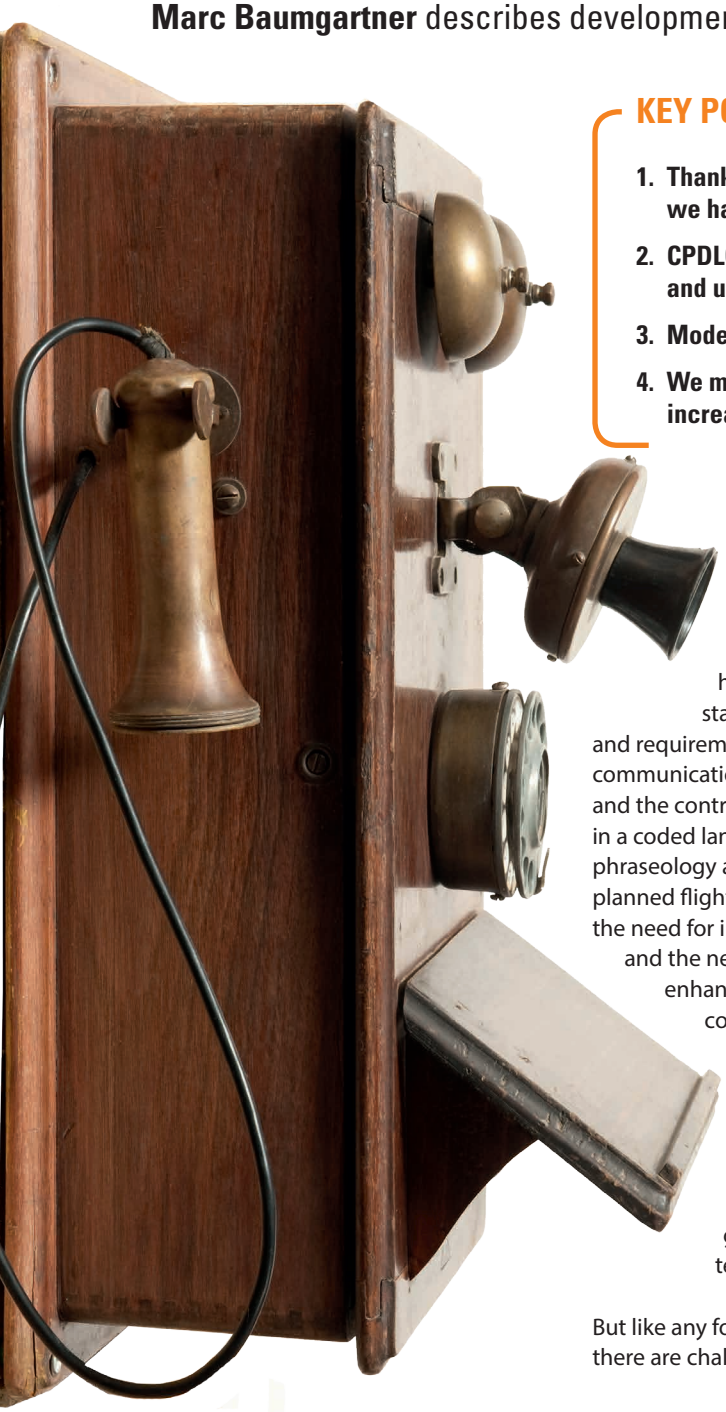
COMMUNICATION AND TECHNOLOGY AT THE INTERFACE

Communication in society has become increasingly mediated by digital devices. Similarly, technology in aviation is shifting the emphasis from voice communication to screens. What are the benefits, and what are the pitfalls of this new interface? **Marc Baumgartner** describes developments at Geneva.



KEY POINTS

1. **Thanks to 'old' new technology, such as CPDLC and Mode S EHS, we have improved safety at the interface in certain situations.**
2. **CPDLC has the potential to make communication more transparent and unambiguous.**
3. **Mode S helps controllers to read the mind of the cockpit.**
4. **We must stay alert to the possible unintended consequences of increasing automation at the interface.**

Communication is one of the most important elements of air traffic control and air traffic management. It has its own international standards, procedures and requirements that formalise communication between the pilot and the controller. Communicating in a coded language, using aviation phraseology and sticking to pre-planned flight plan requests, reduces the need for interpretation of clearances and the need for further explanation, enhancing the successful communication at the interface between the ground and the air. This is all repeated many times during a flight for the pilot; simultaneously for up to 20 aircraft at any given time for the ATCO team in a busy sector.

But like any form of communication, there are challenges of interpretation and understanding, and this is affected by culture, language and technology. When communication is not clear, due to human, procedural or technological limitations, safety can be put at risk rapidly.

Two types of technology, in recent years, have entered the interface between controller and pilot.

CPDLC: Transparent and unambiguous

Nowadays in the Geneva ACC we are using a CPDLC system to transfer some information to the cockpit with some airlines. What we have noted since the use of CPDLC has become more frequent is that we have quickly adapted to this new interface between the ground and the air. Transit times can be from two minutes to 17 minutes and therefore a rapid, standardised exchange of information in a clear format is required. CPDLC has the potential to help achieve all this.

- **It is transparent.** When I send the message I see if the pilot has acknowledged the receipt of the message or if the message has not been delivered. If it does not work (e.g., too long transmission time or provider aborts) an error message is delivered to my controller work position.
- **It is unambiguous.** The information that is being transmitted corresponds to a format that is easily identifiable and corresponds to the expectations both the pilot and the air traffic controller will have in their respective working environment of the communication happening. "CLIMB TO FL330" is clear as a message.

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Mode S: Reading the mind of the cockpit

How many times have you come across a situation where you say something to a family member, a work colleague, and you realise at a certain stage that your message was not clear for the receiver, or that the receiver had a different understanding of what your message was intended to say. In these cases, have you not sometimes wished you could read the mind of the other person?

As an ATCO, I have started to get an insight into the 'mind of the cockpit' via additional technology at the interface: Enhanced Mode S Download Parameters. Since a couple of years, I have seen what the pilot sees on his or her selection panel. Importantly, Mode S displays discrepancies between the selected onboard equipage and the clearance that I have entered electronically into the radar processing system.

From a communication point of view, we have benefitted a lot from the Mode S Enhanced Surveillance (EHS) download aircraft parameters (DAP). We can now read on our controller working position what the pilot has understood from our clearance, in particular when it comes to cleared flight level, speed and heading. Time latency for a monitoring alert has been defined as four seconds, meaning that I could correct a misunderstanding after four seconds (imagine this correction possibility in human relationships!).

Looking forward

In future, some of the communication and information exchange will be carried out via new technology that will allow for a reduction of potential misunderstandings, via harmonised and standardised interfaces between the ground and the air (Baumgartner, 2017). Technology is an increasingly important part of collaboration.

A new phenomena though, will be that communication will be more silent – and the so-called party-line effect might be biased or disappear completely. What effect might this have? Do we trust more a human voice, even if it is more error prone than a machine-machine interface? Will voice communication become as obsolete as the switching rooms of the past?

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Another phenomena may be changes in the distribution of attention. Will we have more head down time? And then there is the possibility of changes to mutual understanding of a situation. Will controllers and pilots have the same understanding of what is going on in the sector? These are questions for human factors specialists, and for us as air traffic controllers and pilots.

Reference

Baumgartner M. (2017). DigiATMisation. Is a radical reform of the technological pillar needed? Or is it too late? *Controller magazine*, October, 6-7. Montréal: IFATCA.

Marc Baumgartner is an operational air traffic controller and centre supervisor in Geneva ACC. Marc was a member of the Performance Review Body/Performance Review Commission. For eight years until 2010, he was President and CEO of the International Federation of Air Traffic Controllers' Associations (IFATCA) representing more than 50,000 air traffic controllers from 137 States. Marc is coordinating the activities of IFATCA in SESAR and EASA.