Dataflow tabular charts

Bringing 3D to architecture diagrams

Yves RÜTSCHLÉ / Security Engineer
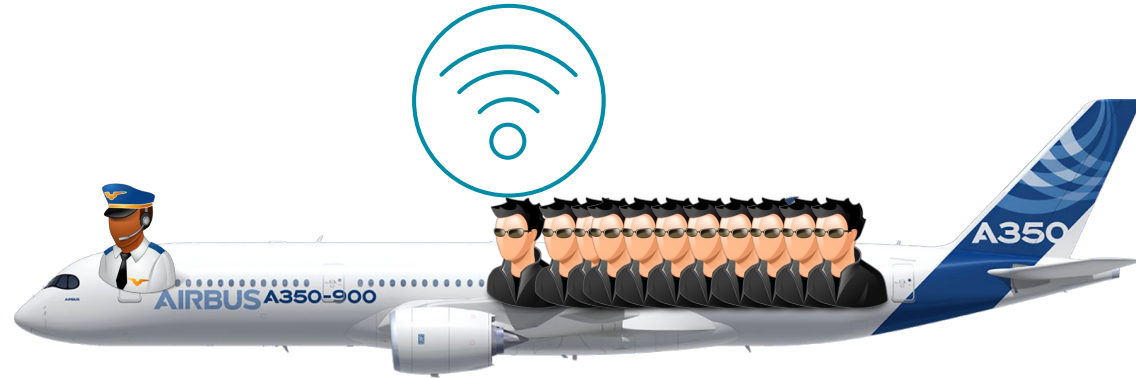
Pass-the-salt 2022

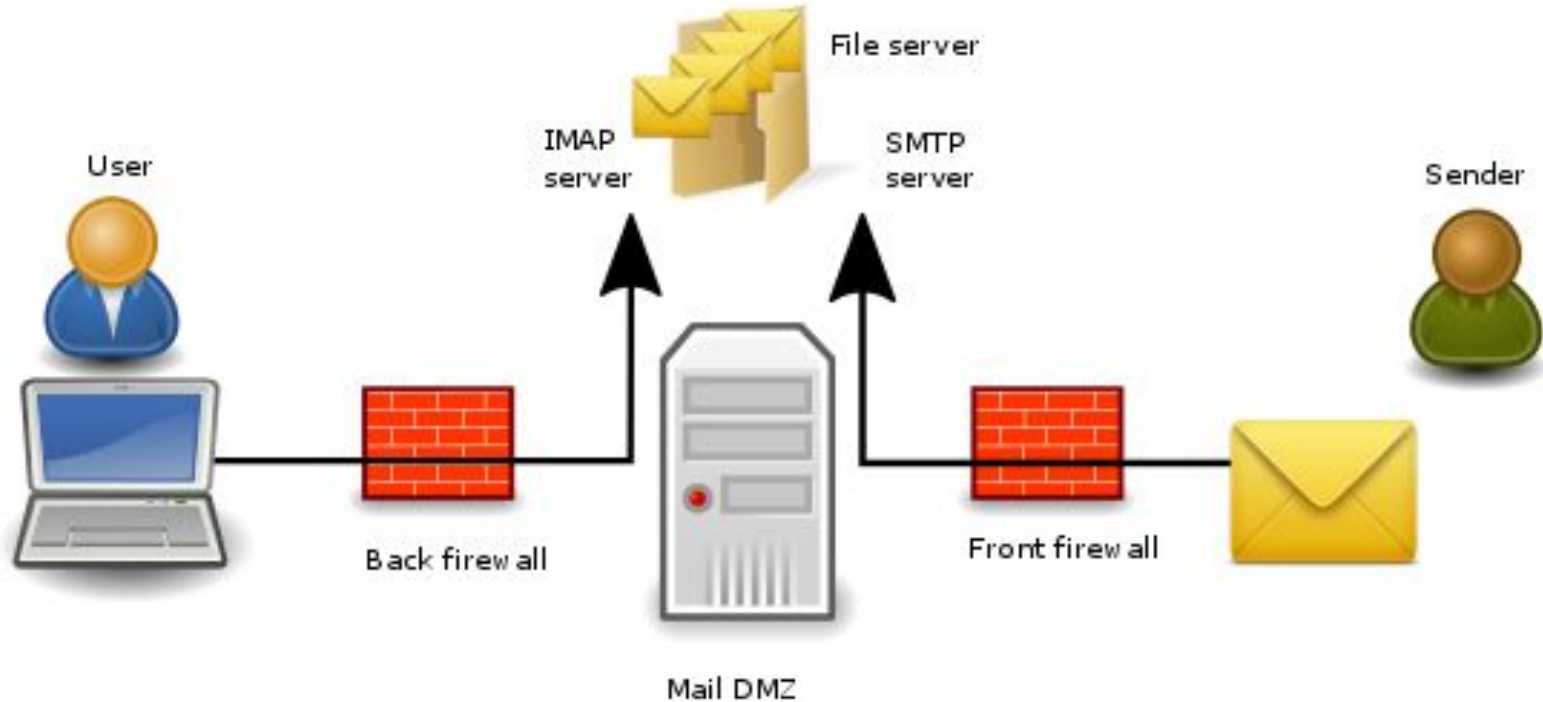5th July 2022

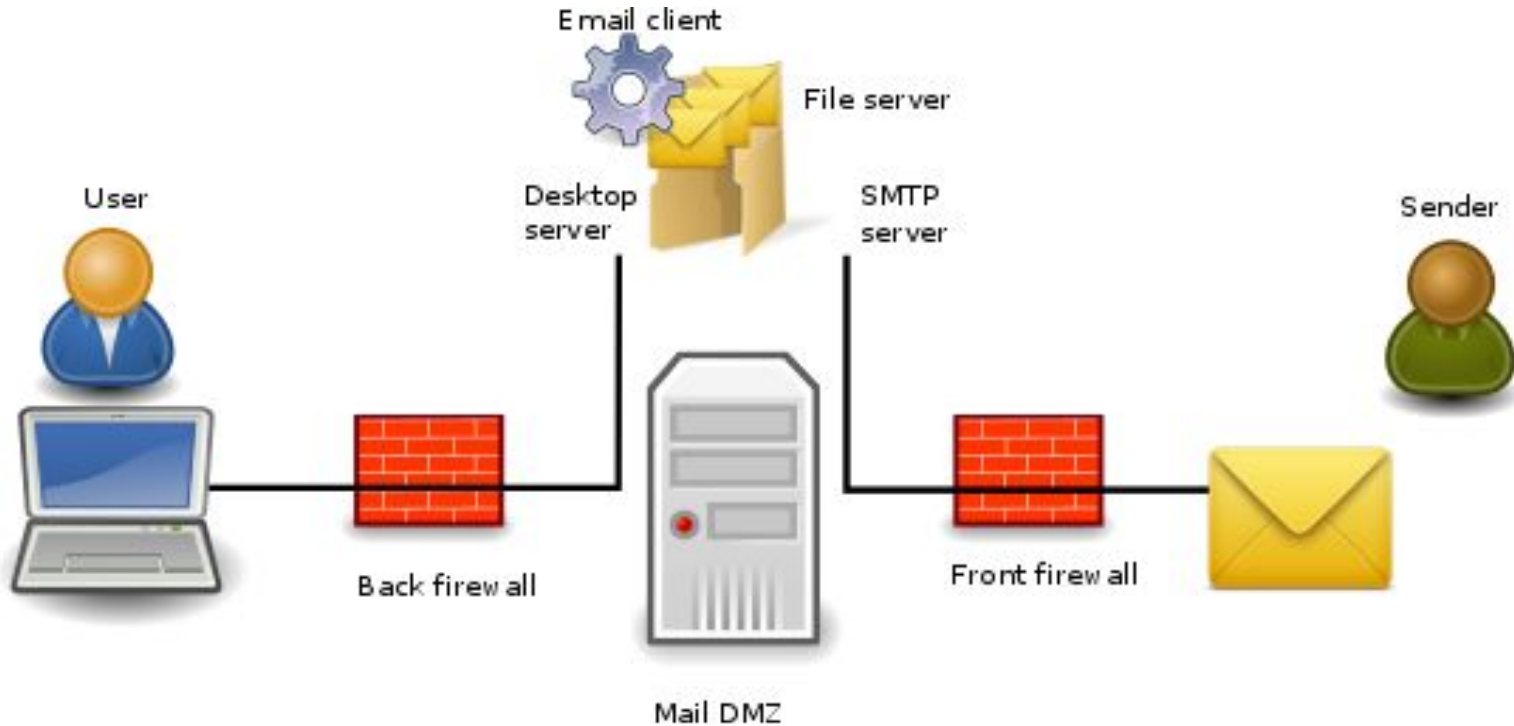# We make connected things

EASA
European Aviation Safety Agency

"Two security barriers"

AIRBUS A350-900

A350

AIRBUS

Let's make architecture diagrams

AIRBUS

Let's make architecture diagrams

AIRBUS

State of the art

A bridge connecting two LAN segments

Station A on LAN 1 | Bridge Device | Station B on LAN 2

Bridge entity

MAC entity

| 2 | MAC A | | MAC | BRIDGE | MAC | | MAC B |
| 1 | PHY 1 | | PHY 1 | | PHY 2 | | PHY 2 |

LAN 1   LAN 2

AT+..	AT Handler	SM
TELNET	TELNET	IAI-2
TCP	TCP	
IP	IP	
Ethernet	Ethernet	

AIRBUS
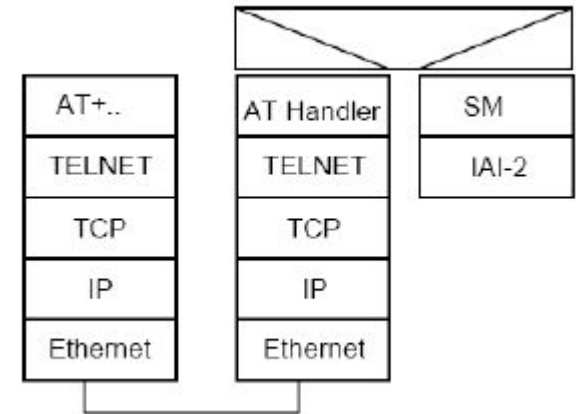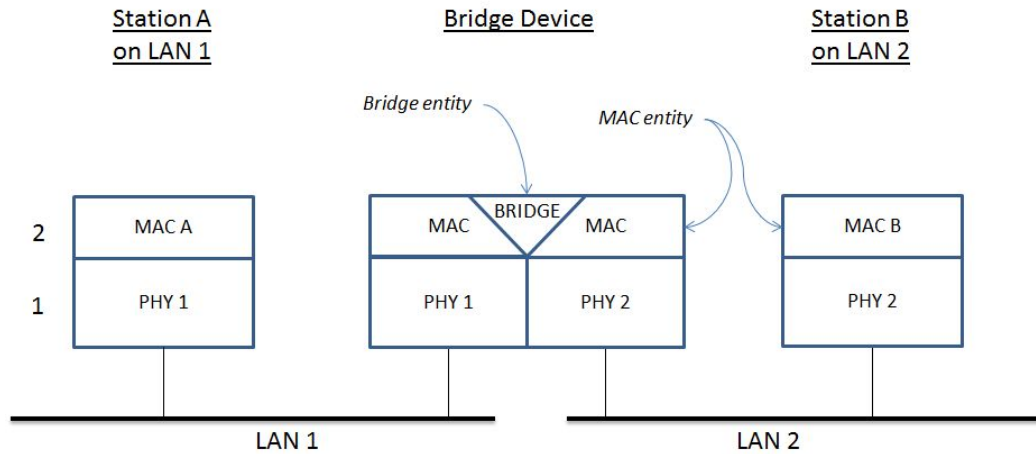
Defining "data flow tabular charts"

Design goals

Show:

Ⅰ End-to-end dataflow

Ⅰ Protocols layers and changes

Ⅰ Processes and equipment crossed

Ⅰ Security functions

AIRBUS

Elements of the charts
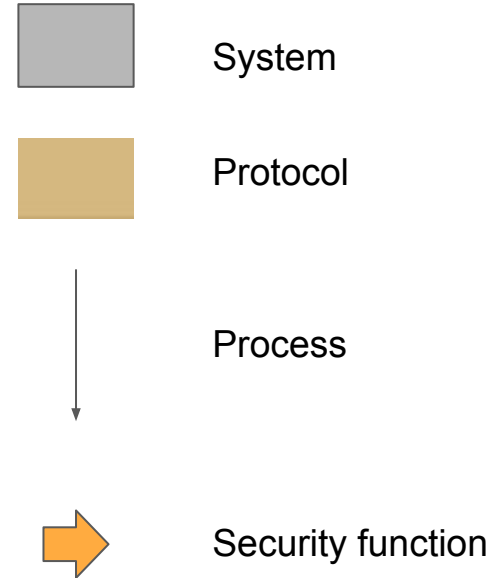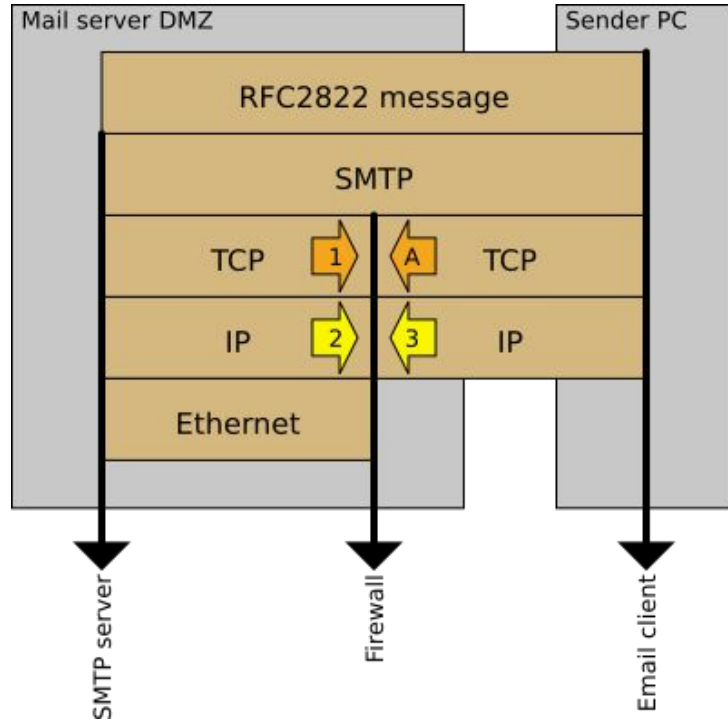
The e-mail case (IMAP version)

Human		Reader laptop		Firewall Router		Mail server DMZ		Front firewall		Sender PC
Human content										
		RFC2822 message								
		IMAPS				local file		SMTP		
		TCP	TCP					TCP	TCP	
		IP	IP					IP	IP	
		Ethernet	Ethernet					Ethernet		

Human — Email client — Routing — IMAP Server — SMTP Server — Routing — Email client

AIRBUS
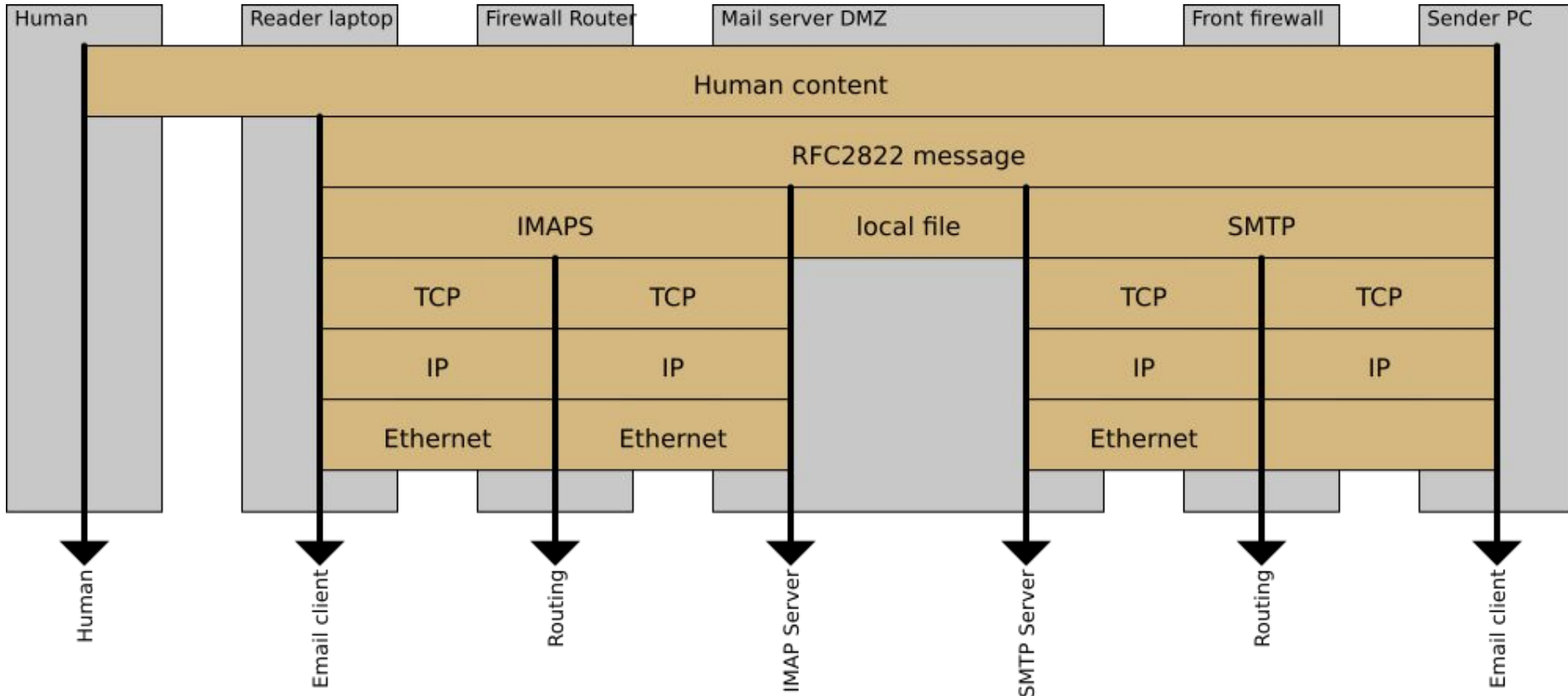
The e-mail case (VNC version)

Human	Reader laptop	Firewall Router	Mail server DMZ	Front firewall	Sender PC
Human content					
	VNC		RFC2822 message		
			IMAPS	local file	SMTP
	TCP	TCP	TCP		TCP	TCP
	IP	IP	IP		IP	IP
	Ethernet	Ethernet	Ethernet		Ethernet	

Human — VNC client — Routing — Email client — IMAP Server — SMTP Server — Routing — Email client

AIRBUS
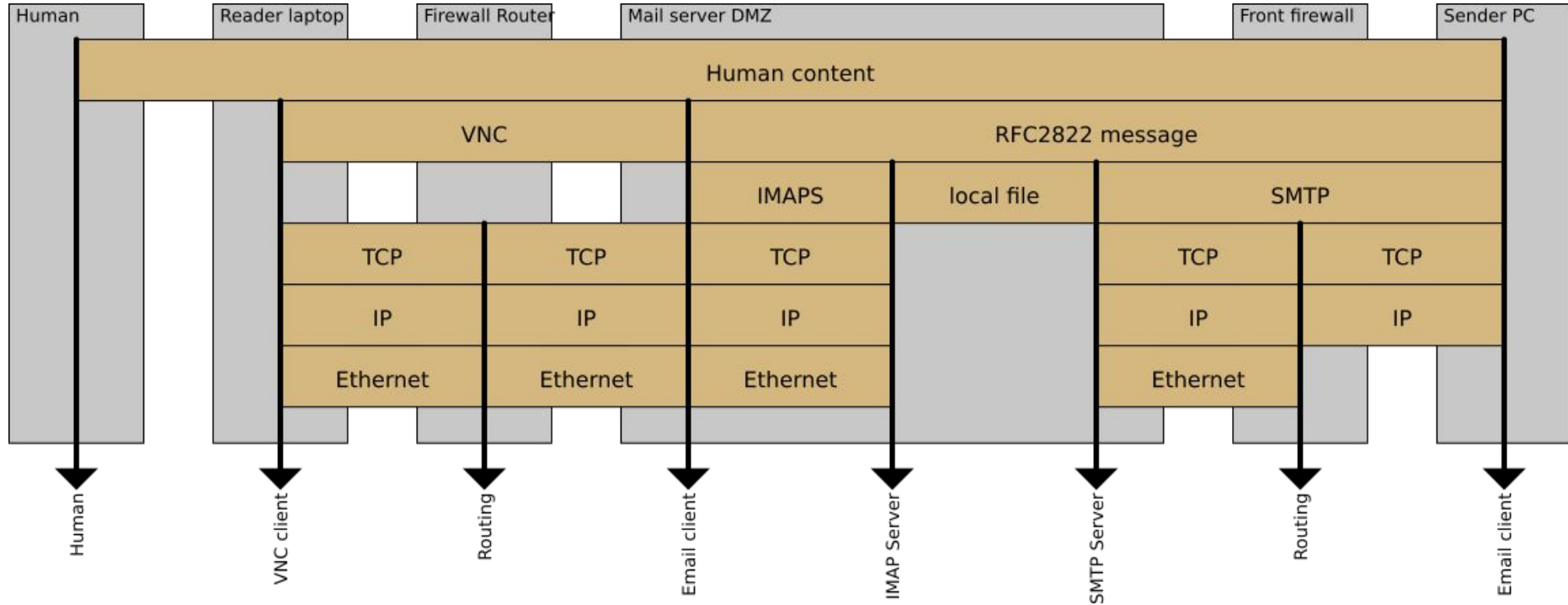
Introducing *dtc.pl*

Keep charts consistent

Avoid fiddling with image editing

Satisfy boss' need for unnecessary changes

We should make
this blue!

```
$ dtc.pl email.dtc -o email.svg
```

Inkscape converts SVG to anything

https://www.rutschle.net/tech/dtc/dtc.html

AIRBUS

Introducing *dtc.pl*

Systems

Functions

Function depth

```
Mail server DMZ:
-> SMTP server (4)
Ethernet / 2> IP / 3> TCP / SMTP / RFC2822 message
-> Firewall(3)
void / <2 IP / <3,A TCP / SMTP / RFC2822 message
Sender PC:
-> Email client (5)
```

Security function
with colour spec

Security function
with colour spec
and caption

Protocol stack

Mail server DMZ

RFC2822 message

SMTP

TCP   1   A   TCP

IP   2   3   IP

Ethernet

Sender PC

SMTP server   Firewall   Email client

AIRBUS

Introducing *dtc.pl*


```
Human:
-> Human (6)
void / void / void / void / void / Human content
Reader laptop:
-> VNC client (5)
Ethernet / IP / TCP / void / VNC / Human content
Firewall Router:
-> Routing (3)
Ethernet / IP / TCP / void / VNC / Human content
Mail server DMZ:
-> Email client (5)
Ethernet / IP / TCP / IMAPS / RFC2822 message / Human content
-> IMAP Server (4)
void  /void  / void / local file / RFC2822 message / Human content
-> SMTP Server (4)
Ethernet / IP / TCP / SMTP / RFC2822 message / Human content
Front firewall:
-> Routing (3)
void / IP / TCP / SMTP / RFC2822 message / Human content
Sender PC:
-> Email client (6)
```
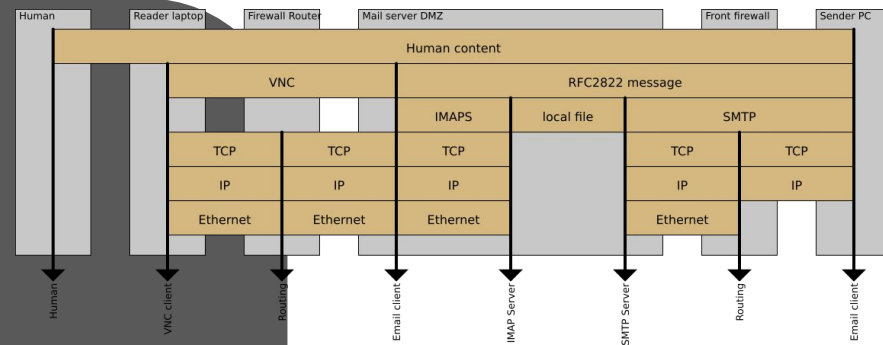
Dataflow tabular charts for RFC Editors

```
$ dtc.pl email.dtc --format txt -o email.txt
```

```
+------------------+   +------------------+   +------------------+   +------------------------+   +--------------------+   +-------------+
|                  |   |                  |   |                  |   |                        |   |                    |   |             |
| Human            |   | Reader laptop    |   | Firewall Router  |   | Mail server DMZ        |   | Front firewall     |   | Sender PC   |
|                  |   |                  |   |                  |   |                        |   |                    |   |             |
|  #----------------------------------------------------------------------------------------------------------------------------------#  |
|  #                                                     Human content                                                                #  |
|  #----------------------#                                                                                                           #  |
|  #                      #                                             RFC2822 message                                              #  |
|  #                      #----------------------------------------------#------------------------#----------------------------------#  |
|  #                      #        IMAPS                  #       local file        #                SMTP                           #  |
|  #                      #---------------#--------------#------#------------------#-------#-----------#-----------------------------#  |
|  #                      #     TCP       #     TCP      #                        #      TCP         #        TCP                  #  |
|  #                      #---------------#--------------#------#                  #-------#-----------#-----------------------------#  |
|  #                      #     IP        #     IP       #                        #      IP          #        IP                   #  |
|  #                      #---------------#--------------#------#                  #-------#-----------#-----------------------------#  |
|  #                      #   Ethernet    #   Ethernet   #                        #   Ethernet       #                             #  |
|  #                      #---------------#--------------#------#                  #-------#-----------#-----------------------------#  |
|  #                      #               |  |           |  |   #                 #                  |  |       #      |  |        #  |
|  #                      #               |  |           |  |   #                 #                  |  |       #      |  |        #  |
|  #                      #               |  |           |  |   #                 #                  |  |       #      |  |        #  |
+---#------------------+   +---#--------------+   +---#--------------------+   +---#--------------------+   +---#------------------+   +--#---------+
V                       V                       V                       V                       V                       V
Human                   Email client            Routing                 IMAP Server             SMTP Server             Routing             Email client
```

AIRBUS

Thank you

AIRBUS

Credits

Icons: credits to http://www.icons-land.com

AIRBUS

CONTACT

Yves RÜTSCHLÉ
Security engineer
yves.rutschle@airbus.com

APSYS

AUGMENTED TRUST