increase trust and liking for virtual team members. (Walther and Bunz, 2005) Lafasto and Larson (2001) asked a question to 6,000 team members from a team excellence database. 'What are the strengths of the team's leadership?' and 'What does the team leader do that keeps the team from functioning more effectively?'. The results were 1) Focus on a goal, 2) Ensure a collaborative climate, 3) Build confidence, 4) Demonstrate sufficient technical know-how, 5) Set priorities, 6) Manage performance. *Team leaders must communicate often and with clarity to followers, establishing good interpersonal relationships, provide support and feedback to team members build confidence, ensure collaborative environment, set priorities and manage performance. Collaboration and communication software should support all of the above for effective team leadership.*

### **Challenges faced by virtual team leaders**

Leaders need to find the best communication and collaboration tools for their needs and receive training necessary to effectively use these systems enabling rich interactions with the team (Hambley, O'Neill and Kline, 2007)

Challenges of time zones can lead to decreased interpersonal contact, increased chances of misunderstanding, role ambiguity and goal commitments to different work units. (Hertel, Geister and Konradt, 2005) Potential difficulties in supervising team members. An effective team leader needs to find a way to avoid 'social loafing' where individual team members expend less energy than if they were working alone. This theory was developed by Max Ringelmann (1913). Differences in cultural and diversity means that it can be hard to develop trust (Bell and Kozlowski, 2002) Hofner Saphiere (1996) reported that in highly productive intercultural virtual teams, some members acted as "cultural interpreters", for instance by speaking for another person when this person was frustrated or lacked language proficiency. The team leader is also responsible for developing and shaping processes and assimilating new team members plus team orientation. (Ostroff & Kozlowski, 1992) Within a virtual team task complexity varies Thompson (1967) typology, that characterises work flow is *pooled/additive* (work and activities are performed separately by all team members and then combined into a finished product), *sequential* (work and activities flow unidirectionally from one member to another), *reciprocal* (work flow goes back and forth one on one between the team), *intensive* (team must problem solve together). *The team leader must facilitate the management of the team and provide supports to team members in terms of creating norms and procedures for a team to follow, this can help to avoid conflict within the team when carrying out tasks. A effective team leader must choose the most appropriate collaboration and communications tools to suit the team needs and provide training to staff.*

### **Awareness, workspace awareness and technology limitations**

According to sociologist Charles Horton Cooley (1902) individuals develop their concept of self by observing how they are perceived by others, a concept coined as the 'looking-glass self'. In a social situation an individual *imagines* how they appear to others, that individual imagines others judgement of that appearance and develops feelings about and responds to those perceived judgements. In the virtual realm we can actually see ourselves, adding another dimension to the theory. How does that added sensory information affect our communication online? In relation to distributed teams and group awareness Dourish and Belotti (1982) defined awareness as "an understanding of the activities of others, which provides a context for your own activity." In terms of decision making this awareness is vital especially for teams working in parallel. Gutwin and Greenburg, (2010) propose that groupware systems designed for distributed teams working over a shared visual surface have lost the aspect of workspace awareness that is easily achievable in a face to face setting see Appendix 4.

Meaning that collaborative software with a shared visual space like electronic whiteboards, documents, drawings and blueprints are not as successful in their use unlike communication systems for example email and instant messaging. Key issues with the system software - 1. Input and output devices generate only a fraction of perceptual information that can be experienced face to face, 2. Users interaction generates little information than actions in a physical workspace, 3. The groupware system does not often present even the limited information available to the system. Lack of information creates a stilted and unnatural interaction. Knowing what is going on in the workspace, *situation awareness theory* (Endsley, 1995, p.36) is defined 'as a state of knowledge, from the processes used to achieve that state, and *situation assessment* is the process of achieving, acquiring or maintaining SA. Gutwin and Greenburg, (2010) emphasise the importance that awareness of group members is a critical consideration when it comes team cognition. Team cognition is not just the spoken language and depending on the situation, effective team cognition includes environmental cues to establish common understanding, noticing other people's gestures and what they are referring to. Signalling for example is another form of communication (Herbert, C., 1996) that is missed through the narrow focus of a computer screen. I have personally gestured at a shared screen view on occasion, pointing at something that I wanted the team to note only afterwards realising that they cannot see my hand signals. Technological considerations in videotelephony are display delays, low resolution screens, people cutting others of mid conversation. Interpersonal distances are changed (often reduced) which compared to co-present interaction. Angles of view are different and patterns of gazing are changed. (Manstead, A.S.R., Lea, M., and Goh, J., 2011) Two crucial aspects of presence are 1) awareness of another and the capacity to relate to them and 2) the social meaning given to the relating situation, which is often, but not always described positively, the sense of social presence. The degree of physical presence of a communication medium is therefore defined by its capacity to support relating to others. "It follows that if you strip away some or all of the non-verbal cues than the quality of the communication is downgraded." (Manstead, A.S.R., Lea, M., and Goh, J., 2011) *If leaders are to be effective than communication tools must advance to include all aspects of face to face communication, verbal/non-verbal. CMC's need to be dynamic, intuitive and flexible with a very clear sense of workspace awareness in order to be adopted by team leaders.*

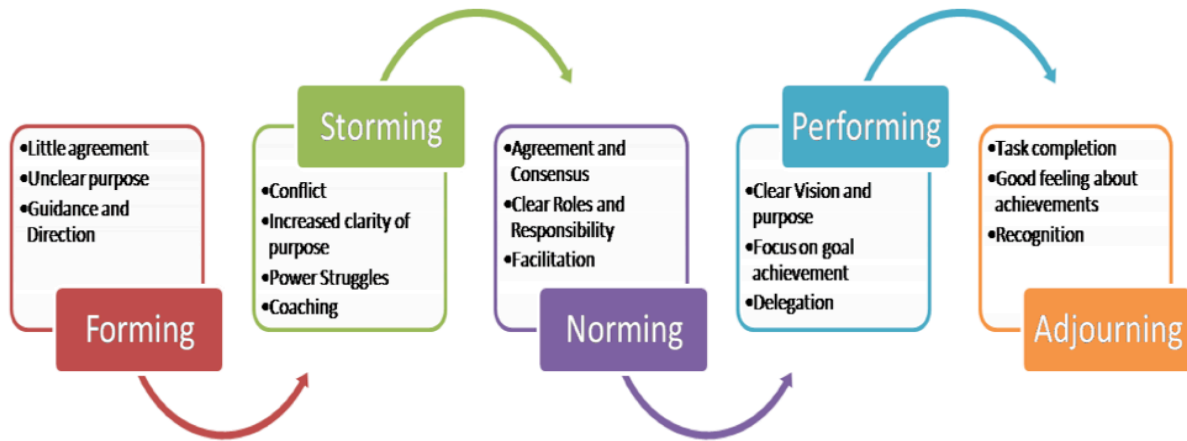
**Conclusion:**

Implications for designers of collaborative software: An effective team leader must choose carefully the communication and collaborative tools to suit the team. However in my research on the topic it is clear the quality and user experience of current video conferencing does not replicate a face to face interaction. Further development is needed to better capture non-verbal social cues and increase the quality of visual information that is presented to team members onscreen. Video software could be developed to mimic interpersonal distances, creating a virtual social zone. Address the potential issue of seeing yourself onscreen when conversing during an interaction with a simple avatar? Even movie stars have an aversion to seeing themselves onscreen becoming super critical of a performance. Could this negatively impact on our experience of the interaction? How much does poor quality communication, lack of social cues and copresence affect current interactions online in virtual teams? The development of a more realistic online collaboration space that will be adopted by team leaders is needed. Tele immersive environments are interesting but may prove too expensive an option for widespread use within an organisation. It would be interesting to see research and development around practical improvements to current technologies in the areas of video communications and collaboration spaces.

**Appendices**

**Appendix 1.**

Tuckman’s Model (1965) based on an assessment of literature on group development.



Source: Okpalad, based on Tuckman and Jensen (1977)

**Appendix 2.**

Virtual Team Leadership: Perspectives from the Field: *Importance of F2F meetings in virtual teams*

Theme	Frequency
<b>FTF Meeting at Virtual Team Conception</b>	
FTF kick-off is very important	6
FTF meetings needed if members have not met	2
New team member always meets rest of team FTF	2
<b>Impact of FTF meetings</b>	
Trust develops faster if first meet FTF	2
Increased comfort level and rapport if first meet FTF	2
<b>Significance of Meeting FTF</b>	
Meet FTF if economically feasible	3
Nothing replaces FTF (a must)	2
Important for leader to meet team members FTF	1

### Appendix 3.

#### Virtual Team Leadership: Perspectives from the Field: *Behaviours of effective virtual team leaders*

Theme	Frequency
<b>Building a Virtual Team</b>	
<u>Provide role and expectation clarity</u>	6
<u>Encourage regular communication and establish various communication channels to support it</u>	5
Set goals for the team	3
Establish a vision/mission for the team	2
Facilitate team members getting to know each other	2
Create team operating principles (e.g., appropriate behaviours, ground rules)	2
Help engage people to communicate effectively through different media	2
Pre-qualify people for their tolerance for isolation	1
Build trust in the team	1
<b>Virtual Team Leadership Skills</b>	
<u>Obtain training to lead a virtual team</u>	2
<u>Lead by example (work alongside team when needed)</u>	2
Manage to results (hold people accountable)	1
Strong facilitation skills	1
Try to simulate as if team was co-located (e.g., invest in technologies to do so)	1
Keep team members feeling connected to rest of team	1
Promote an information sharing environment	1

Theme	Frequency
Celebrate and reward successes	1
Make projects fun	1
Allow for and create opportunities for virtual workers to balance isolation with social (e.g., allow them time to network in community)	1
Obtain coaching to work in a new medium	1
Leader-follower relationships	
Establish regular one-on-ones with followers	6
Invest time getting to know followers	2
Periodically visit followers FTF in their own environment	2
Respect people's lives (e.g., personal responsibilities, holidays)	<i>Data needed</i>
<b>Virtual Team Meetings</b>	
<u>Establish regular virtual team meetings (typically teleconference)</u>	4
<u>Ensure meetings are well organized</u>	3
“Share the pain” (rotate virtual meeting times to be convenient for different time zones)	2
Control side-bar conversations in virtual meetings	1
Make sure introverts get a chance to contribute	1
“Be here now” (leader needs to be 100% Focused during virtual team meetings)	1



Results of behaviours of effective virtual team leaders continued

Theme	Frequency
Follow-up after virtual meetings to ensure understanding of participants	1
Be able to ad lib when technology fails (always have a Plane B)	1
<b>Virtual Team Management</b>	
<u>Have a strong, dedicated project manager</u>	4
<u>Tailor amount and type of communication to suit individual needs</u>	1
Establish tools to track progress (e.g., project management software)	1
Regularly review issues and obstacles	1
Make effective virtual teamwork part of performance appraisals	1

Appendix 4.

Elements of Workspace Awareness, Gutwin, C., and Greenberg, S. (2004)

**TABLE 9.1**  
**Elements of Workspace Awareness**

Category	Element	Specific questions
Who	Presence	Is anyone in the workspace?
	Identity	Who is participating? Who is that?
What	Authorship	Who is doing that?
	Action	What are they doing?
	Intention	What goal is that action part of?
Where	Artifact	What object are they working on?
	Location	Where are they working?
	Gaze	Where are they looking?
	View	How much can they see?
	Reach	How far can they reach?

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## Introduction

“ Many ideas grow better when transplanted into another mind than the one where it sprang up.” - Oliver Wendell Holmes

Creating a team that is cohesive and productive is challenging. The question here is have providers of groupware achieved the perfect combination of features in order to support effective communication within the collaborative environment. What do these collaboration tools afford the team in terms of information sharing, ideation, working synchronously and asynchronously on projects. Chaffey, 1998) The importance of asynchronous use of groupware is one the major benefits. Employees can communicate and work on joint projects even if they are in different time zones and locations see below Table 1. (Chaffey, 1998)




→ **Table 1.1** *Different uses of collaborative systems classified in time and space*

	<i>Synchronous</i>	<i>Asynchronous</i>
Same location	Same time, same place Example: meeting support software	Different time, same place Example: workflow systems
Different location	Same time, different place Example: video-conferencing	Different time, different place Example: e-mail and discussion groups

Synergy or group cohesion is the ideal in terms of team development, “the whole is greater than the sum of its parts” (Federer, 2013). The phrase “affordance” was coined by James Gibson in 1977, Don Norman described it in his book, *‘The design of everyday things’* as perceivable action possibilities. What can the object afford that you do with it, the obvious and the not so obvious uses, that maybe the designer of the object never thought of. Three groupware examples used today are Microsoft teams (2017), Slack (2013) and G Suite (2006). In this essay we will compare and contrast features of the groupware and what they afford in terms of supporting effective team work and online collaboration. Using some of the common features of groupware we will assess the affordances under the following headings 1) Audio and Video conferencing, 2) Document Management, 3) Task Management, 4) Project Management 5) Team Communication, 6) Workflows, 7) Time Tracking and 8) Calendars.

## 1) Audio and Video conferencing

### Overview of affordances




 <p>Microsoft Teams</p>	<p>High quality audio /video calls.          Live events up to 10,000 people inside or outside organisation.          Invite External guests.          Scheduling assistant.          Screen sharing.          Meeting recordings audio/video.          Records of meeting activity          Automatic transcription          Instant messaging.          Content sharing.          Global dial-in for audio conferencing on mobile.          Supporting Room Devices.          Security.</p>
	<p>Voice or video calls.          Screen Sharing.          Start a call in a channel.          Integration of internal apps and third party.          App Training.          Security.          App Customisation          Admin can customise call settings in the workspace for all members.</p>
 <p>G Suite (Hangouts Meet)</p>	<p>Video and voice conferencing.          Join a meeting from calendar.          Native apps for IOS and Android.          Accessible to external teams using systems SIP or H.323 standards.          Dial in          Supported in Chrome, Firefox and edge.          Screen Share and presentations.          Live streaming in-domain viewers 100,000          Meet Hardware.          Security.</p>

**Compare and contrast:** In Slack you can start calls from within a channel however it allows App integration from outside third-parties enabling you to work with familiar software and gain access to features not native to Slack, like Zoom, Skype etc. Slack affords adaptability and flexibility in terms of a groupware solution for an organisation. Voice messaging can be added with a third party app. The quality of audio and video calls within Slack needs improvement. (Duffy, J., 2020) Meetings are not recorded in Slack however a small amount of metadata and certain performance metrics on latency and jitter are. AI Assistant for Meetings - fireflies.ai

(Record, Transcribe and search your voice conversations). Slack calls are not supported in all browsers or on virtual machines and you cannot screen share in chrome. Microsoft have developed features that enable seamless collaboration during a meeting, sharing documents, note taking. Meetings are recorded and transcribed automatically and the content is searchable. Google’s Hangouts Meet does not really provide many integrated features like Microsoft teams. If you are a small enterprise or individual working from home it would provide an adequate conferencing solution. Microsoft Teams ticks all of the boxes for inbuilt features however slack is not far behind with the ability to integrate third party apps. Microsoft Teams and Google have looked at hardware to support its groupware solutions which if developed could provide a competitive edge in relation to creating a realistic face to face experience on video conferencing calls.

## 2. Document Management




Overview of affordances

 <p>Microsoft Teams</p>	<p><b>Teams and channel files</b>  <b>SharePoint document library</b>  <b>File Restoration</b>  <b>Share documents in channel conversation</b>  <b>Share link to file in your team’s library</b>  <b>Upload files</b>  <b>Co-edit files in Office for the web,</b>  <b>Android and iOS, excel or visio files.</b>  <b>Share files externally - link settings you can allow editing</b></p>
	<p><b>Share files and documents communication channel.</b>  <b>Integrated file sharing from your computer, device or cloud storage service.</b>  <b>Collaboration on large files /in-line file &amp; document sharing.</b>  <b>Channels are searchable.</b>  <b>File safety &amp; security.</b>  <b>Slack app syncing devices for file sharing.</b>  <b>Feedback gathering.</b>  <b>Emojis usage for quick response.</b></p>
	<p><b>AODocs business process platform integrated with google Drive.</b>  <b>Slack being used for real time team conversation and collaboration on files.</b>  <b>Use google docs to collaborate on files.</b></p>

**Compare and contrast:** Slack needs a third party app to index and make team files searchable. Slack supports Google Drive, Dropbox, Box, Microsoft One Drive and Sharepoint Online for document management. In Slacks file sharing you can add context to the document with all the conversation relating to it, saved in one place. Microsoft Teams Sharepoint Online provides nearly a microsite for your team that is backed up in the cloud. If you accidentally delete a file you can go to your teams Sharepoint location and restore the file. Sharing files with Linux users they will not be able to open a file with the desktop Office app and will need to use office for the web. You can use Google docs to collaborate on documents G Suite falls and you can integrate with Slack for a better team collaboration solution. Microsoft again shows that it has tried to integrate a better solution for file management within its own system. Slack can also integrates with Microsoft file managing solutions.

### 3. Task Management

#### Overview of affordances




 <p>Microsoft Teams</p>	<p><b>Microsoft Planner Integration</b>  <b>Personal planner to organise tasks and set priorities.</b>  <b>Tasks visible to all team members.</b>  <b>Makes clear who to consult for what deliverable.</b></p>
	<p><b>Allows integration of third-party apps like 'Asana' 'Wrike' or 'Flow'.</b>  <b>Channel creation for tasks #task name.</b>  <b>Channel creation for weekly planning and stand-up #team – weekly.</b>  <b>Pin instruction to channel to manage tasks.</b>  <b>Traditional to-do lists.</b>  <b>Third party apps for productivity - organising tasks and to do lists.</b>  <b>Saved items - list of tasks (individual).</b></p>
	<p><b>Integrate third-party apps for Task Management</b></p>



**Compare and contrast:** Microsoft planner is a part of Microsoft teams and so you do not need a third party app to organise tasks unlike Slack and G-Suite.

#### 4. Project Management

Overview of affordances

 <p>Microsoft Teams</p>	<p><b>Microsoft planner teams can break down large tasks into smaller tasks and time periods.</b>  <b>Priority Matrix Apps – 4-quadrants, calendar, Gantt Charts and reports</b>  <b>Third party app integration ‘Wrike’</b></p>
	<p><b>Create channels for relevant team members to collaborate.</b>  <b>Management tools.</b>  <b>Share project resources, files and deliverables.</b>  <b>Allows instant feedback.</b>  <b>Pin important messages to relevant channels.</b>  <b>Connecting to Asana/Trello and get direct notifications in your project channels.</b>  <b>Slackbot can be used to set team reminders to you to share what you are working on.</b>  <b>Share any issues that my hinder the project.</b>  <b>User group creation.</b></p>
	<p><b>Use sheets to track, update, and collaborate on project plans</b>  <b>Synchronous collaboration</b>  <b>Use a group email to share information</b>  <b>Create shared calendars for meetings.</b>  <b>Layer calendars to view schedules.</b>  <b>Third party app integration ‘Wrike’</b></p>

**Compare and contrast:** Slack excels in terms of flexibility to project manage within its own space with ai assistance helping the team in terms of prompts etc. All the groupware can integrate with project management solutions that enable a better features for project management.

## 5) Team Communication




### Overview of affordances

 <p>Microsoft Teams</p>	<p>Voice Messaging. Video Messaging. Chats Team and individual Posts - one big group chat Chats are searchable. Filter messages. Hide/Mute a chat or pin a chat to a team. Visio desktop app to create diagrams to express common ideas, describing a process, useful for process.</p>
	<p>Voice Messaging. Video Messaging. Holding daily stand up meetings. Use status updates to communicate work availability. Channels for team communication. Messaging and file sharing. Make channels private to certain members. Searchable message content. Emojis for quick reactions and feedback. "Also send to channel" button to send a communication to group from a private thread. Relevant messaging forwarding/share link. Message from DMs to group. @mentions.</p>
	<p>Multiple projects prioritise and set up filter and labels. Priority inbox automatically sorts messages for you. Share presentations in Slide and share in google meet.</p>

**Compare and contrast:** It is interesting to note that you can use *shared channels* to communicate with an organisation outside your own in Slack. Chat is searchable in slack and Microsoft teams. Slack @mentions & reactions in the left sidebar, your name is highlighted in yellow whilst other team members are highlighted in blue. This is good for quickly adding someone into a discussion in Slack. You can also do the same in Microsoft teams plus you can choose to hide a part of the conversation. In slack you can lock and unlock channels.

## 6) Workflows

### Overview of affordances




 <p>Microsoft Teams</p>	<p>Microsoft flow connects to sharepoint, Microsoft Forms, Dynamics, Twitter, PowerBI and UserVoice. Microsoft Flow bot.</p>
	<p>Create Workflows. Workflow Builder. Use message shortcuts to move information to connected apps. Integrated third party apps, 'Asana', 'Wrike' and 'Flow'. Shared channels</p>
	<p>Third party apps</p>

### Compare and contrast:

Slack Workflow originated in order to reduce time and cost of performing business processes and ensuring tasks are performed consistently to improve quality. (Chaffey, 1998) Appendix 1. Third party apps both in G suite and Microsoft teams means that this is a software solution available to all three groupware solutions.

## 7) Time Tracking




### Overview of affordances

 <p>Microsoft Teams</p>	<p><b>Timely integration</b></p>
	<p><b>Connect Harvest + slack</b> allows time tracking on projects, tasks. Track time on different devices. Access to information on projects and team in Slack. <b>/forward slash commands allow status updates</b> Track time spent on a project and keep on budget. Shareable reports /harvest budget Invoice online</p>
 <p>G Suite</p>	<p><b>Harvest third party app</b></p>

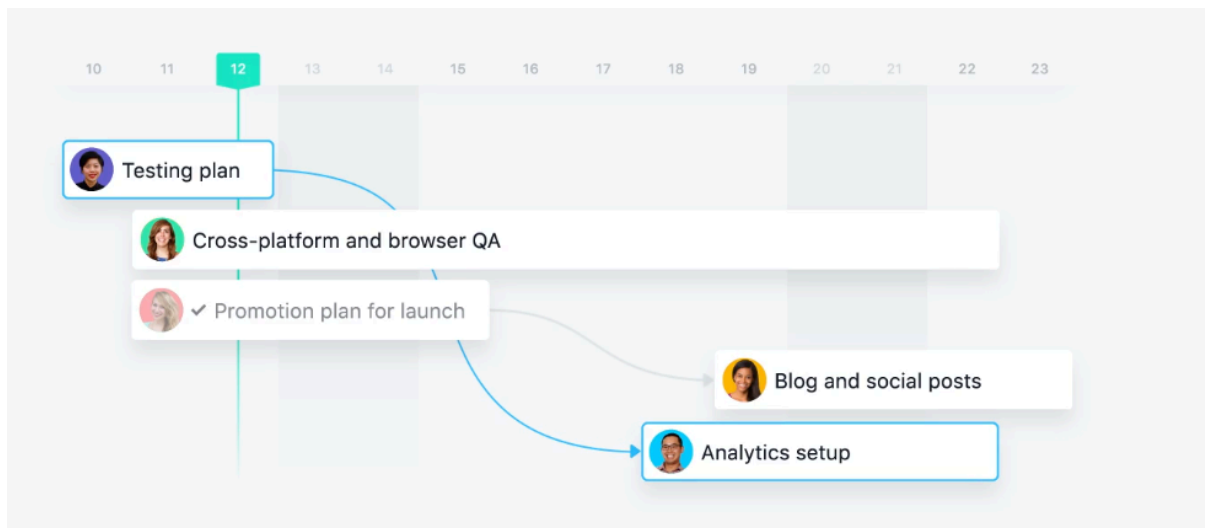
**Compare and contrast:** Harvest and Timely third party apps all function in a similar way tracking time on projects, status updates on team members, budgeting for time spent on a project. All this information enables you to quantify time spent easily for planning, budgeting and billing.

## 8) Calenders

### Overview of affordances

 <p>Microsoft Teams</p>	<p>Allows Teams share a calendar.          Schedule meetings.          Put meeting on repeat.          Project check in prior to key benchmarks.</p>
	<p>Asana, App allows you to plan, manage and visualise work via a shared team calendar.          Easily spot schedule overlaps.          Real-time status of key initiatives.          Easily report information to stakeholders.          Monitor team member workload.</p>
	<p>Group Calendar.          Schedule meetings.          Set access permissions.</p>

**Compare and contrast:** All our groupware offer similar calendar features, sharable calendars and booking meetings however the Asana app in Slack goes a step further in the visual representations which at a glance presents information with greater clarity.

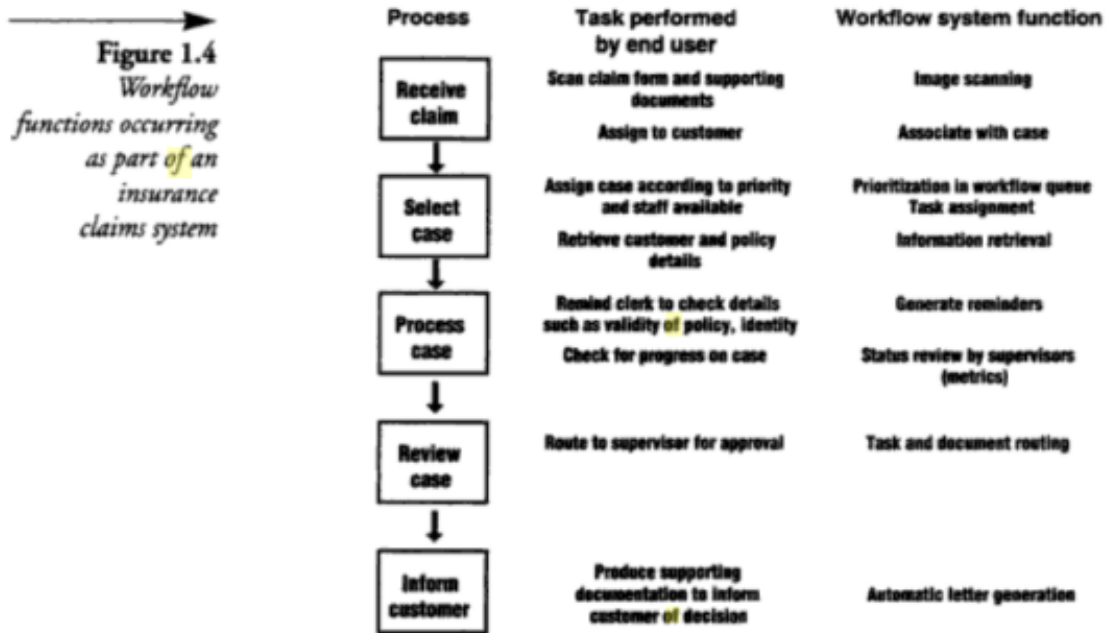


## Conclusion –

Slack is a good example of a truly flexible piece of software, the app integration is especially noteworthy, the app directory has 2000 apps. You can access these apps without leaving the platform. Slackbot comes with Slack and can be programmed with automatic responses. Slack is also used for networking and social activities. (Lin *et al.*,2016) Slack is spot on in terms of their content with easy to follow guides and videos on how to navigate the groupware. In 2020 slack is rolling out new changes to improve the experience of new users. Slack's Asana App can integrate 100+ Apps to provide an organisation wide solution. Microsoft Teams provides an alternative to all the key features that Slack offers in terms of online collaboration. The fact that organisations using Microsoft office 365 automatically have access to Microsoft teams is a real advantage. Slack has an advantage in terms of ease of use and communication of the features and video tutorials. G-Suite feels like separate app solutions thrown together on a dashboard, it lacks a the collaborative feel of Microsoft Teams and Slack. The good thing about G Suite is that it can be integrated with Slack, adding that element that it is missing. Even though Microsoft Teams is a well thought out solution, slacks seamless integration of third party apps will keep the competition alive.

# Appendices

## Appendix 1.



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