Disruptive Analysis

Don't Assume

Video Collaboration & WebRTC

Service provider opportunities beyond standalone videoconferencing

A Disruptive Analysis *thought-leadership* paper

January 2016

Commissioned by BroadSoft Inc.

broadsoft

Author: Dean Bubley
Contact: information@disruptive-analysis.com

Contents

Introduction **3**

Background to this document 3

Framing the discussion 4
What is collaboration? 4
What is video? 4
What is a service provider? 5

Who should read this report? 5

Why is WebRTC relevant? **6**

The necessity of avoiding commoditisation 7

What's different about WebRTC? 7

The "Design Imperative" 9

Limitations of WebRTC 10

Enhancing today's UCaaS with video **10**

SPs and video collaboration: some history 11

How does video collaboration fit with UC / UCaaS? 11

Appropriate & inappropriate use-cases for video 12

Business case & practicalities of video collaboration 13

The future of video-collaboration **14**

Mobile 14

WCC & workstream-based video 15

Embedded & vertical-specific video-collaboration 16

Hypervideo and video-analytics 16

Security & identity 17

IoT scenarios 17

Other video communications use-cases for SPs 18
Customer-interaction & B2C video 18
Video contact centres 18
Video PaaS 19
Standardised mobile video-calling 19

Conclusions & recommendations **20**

About Disruptive Analysis **21**

Introduction

Background to this document

Service providers (SPs) are increasingly focused on enterprise collaboration opportunities, including UCaaS (Unified Communications as a Service), standalone conferencing services, and various other cloud/platform capabilities and integrations.

Collaboration spans numerous formats of voice, video, messaging and document/data sharing. It is evolving rapidly with the parallel shifts to mobile, cloud/virtualisation and social-type technologies. It spans both cloud- and on-premise approaches to communications, and is seeing evolution of both discrete and app-embedded variants. SPs are acting both as cloud-providers in their own right, and as channels for 3rd-party collaboration services and products.

On a broader scale, SPs' efforts in this space are also being driven by changes in the nature of their clients' businesses, as companies look to align their internal and external communications with new processes, organisations and technologies. We see more cross-functional teams, a greater need to work closely with suppliers, contractors and partners, and a desire to make meetings more productive. UCaaS and other cloud platforms are helping enable these corporate imperatives. Integration of UCaaS with IoT is on the horizon, but approaching fast.

This paper considers the video-centric aspects of collaboration, especially where they are enabled or improved by WebRTC technology. It is the third in a series of papers about SPs and WebRTC – the first document gave an overview of potential use-cases for SPs, and their likely future evolution paths; the second focused on vertical-market issues around WebRTC and UCaaS.

This follow-on document gives service providers a deeper picture of tailoring these offers for *specific video use-cases* in terms, and understanding how and where best to develop WebRTC-powered video collaboration in a UCaaS context.

The document has been prepared by independent research firm Disruptive Analysis, and commissioned by BroadSoft Inc., for distribution to its customers, partners and a wider audience of industry participants. It is based on Disruptive Analysis' continuous research programme covering WebRTC, which it has followed since instigation in mid-2011. This sits alongside more than 20 years of broader telecom industry scrutiny & advisory work, especially around the "future of voice" and telco/SP strategy.

Mentions of companies in this document are intended as illustrations of market evolution and are not intended as endorsements or product/service recommendations.

For more details please contact information@disruptive-analysis.com

Framing the discussion

What is collaboration?

The dictionary definition of collaboration is "*the action of working with someone to produce something*".

In the sense of communications systems and business, it is usually a term used alongside UC and email, to mean some combination of conferencing, document/screen-sharing, message- or work-streams, schedule/calendaring and related features. In theory, this set of tools allows distributed teams or partners to work together, having productive meetings or joint-working sessions across multiple locations.

This could mean, for example:

- a marketing team in 4 geographies, developing a coordinated global planning document
- two developers writing code together, with a shared screen and testing environment
- a client, a salesperson, a lawyer and a technical specialist working out details of a new contract
- three speakers presenting a joint webinar to 500 "attendees", fielding written or spoken Q&A, while using a private "back-channel" to coordinate their responses

The actual scenarios for collaboration are widely varied – most business processes (and some social ones) involve multiple people "working together". If they are physically apart then clearly some form of communication is needed, plus a way to abstract the "work" being done to a computing platform. As the world moves towards remote/mobile working and the "gig economy", new forms of collaboration are emerging all the time. Add "in-app collaboration" tailored to specific use-cases, or new methods for input/output such as VR headsets and IoT sensors, and the term gets broader still.

What is video?

Increasingly, collaboration applications and services are embracing some form of video-based capability. While various statistics discuss the amount of "video" online, it is important to recognise that it is not a specific, solitary function. There are dozens – perhaps hundreds or thousands – of different manifestations of video communications.

The most familiar forms are either room-based videoconferencing, or webcam-style "video chat". However, collaboration can also include many other styles of video, such as: streaming, live-broadcast, one-way video, video messages, video webinars, video-based presence, forward-facing "see what I see" images, VR, AR, CCTV, video analytics, filtered & enhanced video, blended streams, video with or without audio, 3D stereoscopic, 360-degree surround, infra-red, biometric, cartoons/animation, hologram and so on.

A good way to think of this is that video collaboration is *much* more than just "talking heads" meetings. Easy/flexible technologies such as WebRTC allow much more diversity of application and functional modes for video and audio.

What is a service provider?

The terms "service provider" (SP) or "communications service provider" (CSP) are becoming equally difficult to define precisely. In the context of enterprise collaboration, a broad definition of SP is simply any organisation that provides a network- or cloud-based communications service. Traditionally, this would likely be the business arm of a traditional fixed or mobile telco such as AT&T, BT or SingTel, or a cable MSO such as Comcast or Virgin Media.

It could equally refer to a dedicated VoIP/UCaaS provider such as RingCentral or Vonage, or a business-related fibre infrastructure provider such as COLT or Interoute. These also overlap with some of the enterprise communications activities of Internet/hosting companies (e.g., EarthWeb), dedicated video- or web-conferencing providers (e.g., BlueJeans or Arkadin), cloud-based team applications such as Slack or Symphony, vendors offering hosted collaboration tools such as Cisco WebEx/Spark or Microsoft Office365, and numerous others. In many ways, web businesses such as Google and Facebook can also be considered SPs, especially as they build out their own networks and develop business-focused apps.

All of these overlap with each other – and more – when it comes to providing collaboration capabilities "as a service". All of these are also exploiting video capabilities – indeed, in many instances it is the web-centric players which are most aggressive around WebRTC-based collaboration and app-embedded video. Older participants still often treat videoconferencing as a separate line of business, and are sometimes reluctant to risk historic high margins by combining it with other collaboration functions. Disruptive Analysis tends to find that people referring to WebRTC as "just another access" are the least-willing to see its broader potential for fostering innovation.

Who should read this report?

This report is intended for strategy executives, product managers, CTOs, CMOs, network architects & planning and operational staff at communications service providers, industry-specialist telecoms providers, software vendors, web/hosting firms, cable operators, ISPs, and similar organisations. It may also be relevant to systems integrators, channel partners, software developers, consultants and investors.

The primary coverage here is of business/enterprise services (including B2B and B2C), but it also touches on other domains: government/public sector, application developers, telecom wholesale and adjacent domains such as IoT. Please contact Disruptive Analysis for more detailed coverage and forecasting of those areas.

It should be noted that the report focuses primarily on collaboration meaning "working together". Other business uses of video such as contact centres, security & monitoring, drones and similar domains are only touched-upon briefly.

Why is WebRTC relevant?

A full description of WebRTC technology, and its historic path to standardisation, was given in an earlier 2015 white paper written for BroadSoft on use-cases and market evolution. An abbreviated summary is repeated below for new readers.

WebRTC is an umbrella term for a collection of standards and approaches used to embed RTC (real-time communications – voice, video or data) into the web and application environments. Originally set up in 2011 as a way to let browsers act as peer-to-peer communications clients, it has since evolved to embrace:

- Communications-enriched native mobile apps on iOS and Android
- Extensions of legacy enterprise UC, conferencing and telecom-network platforms via gateways
- Integration with call centres and CRM systems
- Deployment with centralised PaaS-based capabilities
- Variants such as "Object RTC" (ORTC) and support for old browsers via plug-ins

WebRTC has already appeared in use-cases spanning consumer, enterprise, telecom/cable and IoT markets. Although many early deployments have been for businesses (especially contact centres and collaboration apps), 2015 has seen a huge upswing in the other usage domains as well. In the enterprise, the market has seen WebRTC based UC platforms emerge, as well as richer, contextual customer-interaction applications that go well-beyond traditional call-centre functionality.

As part of this, various use cases have emerged as being relevant for CSPs, including both end-user services such as video-chat apps and hosted, WebRTC-enhanced UCaaS, as well as developer-centric platform propositions and consortia. Over 20 CSPs have now launched some form of WebRTC-based service, in the US, Europe, Asia, Australia and Middle East. Many others have been running trials or developing proofs-of-concept. In general, standalone services have been simpler and quicker to launch, but recent months have seen more CSPs offer WebRTC capabilities integrated with existing platforms or services via gateways or cloud "XaaS" infrastructure.

The challenge for both CSPs and standalone WebRTC software/platform players is now to work out how to monetise this technology effectively. This means either with unique new and differentiable communication services created with WebRTC as a base (such as video-based interaction), or by using it as way to enhance *other* services and applications, such as by improving collaborative workflow and business processes.

All this is also occurring alongside other transitions such as cloud-based IT, a shift to mobility, the rise of IoT, and adoption of cognitive/contextual computing. Against that backdrop, video-based collaboration possibilities are broadening still further, for SPs that are willing to step beyond "commodity" service delivery.

The necessity of avoiding commoditisation

The telecoms industry is already feeling the brunt of commoditisation of basic communications services - consumers and businesses now have many ways to speak to each other via different voice applications, or send messages in ways far more flexible and "cool" than email, SMS or other standards. In the enterprise space, hosted UC comes from both network-based CSPs and standalone cloud-based alternatives, and similar competition exists in conferencing and other applications.

While all of these have minor variations in quality or feature-set, the uncomfortable truth is that much of the basic functionality is now a commodity. It is not that difficult to set up a "vanilla" voice connection, or send text or images. While there are still sometimes awkward set-up processes, videoconferencing and other video applications are also becoming more mainstream.

This means that competition – and especially the attainment of defensible positions – is getting ever-harder in communications. Some of the key strategies include:

- Competing on UI/UX – which application is the most user-friendly?
- Competing on price or "total cost of ownership" (TCO), for example by shifting CapEx to OpEx in managed services, or "sweating the assets"
- Developing an adjacent market or capability, and then add in another (perhaps traditional area) as a "free" extra
- Competing on application/network performance, ease of sale and support, or provision of analytical and reporting tools.
- Customising generic applications/services to specific use-cases', industries' or niches' precise requirements and environments

WebRTC has a role to play in all of these, helping SPs evolve their UC and collaboration systems or platforms into more-differentiated offers. In particular, where SPs are able to work with good partners or internal developers, they should be able to create optimised or customised experiences for prized customers or niches. For example, video-collaboration in a large manufacturing company may need different software integrations and delivery modes, compared to video-collaboration for small legal practices, or for a teaching hospital. UCaaS providers are likely to need to trade some extra cost-of-sale, for creating sustainable, differentiated and higher-margin offers for their customers.

What's different about WebRTC?

There are plenty of ways to implement video-based communications and collaboration – we have had assorted forms of conferencing and video-chat for many years, ranging from high-end telepresence rooms down to free applications like Skype.

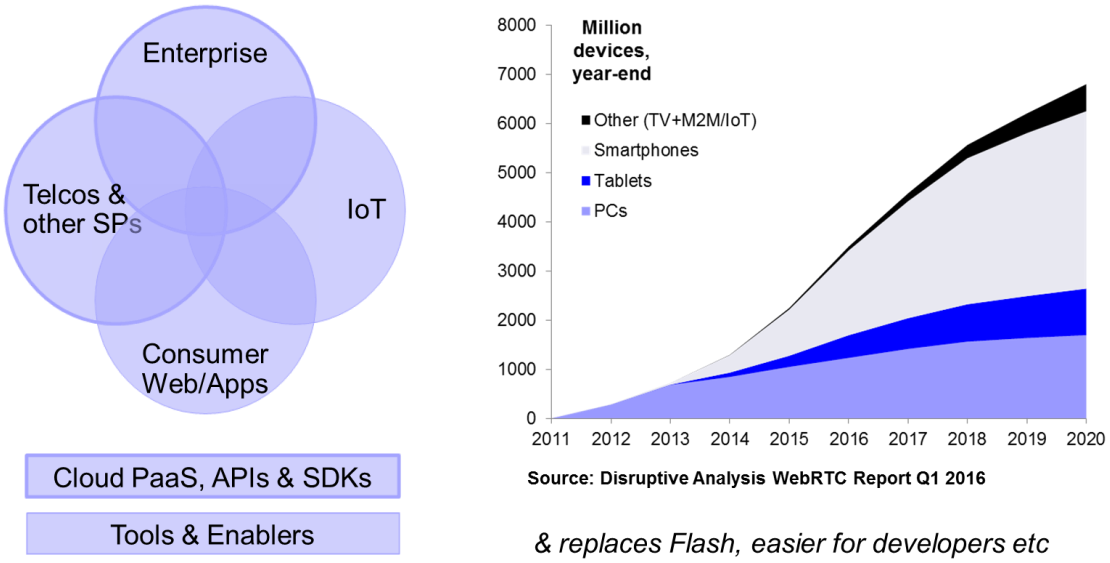
However, WebRTC is different in several important ways. Firstly, as a web technology & API and also a client-framework, it is specifically designed for voice/video to be directly embedded *into* websites or mobile apps. This means that both standalone communications apps and "comms-as-a-feature" implementations in other apps are first-class citizens. This is very different to most other video technologies, which are typically

intended for standalone use first (e.g. in a room-based system) and then possibly integrated into other software at a later point, often with significant constraints and costs. Linked to this, WebRTC can also be used to create new and innovative "islands" of communication, or it can be connected via gateways into existing systems – UC, telecom networks, conferencing applications, etc. – as "another access method". Also, as a web technology, WebRTC allows integration with the various other strands of Internet capability, such as analytics and personalisation and context. The implications of this are considered later on in this document.

The other key difference is the huge volume of solution vendors and open-source elements. This means that developers have many choices for creating their application or service, depending on their skill, time, budget and requirements for scalability and security. For non-communications developers there are numerous WebRTC platform-as-a-service providers that offer simple APIs and SDKs. For established communications SPs there are various gateway products connecting to existing infrastructure, or ready-made applications that can be re-sold or customised. Enterprises can adopt video-based WebRTC solutions from SPs, specialist cloud providers, or integrated with their on-premise systems.

Combined with the plug-in free nature of WebRTC, and the ease of creating mobile-based versions of apps, this acts to "democratise" voice and video service creation. While other proprietary systems will continue to exist for particular use-cases, alongside older technologies such as Flash, Disruptive Analysis believes that WebRTC is hugely significant and allows the simple creation of differentiated communications capabilities.

Figure 1: Why WebRTC?



Source: Disruptive Analysis

The "Design Imperative"

What this flexibility means is that pretty much any collaboration scenario that can be imagined, can now be realised – and more quickly and cheaply than in the past. This makes it possible to experiment with new features and concepts. For example, chat and voice and video capabilities can be added to any existing app or website - turning a sequential workflow, where one person emails a document or form to another for action, into one where multiple people can be involved in parallel.

This shifts much of the development and service-creation burden from "engineering" to "imagination". Once most ideas can be made real, value tends to accrue to the ideation stage of the process. It also changes the nature of competition – it is likely that broadly-comparable functions can be developed by any company's rivals. This puts the emphasis onto good design, mapping human requirements onto a convenient and frictionless user-interface and mode of behaviour, along with competent implementation.

In other words, WebRTC (like many other newer technologies for mobile and web) aligns with the trend towards "design thinking". It is not good enough for something to merely be functional – people actually have to *want* to use it, or else they will be able to find an alternative option to achieve their collaboration goals.

In the context of video communications, this is really important. Application developers and designers need to be really careful to avoid awkwardness or dissonance. Given its potential for invasiveness and extra "cognitive load", video needs to appear in the appropriate places and with the appropriate interfaces. Otherwise its improved utility and productivity will be overlooked by users, distracted by the (possibly minor) downsides.

The human-interaction aspects need to be carefully considered – the sequence of events to initiate and terminate a session, the key-presses needed to control it and so forth. We are all familiar with the frustrations of setting up conference sessions – calling for IT support, or updating plug-ins, is anathema. Psychology plays a part here too – for example, whether to show people an inset image of what *their* own camera is displaying tends to put people at ease in one way, but also exerts extra "cognitive load" as a distraction.

Mobility makes the design decisions even more complex. Phones and tablets vary in size, they can be used in portrait or landscape mode, in different locations, they may have multiple cameras (forward & back), battery constraints – and perhaps above all, ergonomic complexities. Are video-capable smartphones going to be held at arms length, propped up on a table against something or with a stand – and if so, can the user still read and touch the controls? Can the microphone and audio software cope with unusual acoustics in a car – or a bar?

This all means that the "design imperative" of video is extremely high. Only CSPs that are willing to go beyond technology considerations and actually understand and test user-behaviour will be successful, because many of the newer cloud-based providers have already set the bar high.

Limitations of WebRTC

While Disruptive Analysis has been enthusiastic about WebRTC for several years, it is also important to recognise its limitations. At present, it is not yet supported in all browsers (notably not Microsoft IE and Apple Safari), which limits its suitability on users' PCs that are not directly administered by corporate IT functions.

There may also be issues relating to some firewalls, or sub-optimal network routing on long-distance collaboration, that reduce performance. Some WebRTC user interface design is also lacking in notifying users about headphone/microphone usage, or mitigating issues such as closing browser window accidentally.

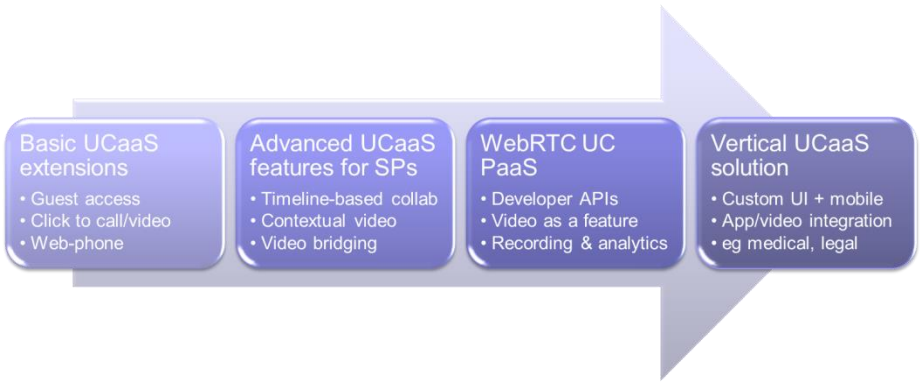
By and large, similar issues also apply to other video collaboration technologies – or else they come with other troublesome requirements such as a need to download and install browser plug-ins or separate apps. As such, it is important for developers to test applications thoroughly, and also consider implementing fall-back mechanisms to cope with the most likely problems.

Enhancing today's UCaaS with video

Broadly speaking, there are two categories for considering video collaboration opportunities for SPs:

- Enhancing existing UCaaS platforms, and today's CSP services portfolios, with additional video-based capabilities in the near-term.
- Developing or selling entirely new video-based, or video-integrated propositions in the future, either directly as a CSP, or in conjunction with partners and vendors. This includes developing platform-as-a-service (PaaS) businesses, or tailoring video to specific vertical markets.

Figure 2: Multiple horizons for blending UCaaS & video collaboration



Source: Disruptive Analysis

These two domains are considered separately in the next two sections of the report.

SPs and video collaboration: some history

Various SPs have historically provided public video-conferencing services, or have installed or managed premise-based systems for enterprise customers. Some major operators have significant portfolios of video-based propositions, spanning external bridging/exchange services, professional production of events, video-based security, and even internal consulting and strategy development for businesses wanting to collaborate more effectively.

Others have supported video as part of more general web conferencing platforms, or more recently have featured desktop- or room-based video within their UC/UCaaS portfolios, sold as both premise and cloud-based solutions.

However, while telcos have sometimes been important channels to market for vendors' video-collaboration products, most have done little to stand out in terms of service innovation. As both vendor-led and in-house UCaaS platforms become more video-centric, this is now starting to change.

Figure 3: Some SPs already have wide video collaboration portfolios

Source: Disruptive Analysis

How does video collaboration fit with UC / UCaaS?

The harsh truth is that most UCaaS service "suites" today are sold as a form of "enhanced, network-based phone service", often to end-users that are still relatively unsophisticated and just wishing to replace ageing on-premise PBXs and key-systems. Relatively few of the "unified" features have been actively used – perhaps beyond

meeting-scheduling and audioconferencing. A proportion of users – especially "knowledge workers" - exploit the presence/IM functions, but others tend to ignore even these, and instead use the system in a similar fashion to a historic PBX/IP-PBX.

Where video-conferencing *is* used as a hosted/cloud service, it is typically in a standalone form from a separate vendor, or at least just integrated with occasional UC add-ons such as document-sharing. And a significant number of business users rely upon free/consumer-grade Internet services such as Skype and Hangouts.

In other words, UC has only rarely been actively used for video collaboration in the past.

There are various reasons for this, but much of it has been down to the perceived lack of clear use-cases for UC-integrated video collaboration, as well as limitations of older end-points, networks that are not always video-ready, lack of training, or perhaps existing video-conferencing services or separate rooms from another provider/vendor. Many companies have balked at the extra costs of implementing video, or its poor fit with existing business processes and organisational issues – there has been more emphasis on other technology shifts such as mobility, multi-channel CRM, and moving applications to the cloud.

This is, however, now changing rapidly. There are three "vectors" by which this is occurring:

- Use of video collaboration by companies that have never done so before, and which are starting with a "clean sheet".
- Existing video conferencing/collaboration solutions being upgraded or replaced by newer cloud-based alternatives, with more UC-style functionality.
- Bridging and integration of existing video platforms, with UCaaS, and new endpoints such as desktops and mobile devices.

All of these approaches can exploit WebRTC, either in "starring" or "supporting" roles. Various new UCaaS platforms are emerging which are "WebRTC-native", while older ones are using the technology to add video capabilities to existing voice platforms, or as an easier path to bridge into existing videoconferencing services and systems.

Appropriate & inappropriate use-cases for video

Video collaboration comes in many forms, and this is range expanding. But it is important for CSPs to consider more granular use-cases, as this can inform them on the technology platform chosen, the way the interaction is presented to the users, and how it can be sold/marketed.

For example, consider the differences between the following scenarios:

- Spontaneous "talking heads" meetings for two people or a small team, on their PCs
- A company meeting in a boardroom, that connects in another three people in a huddle room at remote office, and another couple of individual home-workers on PCs, displaying them on a large screen

- A regular project-team meeting via video, which also involves an external representative of a third-party supplier, which doesn't allow new applications or browser plug-ins to be downloaded
- A webinar with three video "speakers", presenting remotely along with slides, to an audience of several hundred that can see their images, but only ask questions via IM
- Two engineers trying to diagnose a problem with a complex machine, perhaps also patching in a specialist from the company which supplied it
- A future virtual-reality trade show, with booths and private meetings done wearing a VR headset

All of these can be considered to be workable, productive examples of "video collaboration". All have very different behaviours of the participants, different requirements on cameras – and crucially, different ways to set up the session and manage its ongoing effectiveness. Who controls the zoom and pan/tilt? Who is able to "mute" other sources' video? Which participants "dial in" and how? Can average employees do it effectively and simply?

But it is equally important to understand where video *doesn't* fit, both to avoid extra costs or occupying scarce service-creation resource, and also to limit the risks of creating poor user-experiences.

For example, anything involving interruptive and unscheduled video "calls" is likely to be unwelcome. Clearly, circumstances where people are walking or driving are not conducive to video interaction. Instances in which people are at home, or travelling, may mean that video is unsuitable given a messy background, inappropriate clothing, intruding children and animals, and so forth.

A more tricky area to navigate is around multi-tasking. On video, it is painfully-obvious if people are not paying attention, or are dividing their time with other activities. While it is tempting to use video to *force* attention, that can also be counter-productive, for example if maintaining eye-contact makes it harder for one participant to simultaneously take notes. In some situations it also involves physical compromises – perhaps sitting in an uncomfortable pose to be in view of the camera – which is hardly good for concentration either.

There have also been cultural and usability issues – how do people appear and behave on video? Does video conferencing disadvantage people with physical or mental disabilities – from blindness to social anxiety or worries about self-image? Are there HR implications where some staff do not *want* to use video, for personal reasons? If the productivity benefits of better collaboration are offset by extra difficulties, it is a zero-sum game or worse – as cruelly parodied by comedians Tripp & Tyler[1]

Business case & practicalities of video collaboration

Given the number of different use-cases discussed, it is hard to give a general view of ROI for video-collaboration, or video-enabled UCaaS. There could be both hard and soft

[1] https://www.youtube.com/watch?v=JMOOG7rWTPg&feature=youtu.be

cost-savings, plus also both financially-tangible and intangible benefits (and also risks). Furthermore, some of the financial variables relate to *all* forms of cloud-collaboration, whether based on WebRTC or not.

Some areas where costs can be saved include:

- Replacing existing costly / under-used videoconferencing rooms or services
- Reduction in dedicated connectivity for older video conferencing
- Potential reduction in IT support costs for video-collaboration, if newer solutions have greater ease-of-use and reliability/robustness
- More-effective meetings using video could be shorter, with consequent time-savings for people involved
- Reduction in travel costs (although it is unclear how many trips can *really* be replaced [see this post])

The less-tangible benefits are where video improves existing business processes, or enables newer ones. More effective teams working on projects or new product-development; clearer communication between management and junior staff; improved training or compliance and so forth. Each company will have its own calculation to perform.

It is also worth noting that many of the benefits of video collaboration may well be found out *before* the IT/communications team offer the capability – it is likely that individuals or teams will start using their own informal solutions as "shadow IT", or "dis-unified communications". It is also worth enterprises (and their service providers) considering whether they would rather see other business applications embed their own video solution, rather than use the UCaaS-provided functions or APIs.

This paper is not the venue for a detailed description of technical deployment considerations – but at the top of the list is whether the network infrastructure is capable of supporting video traffic, in different guises and configurations. This spans both LAN and WAN domains, especially under heavy load.

Other practicalities include whether the company's PCs have good-quality webcams, whether meeting/huddle rooms are suitably-equipped, whether storage of video communications is needed, and whether any specific IT integrations are needed.

The future of video-collaboration

Mobile

At present, the majority of video collaboration takes place either on room-sized systems, or on PCs with dedicated apps, or in-browser WebRTC. However, as the entirety of UC and collaboration moves towards mobile, it will be necessary for video tools to follow. Obviously there are numerous mobile video communications apps aimed at consumers, but the enterprise-grade tools have been variable in quality and usability thus far.

Smartphones and tablets bring a broad array of extra complexities to video collaboration – especially the likelihood that the user will be walking, driving, or otherwise unable to use the camera. Applications will need to support audio-only modes, or in many cases by messaging-primary, with audio/video "escalation" when feasible. Constraints on screen size, interruptions from other apps, battery power and other factors will also need consideration. Connectivity, whether using WiFi or 3G/4G, will also clearly be a determinant of quality and cost. The capabilities of Android and iOS and mobile variants of Windows are also different, and need careful analysis.

Context is very important here – there is a big difference between tablets being used by individuals around a boardroom table, versus a travelling employee using a smartphone while at the airport.

Nevertheless, the rise of mobile-primary users, as well as the ambitions of both Apple and Google to push further into supplying enterprise-optimised devices, point to a future in which UCaaS must deliver video-capable mobile apps. As seen in the consumer space already, this likely means WebRTC, either running in mobile browsers/WebViews, or integrated directly into native apps using a client-framework or 3rd-party APIs.

WCC & workstream-based video

One of the most important recent trends in UC has been the rapid rise of "workstream collaboration and communication", or WCC. Epitomised by the success of Internet "unicorn" app Slack, many other tools using scrollable, messaging-centric "timelines" have since appeared. Typically, these are provided in cloud-based form, and increasingly integrated with UCaaS offerings.

These services are typically based around a Facebook- or LinkedIn-style set of statuses, threads, discussions or "rooms", with text and documents shared. As such, WCC applications primarily substitute for email. However, most of the providers of WCC tools also integrate realtime voice and/or video communications, or allow 3rd-party plug-ins or integrations to do so instead. Users – especially millennials – seem more attuned to this style of interface, than static dashboards and contact lists and representations of "diallers".

The precise flow and UI varies by solution, but a typical interaction might escalate from a particular subject being discussed, to relevant documents being added, and then a realtime collaboration session being initiated if presence indicates people are online. This video session or voice conversation can thus take place "in" that part of the workstream – and potentially can be recorded and reviewed at a later date.

Disruptive Analysis expects WCC-type tools to be one of the major drivers for video collaboration in enterprise, and in the context of UCaaS solutions, in coming years. It may also be integrated with more large-scale video-conferencing systems, although the usability will need to be considered carefully.

Embedded & vertical-specific video-collaboration

Probably the most game-changing type of video collaboration, enabled by WebRTC APIs, will be where it is *embedded* directly into other apps that service specific types of collaboration. This makes it especially suitable for industry-specific implementations that require interaction modes with a heavy visual role.

For example:

- Video in an inventory-management app could aid collaborative working between warehouse staff and in-store assistants.
- Virtual "patient visits" for a hospital communications systems, or a similar model in prisons
- Identity and authentication can involve video-based checks, either using a real agent to query a user, or with biometrics.
- A field-maintenance worker at a remote location could use video collaboration to fix a problem, along with an expert at HQ and representative from the machine supplier, *inside* a dedicated technical application, with the session integrated into the workflow.
- Tools for software developers to have audio/video communications while simultaneously co-writing/debugging code on a shared cloud platform
- More simply, video collaboration could be used inside a normal office productivity application, as two people work jointly on a report or presentation.

This is an example of an "export" model for UCaaS, where the collaboration function is provided *outbound* via an API or custom integration, to become a secondary capability in another application.

It should be noted that WebRTC is not "the only game in town" here. Older solutions such as Flash are still around, while various other proprietary videoconferencing platforms, such as WebEx, Vidyo and ooVoo also permit integration into enterprise applications.

Whilst general "conference room" use of video is important, and desktop / mobile video calls are becoming more universal, there is heavy competition for service providers from incumbent vendors or Internet options such as Skype (or various free standalone WebRTC services). By considering new, video-integrated applications, there is potential for significant differentiation and premium pricing. Telstra's telemedicine service is an existing example here. Future developments could further benefit from blending video with a service provider's other assets – both the network itself, or perhaps gateways to other applications, billing systems or numbering.

Hypervideo and video-analytics

We are already seeing a lot of work in the areas of both *voice* analytics and image-recognition, as well as moves to turn these data sources into permanent, dynamic forms with concepts such as hypervoice. Extrapolating from this, there are now early signs of video analysis tools becoming useful as well – for example emotional analysis by

recognising facial expressions, or security applications using facial recognition. There is also a growing demand for video and multi-input recording, which over time will likely get tagged and indexed automatically for future reference or amendment.

In future, we can expect a combination of WebRTC, video and machine-learning / big-data analytics to lead to new forms of collaboration and introduction. A number of companies are looking at ways of interacting with video-streams – coming years should yield a variety of fascinating (and perhaps sometimes worrying) use-cases.

Security & identity

Both in video-collaboration and in customer-facing communications scenarios, there is a rising use of visual capabilities to manage users' identities. This takes various forms – some computers and applications use in-built recognition of a user's face instead of a password.

Some companies are setting up video call-centres to authenticate a user against a document like a passport or driving licence. Other use-cases rely on psychology – people are less likely to lie, or act in fraudulent fashion, when seeing eye-to-eye rather than just relying on voice. It is also much harder to falsify live video using filters or faked document images.

Clearly, in business-collaboration scenarios where teams and individuals know each other well, proving identity is rarely important each time they speak. But in a world of external contractors, collaboration with new suppliers, ad-hoc teams across functions or companies, and formation of working groups from random social-media contacts, the need for authentication is likely to become more important. Video will assist here.

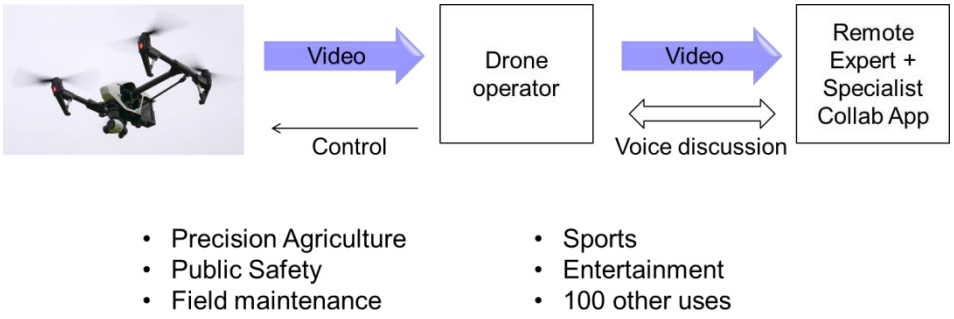
IoT scenarios

Although mostly outside the scope of this document, it is interesting to note the rapidly-growing intersection between the worlds of UC and IoT. While the link between phone systems and newly-connected devices is not immediately apparent, the possibilities become much-clearer when one considers a few examples:

- Wearables like the new breed of virtual-reality & augmented-reality headsets, equipped with cameras and displays, are being adopted for enterprise purposes by field-maintenance staff, agricultural workers and others, especially where there's a need to work in hands-free mode.
- Various platforms for remote cameras are being deployed, and again may form part of collaboration: CCTV cameras and drone-mounted video feeds are two prominent examples that can allow people to work together in new ways.
- In-vehicle systems are also important. While drivers may not be able to use video, it is easier to imagine taxi passengers, or those in autonomous-driving vehicles, exploiting video-based connectivity.
- Certain vertical markets may have niche video-working roles. TV broadcast, medical consultations and imaging, retail operations and inventory-management

and numerous others may blend video capabilities into dedicated UC-oriented solutions.

Figure 4: The intersection of IoT & video collaboration holds huge promise



Source: Disruptive Analysis, Q1 2016 WebRTC update

Other video communications use-cases for SPs

As well as collaboration, it is worth noting that various other uses of video communication are cropping up in business, or related areas. This section is a brief overview of the most significant.

Customer-interaction & B2C video

There is currently a lot of interest in developing variants of audio/video-chat that are tailored to specific industries' needs. A number of such solutions have already emerged, although mostly as packaged solutions rather than CSP-hosted versions:

- Telemedicine using videoconferencing alongside diagnostic data/applications
- Insurance claims-management apps, which can use "see what I see" video from a smartphone's rear-facing camera to allow an agent to assess damage
- Various education-sector and coaching applications, from online-university seminars, through to personal fitness training

Video contact centres

Another entire paper or report could be dedicated to the emergence of video-based call centres, for in-app or in-web provision of video customer sales/support functions. We are already familiar with Amex-style "concierge" services, or Amazon Mayday, but this model is extending more broadly. Video is being employed for at least some customers or high-value/high-touch queries, in a variety of consumer-facing industries. More sophisticated versions use "push" techniques to send pictures or enable co-browsing along with video-chat, or exploit the phone's native APIs (e.g. for sensors & camera).

A good example of the use of video contact-centres is in online authentication / legitimation of identity in financial services. Using a webcam or smartphone, a customer can verify their identity when opening a bank account, or taking out a loan, to ensure compliance with financial "know your customer" regulations.

That said, the costs and complexities of video-capable staff hiring/training are prohibitive for most "mundane" call centre interactions, where the emphasis is in pushing users towards self-care or other automated channels. One of the most important areas of opportunity for cloud-based video contact centre providers will be providing analytical tools to steer the right customers, to the right agents, for the right interactions.

Video PaaS

A number of service providers are using WebRTC as the basis of general, developer-centric video platform-as-a-service propositions. Telefonica, AT&T, NTT and SKT are among this group, creating APIs for web and mobile developers to blend video capabilities into their apps or services. There are various strategies here, including iOS and Android SDKs, optional interconnect with core phone networks and numbering, higher-level platform services such as multi-party video handling, recording and so forth. Most use-cases of video PaaS are consumer-facing, although increasingly they are being used as the basis for enterprise app-integrations.

Standardised mobile video-calling

Some service providers are trying to deploy standardised network-integrated video-call or video-chat services, either using the GSMA's RCS (Rich Communications Suite) messaging application, or the video equivalent to VoLTE, called ViLTE. They are included here for completeness, but have little realistic prospect of impact on the video collaboration market.

ViLTE has had very limited deployment to date, and seems unlikely to gain much traction in the future: there is no reason to believe that a "call" metaphor and "native" video-dialler is the right model of user-interaction for video, which is becoming heavily customised for specific use-cases. Disruptive Analysis has been a long-standing and vociferous critic of RCS, and continues to believe it faces no prospect of meaningful success (see this post). In any case, its proponents' most-recent pitch has been more aimed at the consumer space, so its enterprise video collaboration impact will be negligible.

Conclusions & recommendations

UC/UCaaS and collaboration are becoming more video-centric. Technology evolution, behavioural change, and the parallel trends towards cloud and mobility, are helping make interaction more visual. New use-cases are emerging, and WebRTC's flexibility to create integrated experiences suggests it will play a major role here. Most cloud-based video, and many mobile app-integrated video implementations will be based on WebRTC in the future.

That said, it would be wrong to suggest that video will become ubiquitous, or somehow replace voice communications in its entirety. And while extremely important, WebRTC is not the *only* way to create such services. The challenge for vendors and CSPs is to tailor their solutions to *realistic* use-cases, and also to consider the practical challenges in implementation of video at a human level, from organisational dynamics to psychology and application interaction design.

There will be a mix of "unified", "standalone" & "embedded" video collaboration apps & tools. This is an evolution of the current market, but it bears careful scrutiny and analysis. CSPs can play in all three of these segments, but need different skill-sets and go-to-market strategies for each:

- Adding video capabilities to existing UCaaS will likely be vendor-driven, unless the SP has its own UC platform. The skills needed will more exist around marketing and sales/support – positioning video for relevant use-cases and with appropriate partners for the CSP's target market, and assisting clients with implementation (e.g. network dimensioning).
- Providing standalone video-collaboration is an extension of the existing videoconferencing SP business, but will need to consider a broader range of integrations. There will also be risks of cannibalisation of existing customers by (probably cheaper) cloud implementations. Installation and sale of end-points will continue to be important, as well as working to create new mobile video experiences.
- Embedded video collaboration for CSPs will come in two forms – either the creation of dedicated products for specific markets (e.g. healthcare, legal, etc.), or a focus on 3rd-party developers via an API/PaaS platform. The latter is complex and expensive, and likely to be out of reach for all but the largest SPs – although collaborations with some vendors or existing PaaS players can also be considered.

In summary, WebRTC & video can help SPs differentiate and customise their UC and collaboration offer. Today's services can be extended with video, while many of the new opportunities are video-centric to begin with. However, just adding "commodity video" is unlikely to be enough to make a huge difference – service providers need to recognise that video collaboration needs considerable effort around design, integration and support in order to provide a sustainable advantage. But if CSPs are willing to step up to this, video has the potential to drive demand for extra connectivity, and also help improve margins by targeting specific niches – as well as maintain relevance in a world where users are shifting from voice/telephony to a much broader array of communications options.

About Disruptive Analysis

Disruptive Analysis is a technology-focused advisory firm focused on the mobile and wireless industry. Founded by experienced analyst Dean Bubley, it provides critical commentary and consulting support to telecoms/IT vendors, operators, regulators, users, investors and intermediaries. Disruptive Analysis focuses on communications and information technology industry trends, particularly in areas with complex value chains, rapid technical/market evolution, or labyrinthine business relationships. Currently, the company is focusing on mobile broadband, operator business models, the Future of Voice, smartphones, Internet/operator ecosystems and the role of governments in next-generation networks.

Disruptive Analysis attempts to predict - and validate - the future direction and profit potential of technology markets - based on consideration of many more "angles" than is typical among industry analysts. It takes into account new products and technologies, changing distribution channels, customer trends, investor sentiment and macroeconomic status. Where appropriate, it takes a contrarian stance rather than support consensus or industry momentum. Disruptive Analysis' motto is *"Don't Assume".*

For more detail on Disruptive Analysis publications and consulting / advisory services, please contact information@disruptive-analysis.com. For details about Future of Voice & Contextual Communications workshops & publications, please see www.deanbubley.com.

Website: www.disruptive-analysis.com
Blog: disruptivewireless.blogspot.com
Twitter: @disruptivedean
Quora: Dean-Bubley

Intellectual Property Rights / Disclaimer

Every reasonable effort has been made to verify research undertaken during the work on this document. Findings, conclusions and recommendations are based on information gathered in good faith from both primary and secondary sources, whose accuracy it is not always possible to guarantee. Disruptive Analysis Ltd. disclaims all warranties as to the accuracy, completeness or adequacy of such information. As such no liability whatever can be accepted for actions taken based on any information that may subsequently prove to be incorrect. The opinions expressed here are subject to change without notice.