East SIG Report – August 2023

After welcoming members to the August meeting of East SIG, host Frank Maher outlined the nights agenda below:

Presentation 1: **Q&A** with George Skarbek
Presentation 2: **How River Locks work** by Trevor Hudson
Presentation 3: **Using SIG Storage** by John Swale
Presentation 4: **The Universe is Hostile to Computers** by Viv Ellison

Q&A by George Skarbek.

Question: Should I be running a security program on my Android mobile phone?

Answer: If you have important information such as banking details on your phone you certainly need security. Even your contacts are important, in case someone gets hold of your phone they could sent out things under your name.
The Android system is fairly robust, hence there have been few attacks. There are a number of free anti-virus programs for Android that you can get from the Google Play Store. I don't know how effective they are as I haven't looked at them for a few years. I run a free one and it works away in the background and is not intrusive.

The website AV Comparative (https://www.av-comparatives.org) rates anti-virus programs including those for Android. The site not only rate these programs at how good they are at stopping viruses, but by how much they slow down a computer.

[AV-Comparatives' latest Mobile Security Report 2023 is now available. Nine security products for Android have been thoroughly tested and reviewed. https://www.av-comparatives.org/tests/mobile-security-review-2023/]

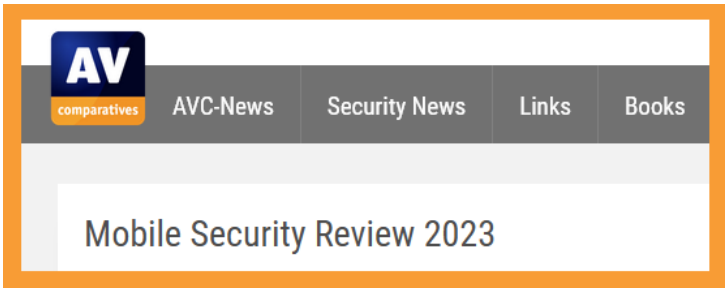


Figure 1 – AV-Comparative Mobile review 2023.

Question: I currently use the free version of Macrium Reflect for backing up my hard drove. The free version is going to be retired soon leaving only the paid version. What is the next best free backup program?

Answer: I haven't investigated free backup programs as I use Acronis. Recently I was offered a version of O&O's image backup program for $9.99. This was a third of the price of Acronis from User Group Resources (https://ugr7.com), so I gave it a try. The time for O&O to create an image

backup was similar to Acronis. However, unlike Acronis where you can specify which files you don't what backed up, using wild cards, I couldn't do that with O&O so I deleted it immediately.

I'm into photography and use Adobe camera raw where there are thousands of files relating to camera models and lenses. These files don't need to be backed up because, if they are lost, they can be downloaded at any time with the latest version from Adobe. With Acronis I can specify wild cards, such as *canon.* and it won't backup those files containing canon. With O&O backup, you have to specify each file individually that you don't want backed up. That's okay for the swap file, but for my use with over a thousand unnecessary files to backup, that is unworkable. It depends what is important for you whether O&O will suit you.

Question: I use Acronis and the paid version will soon run out. Acronis have gone away from the perpetual licences and are now selling yearly licenses for "Acronis Cyber Protect Home Office". According to their website, the new product provides integrated backup, antivirus and anti-malware protection. I've been looking at EaseUS Todo as an alternative. It looks good but does anyone else used that?

Answers from audience:
1. EaseUS Todo was mentioned at the monthly meeting as being very good. The only negative is that it's from China.

2. NIUBI Partition Editor free, is another that may suit. I've found that very useful for resizing and moving partitions around. It will clone a partition but I haven't tried that feature yet, but I plan to do that soon.

3. Acronis can be purchased cheaply from Jean Barlow from User Group Relations at https://ugr7.com/index.html, at a cheaper rate than the recommended price for MelbPC users. A multiple licence is a good cheap option worth considering.

4. Macrium Reflect is good, it's fast and anything that is good is worth paying for. I'd never go back to Acronis.

Figure 2 – Recommended Backup Software

How River Locks Work by Trevor Hudson

The next presentation was a short 5-minute video inspired by Trevor Hudson's recent river cruise from Amsterdam to Budapest. The cruised covered a distance of 1,500 kilometres, along the Amsterdam Rhine canal, the Rhine River, the Main River, the Main-Danube Canal and the Danube River.

Figure 3 – YouTube banner – How River Locks Work

For ships to travel safely between Amsterdam and Budapest, they must navigate through a total of 68 river locks. These locks play a crucial role in maintaining the river's water level, ensuring safe and unobstructed navigation. While the majority of these locks operate based on the principle of gravity, a small number of them utilize pumps and storage reservoirs. The design of the lock gates varies: certain locks have gates that move upward, some downward, and others use swinging gates. Throughout the entirety of the journey, the average elevation change per lock was measured at 5 meters.

Figure 4 – River cruise route, Amsterdam to Budapest

In his video, Trevor illustrates the functioning of a gravity lock, by using an animation of a cruise ship moving upstream through one of these locks. The video features still images of various locks he passed through, and includes a separate video of a gravity-fed lock gate being lowered, before his cruise ship could travel upstream.

In 1992 the Main- Danube Canal was constructed. This canal in the continental divide in Germany, connects the Main River at Bamberg to the Danube River at Kelheim. This man-made Canal shown in Figure 4, allows ships to travel between the Rhine Delta on the North Sea in the Netherlands and the Danube Delta on the Black Sea near Ukraine.

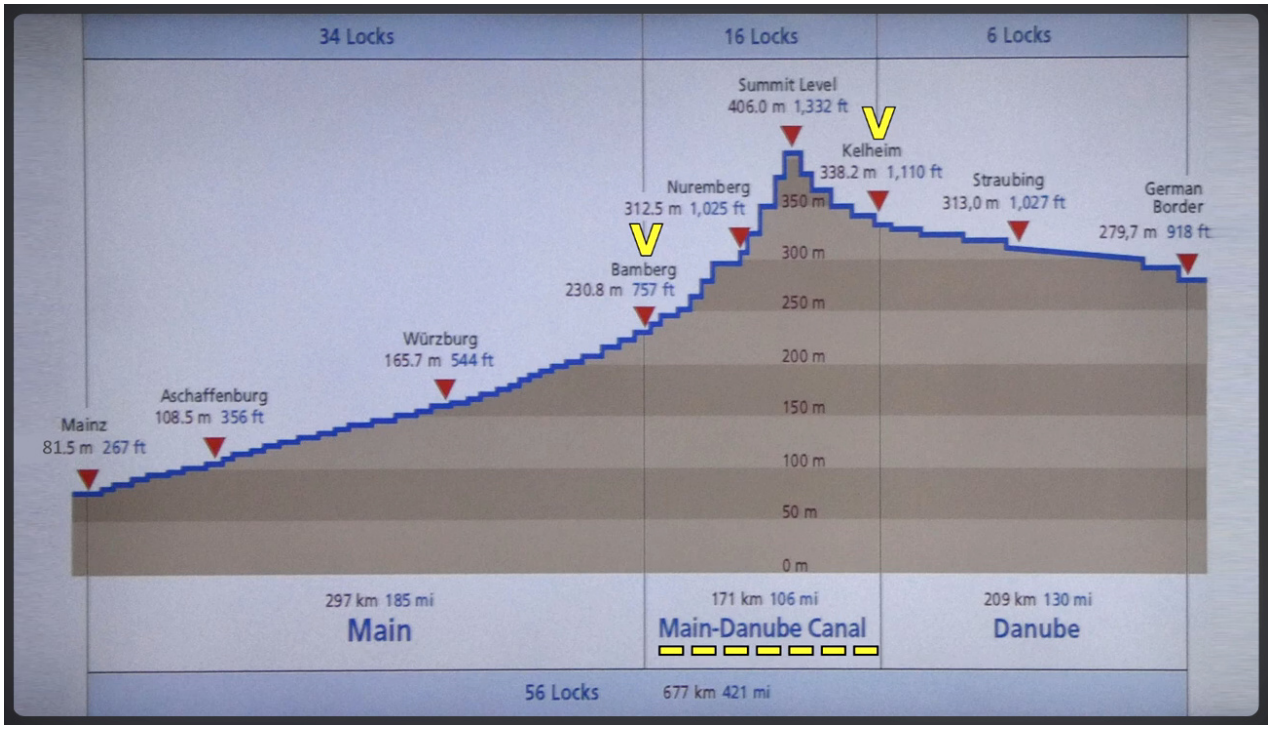


Figure 5 – Locks either side of the Main-Danube Canal

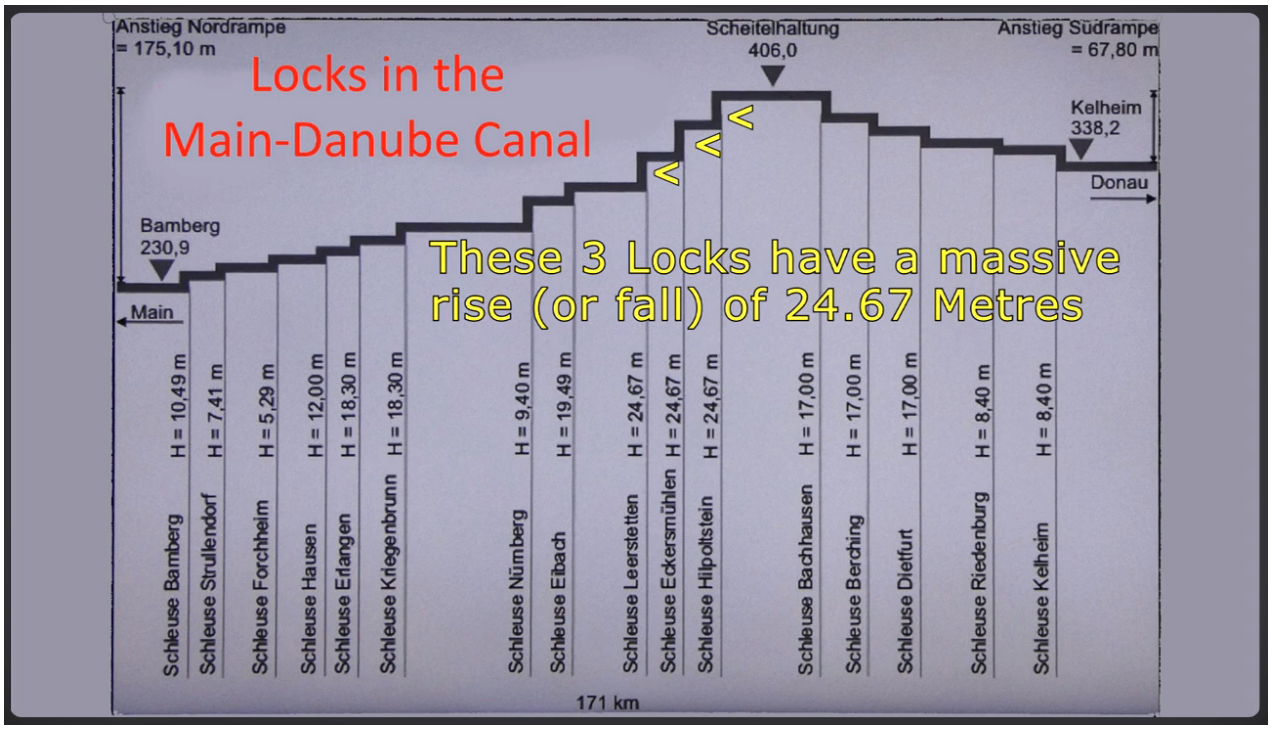


Figure 6 – Lock Rises & Falls in the Main-Danube Canal.

The 171 kilometres section of the cruise along the Main-Danube Canal, between Bamberg and Kelheim, was a highlight of Trevor's cruise. The video includes numerous still images and graphics for this section of the cruise. As seen in Figure 6 the Main-Danube Canal rises to a peak of 406 metres above sea level, with the largest locks being in this section of the cruise.

The three locks approaching the canal peak each raise the water level by over 24 meters. As there are no rivers on the top of the mountain to refill the lock chambers, these locks use reservoirs to recycle most of the water. Still images and a graphic depicting their operation can be seen in the YouTube video.

The 4 images above have been taken from Trevor's video, which can be viewed on YouTube at https://www.youtube.com/watch?v=z9opDmPflIc&t=202s

Using SIG Storage by John Swale

The absence of significant digital storage at MelbPC for PowerPoint presentations, documents or recordings of meetings, from both committee and SIGs (Special Interest Groups), has been a persistent issue for some years. This information is vital for reference by MelbPC members, aligning with our motto of "members helping members." With the introduction of Zoom video recording, which generates particularly large files, the committee has taken steps to address this challenge. They have substantially expanded the digital storage capacity for the SIGs by installing a dedicated server located in the MelbPC Office basement at Moorabbin.

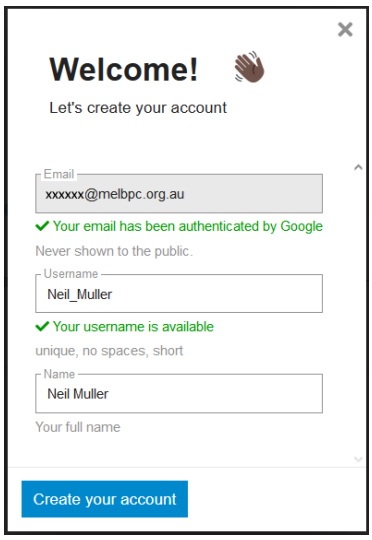
In this presentation titled "Using SIG Storage" by John Swale, John outlined the process of addressing the need to distribute information to MelbPC members. The website development group initiated a discussion with the committee, resulting in the acquisition of storage space on a server located in the Moorabbin basement. This server will serve as the primary storage repository for SIGs, allowing them to archive their Zoom recordings and other files. Because of the large size of the Zoom recordings and MelbPC corporate storage limit on Zoom, recordings had to be downloaded from Zoom or they would be lost, hence urgent action was needed to solve this issue.

John's aim in this presentation was threefold. First to inform members where to access guidelines for using the SIG storage, the steps needed to load information onto the server and finally a trick that users need to be aware of to gain access to the site.

Documentation (forum.melbpc.org.au)

Before members access any information held on the server, John recommended they view the various user guides. These guides are held in what is called the forum. Logging into at https://forum.melbpc.org.au/ takes you to the "Club Documentation" folder.

You may need to create an account first (which this author had to do) before you can reach the "Club-documentation" webpage. (Refer Figure 7 opposite).



On the “Club-documentation” webpage, select “Members Nextcloud Storage – guide for Members”. The term NextCloud is the name of the server software used by MelbPC. Under the above folder is where you find the guides needed for using the SIG repository. It is important users read these guides before uploading any files. The guides are under the 7 headings shown in Figure 9.

John briefly described each guide, but emphasized the “Content Review” guide, as this guide outlines what happens to files that are uploaded and is copied in full below.

> *Upon completion of an upload the file content will be reviewed by the SIG leader who will either reject and delete the content or approve the content as appropriate and Move it to the Content area for long term storage.*

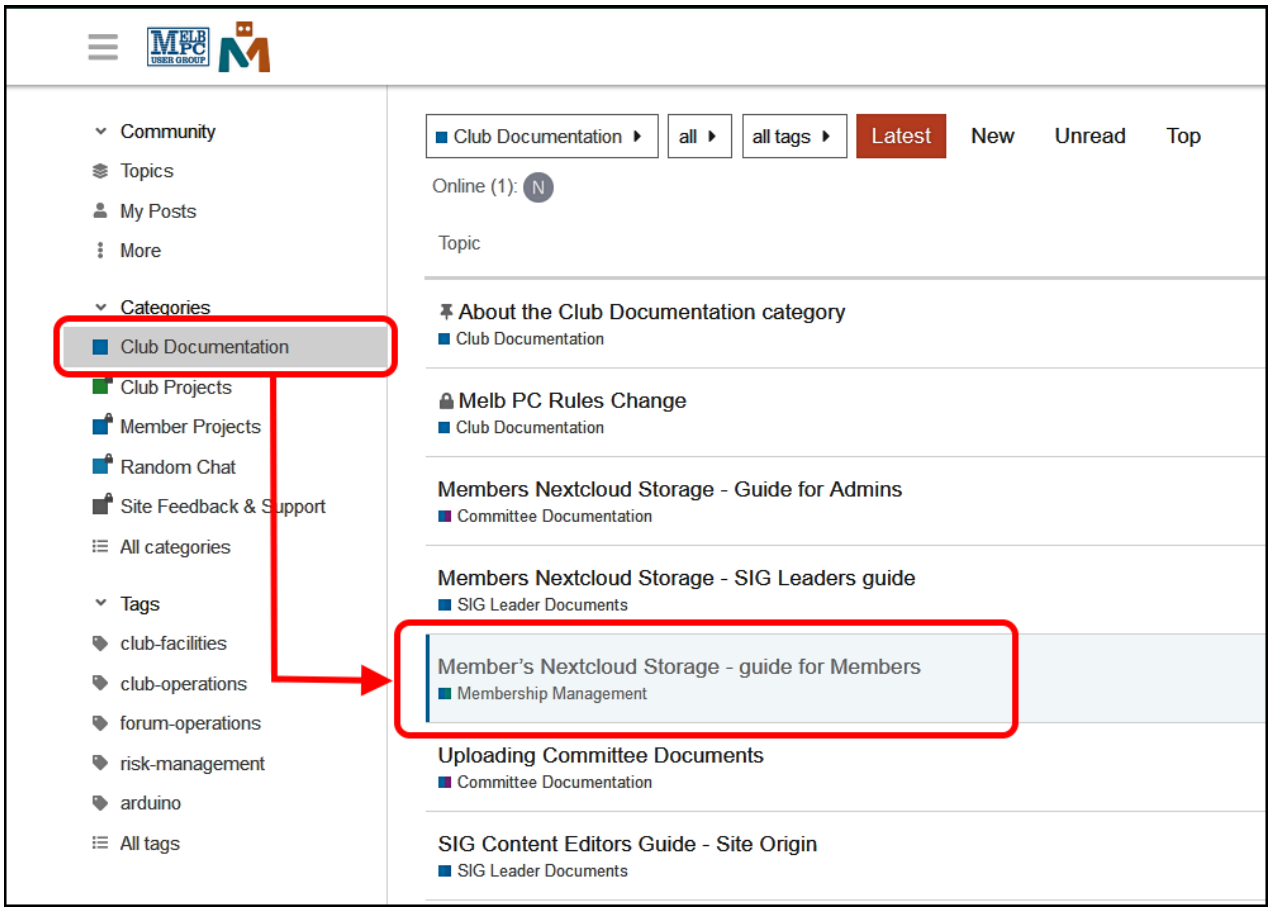


Figure 8 – Club Documentation folder

Uploads (files.melbpc.org.au)
To upload files to the SIG repository, members must first log in to “All files” at https://files.melbpc.orq.au/ . Files should be uploaded to the "Uploads" folder. The SIG leader will be notified and will review the information to determine if it is appropriate. Once approved, the file will be moved to the "Content" folder.

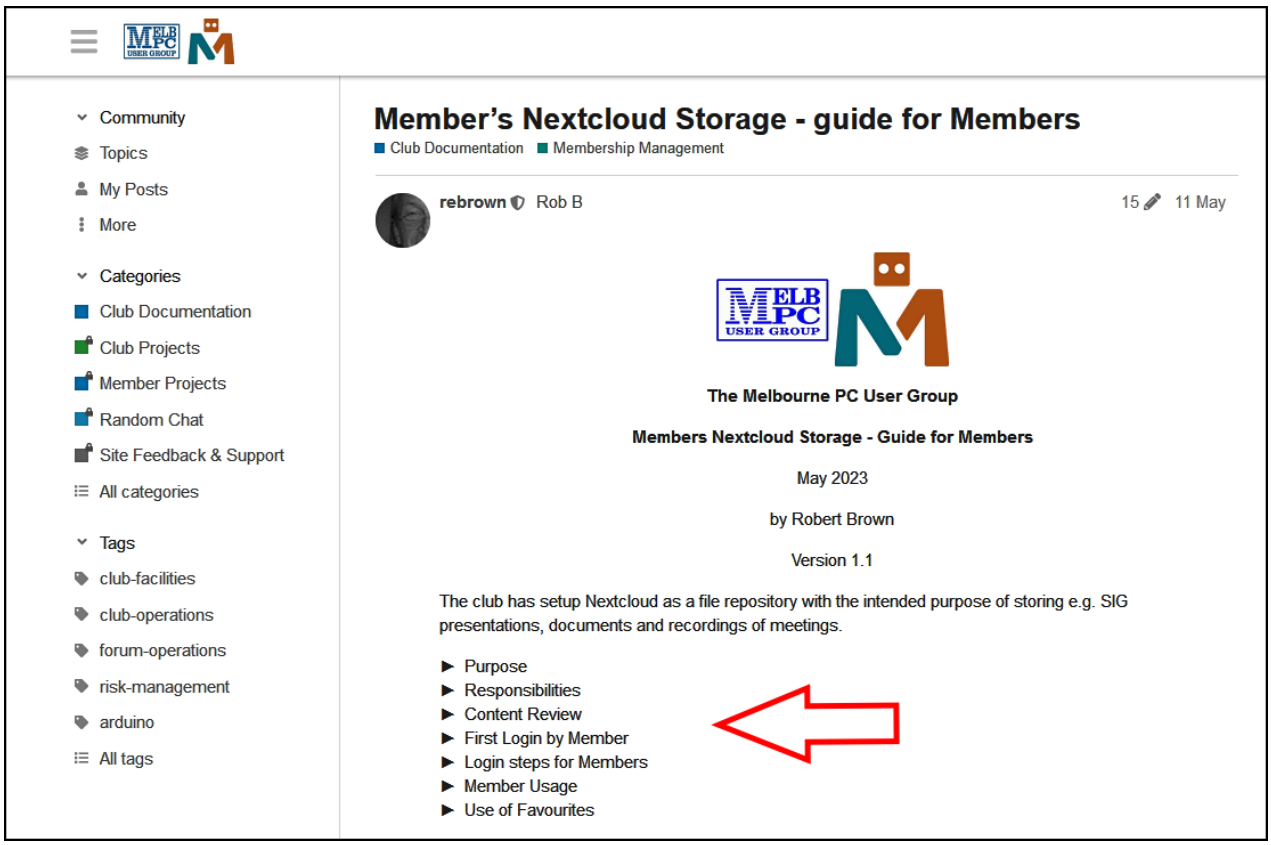


Figure 9 – Club Documentation - Guide for members folder

Tricks

How you login to **files.melbpc.org.au** is **critical**. You must use your Google Workspace log in, which is also your MelbPC log in .i.e. xxxxxx@melbpc.org.au.

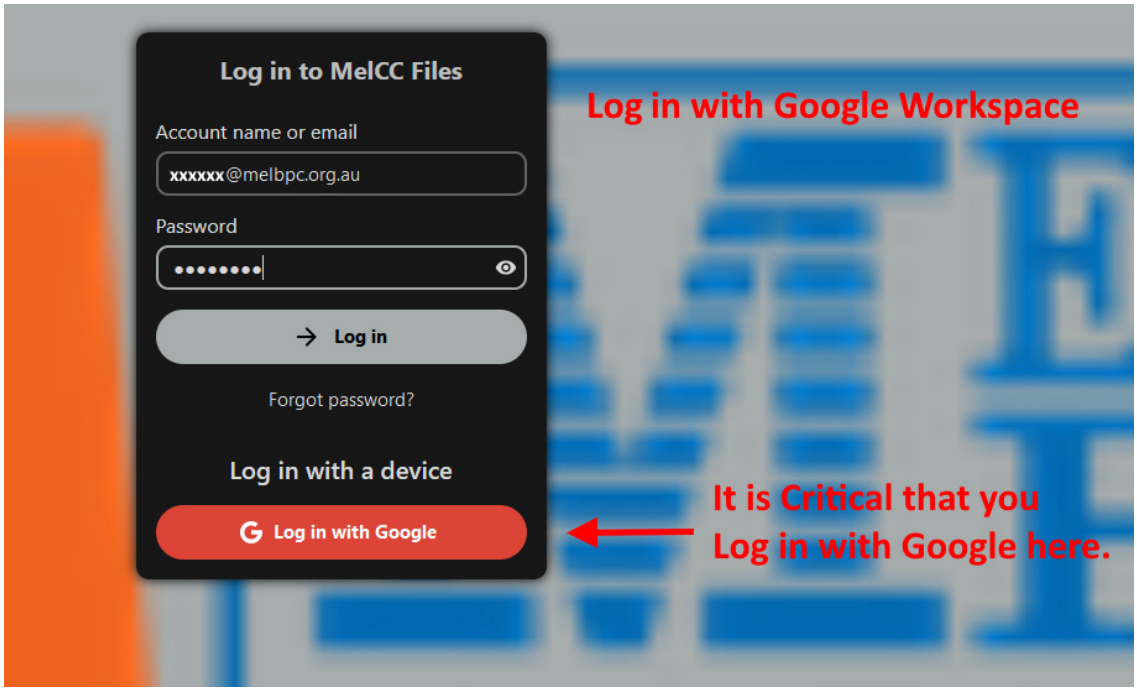


Figure 10 – files.melbpc.org.au Log in with Google.

User Example
Once you log in with your Google account, you see the “All files” folder as shown in Figure 11.

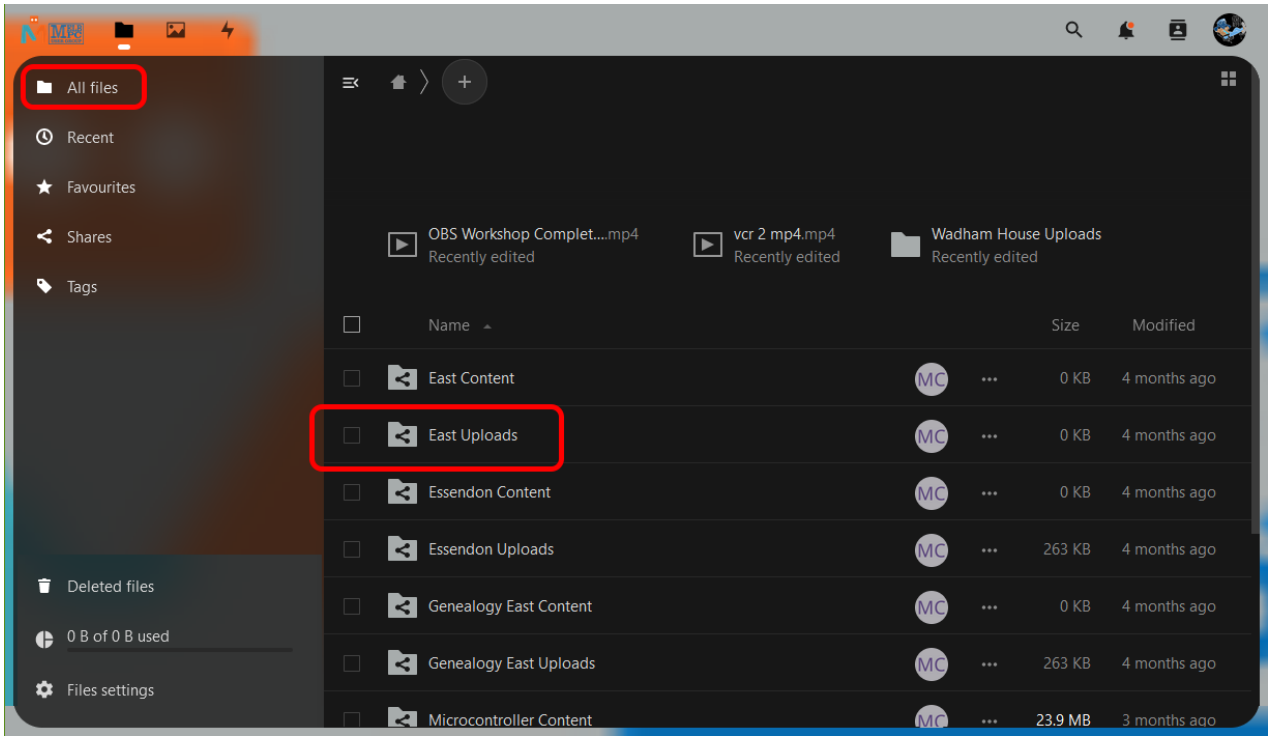


Figure 11 – “All files” folder

When the “All files” opens, select the “East uploads” folder, for uploading to the East SIG.

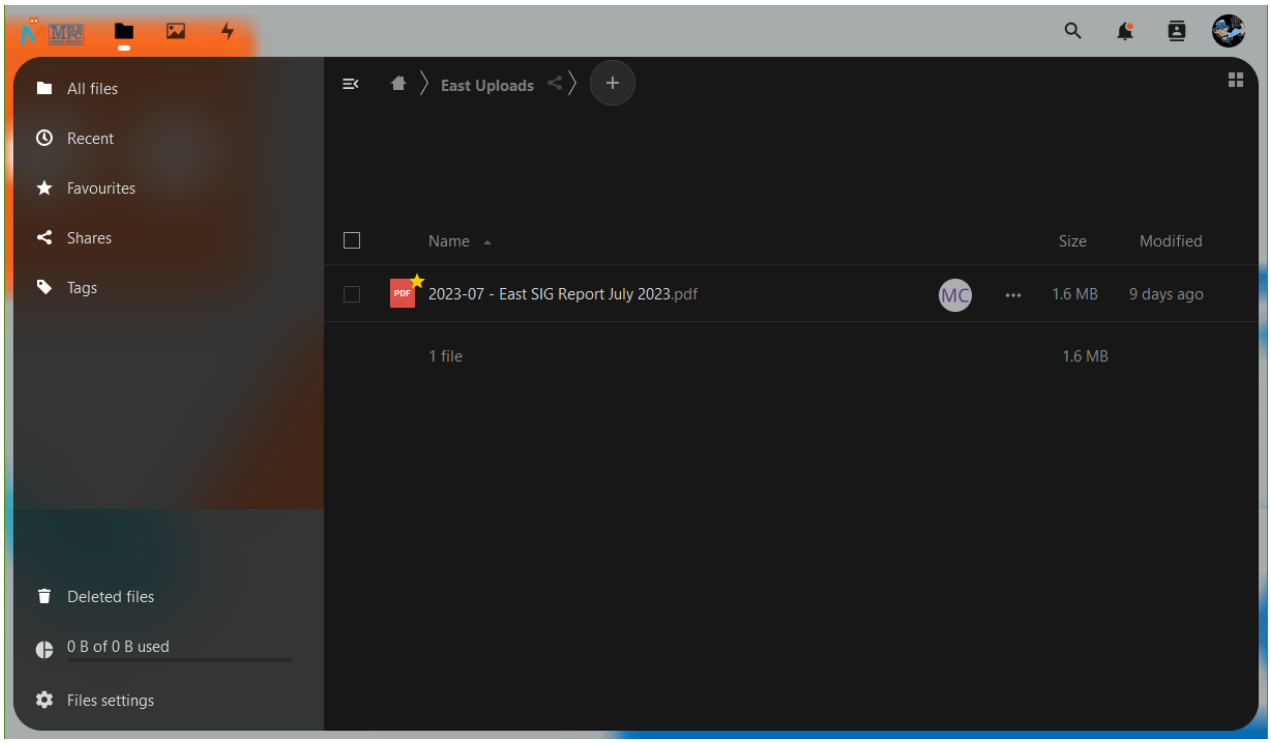


Figure 12 – “East Uploads” folder

The “East uploads” folder in Figure 12 displays a file waiting for approval by the SIG convenor. Once approved, it moves to the “Content” folder. The yellow star on the file icon represents favourites.

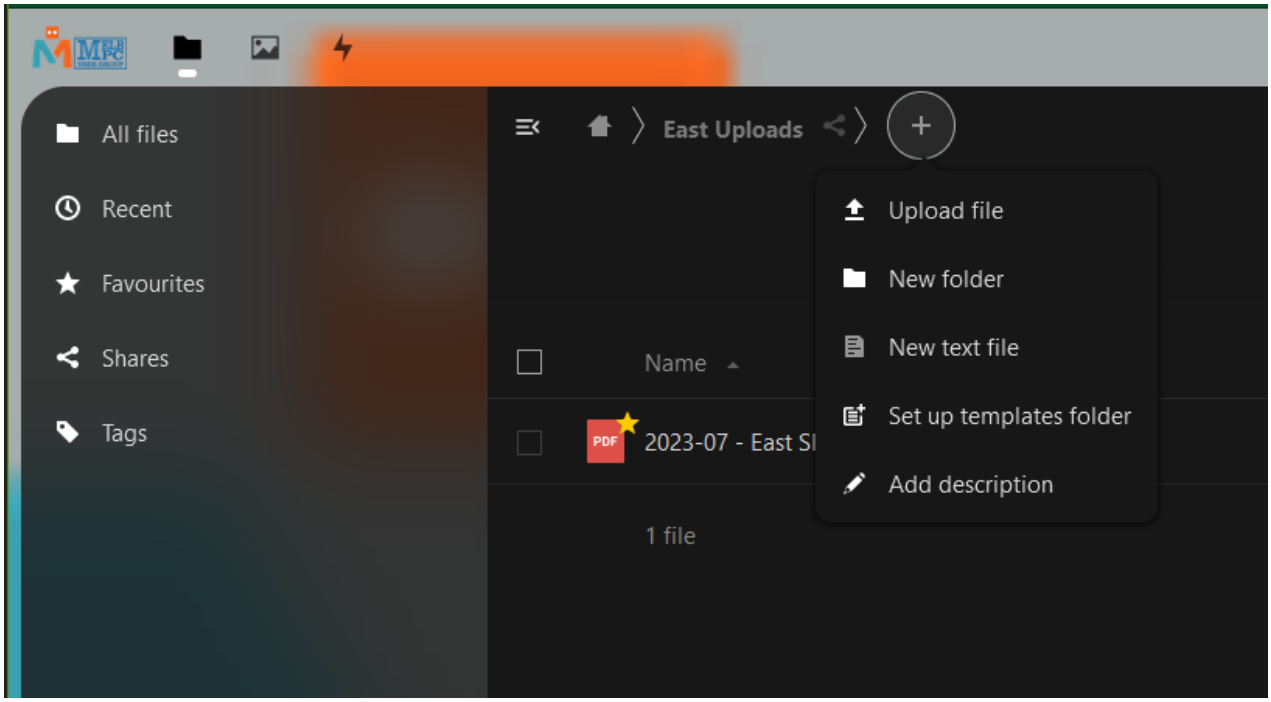


Figure 13 – Options menu to Upload a file

To upload a file, click on the plus sign, located at the top centre of the open window. From the drop-down menu shown in Figure 13, select “Upload file”. From your computer, select the file you want to upload to the “East Uploads” folder.

When files are first up loaded to the “Content review” folder, others can view the uploaded files but you can’t see what is in the files, until it’s approved and moved to the “Contents” folder.

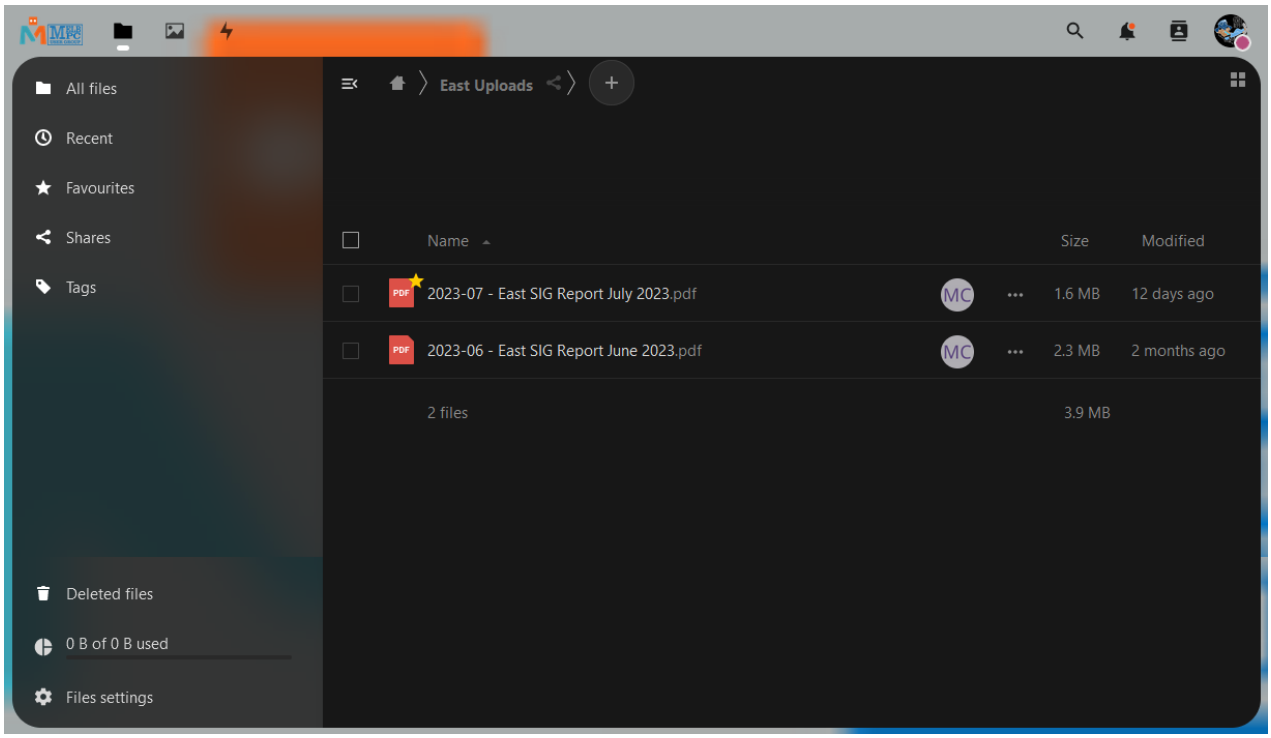


Figure 14 - New file added to East Uploads folder

Storage Issues
For any stored information to be of any benefit to members, it needs to be available on a searchable index. Documents, SIG reports and PowerPoint presentations will be an easier proposition to index. However, Zoom recording present a more difficult problem for them to be of benefit to members.

Potentially each Zoom recording will need to be broken down into individual presentations and edited to remove unwanted sections that aren't appropriate, then indexed. A decision will also need to be made as to determine how much of a Zoom recording to put up. The website development group realise this is no small task and may need to seek volunteers.

East SIG convenor Frank Maher felt it unlikely anyone would take up the mammoth role to edit the Zoom files, so most likely they will have to go up unedited. Indexing or some searchable file will then become important.

To conclude this presentation, John recommended members go to the MelbPC website and have a look both the guides and files area.

The Universe is Hostile to Computers introduced by Viv Elliston

This YouTube video describes various instances influenced by cosmic rays, an invisible phenomenon that affects electronics and the world around us. It starts with examples of unexpected events: a plane plummeting, a video game glitch, and an election recount.

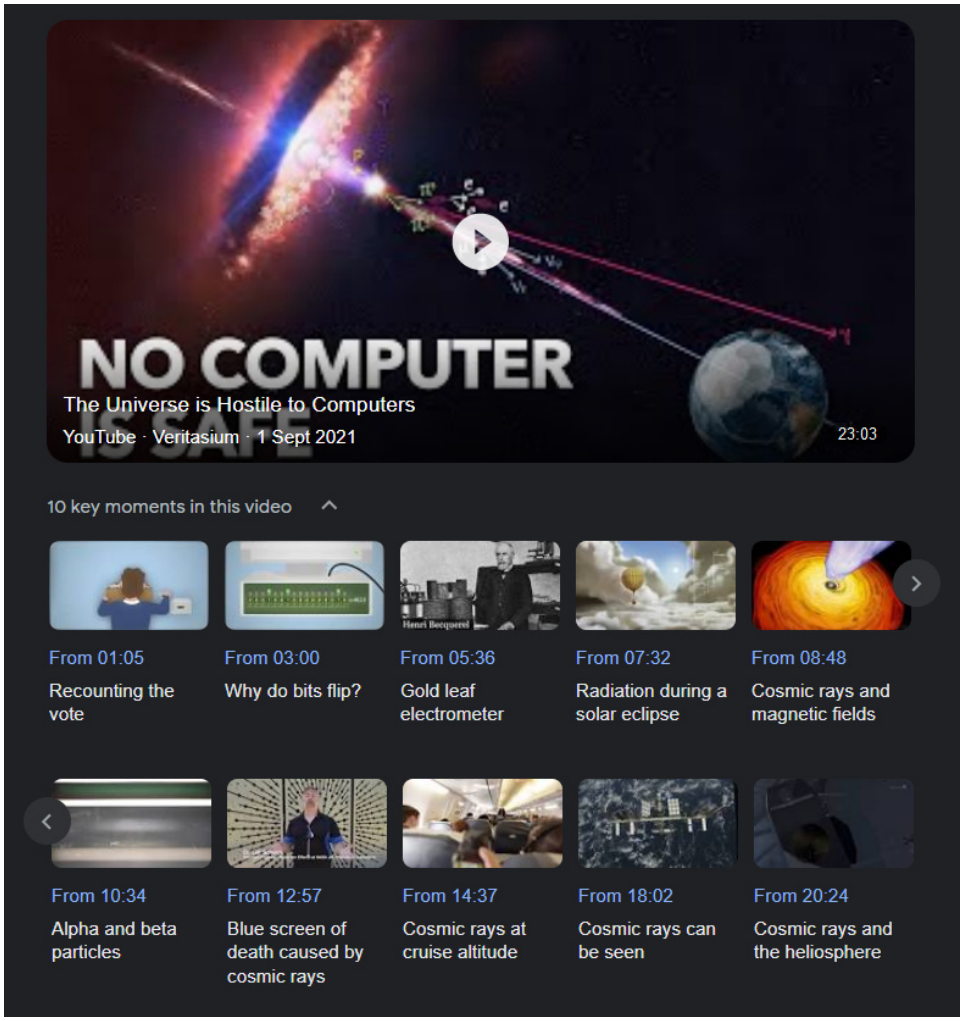


Figure 15 – The Universe is Hostile to Computers by Veritasium

On May 18th, 2003, an election in Belgium experienced issues in vote counts, specifically with Maria Vindevogel's votes. Computer experts investigated and found that a cosmic ray likely flipped a bit in the computer's tallying process, leading to the discrepancy.

The video then delves into the concept of cosmic rays, particles from space that can impact electronics and biological systems. It explains how cosmic rays can lead to bit flips in computer hardware due to their ionizing effects. The phenomenon was first observed in the 1970s when computer chips became more sensitive to particle impacts. The discovery of cosmic rays is credited to Victor Hess, who conducted balloon flights to observe radiation levels at varying altitudes.

The video also highlights instances of cosmic ray-induced errors, including glitches in video games, crashes of supercomputers, and even potential contributions to plane incidents like the Airbus A330 dive. It discusses how cosmic rays affect technology, prompting aerospace companies to design radiation-resistant systems. The Mars Rover, for instance, uses radiation-hardened computers to withstand cosmic ray impacts during space missions.

The video concludes by emphasizing that cosmic rays are an integral part of our universe, influencing various aspects of technology and life on Earth. It underscores the importance of problem-solving skills to address challenges posed by cosmic rays and other unpredictable phenomena.

The video can be viewed at https://www.youtube.com/watch?v=AaZ_RSt0KP8

Neil Muller

Default (GPT-3.5) Transcript of the video “The Universe is Hostile to Computers” by Veritasium

ChatGPT

A plane plummets out of the sky, a speed runner inexplicably jumps to a higher platform. What the? What the?! And an election recount is triggered. All because of the same invisible phenomenon that permeates the universe.

On May 18th, 2003, voters in Belgium went to the polls. In many regions, voting was done on a computer, something the Belgians had been experimenting with for over a decade. But the system had a backup. Each voter would insert a magnetic card into the machine and make their selection on screen. Their vote was saved both to the computer and the magnetic card, which they dropped into a box for redundancy. Late that night, as the votes were being tabulated, one of the election officials detected a problem with the results from Schaerbeek, a municipality in central Brussels. Maria Vindevogel, a little-known candidate with her own party received more votes than was mathematically possible. They knew this because of the way the preferential voting system works. So they took out the magnetic cards and started a recount. One by one, they fed each of them through the machines again, and after several hours, the recount was complete. The vote totals for every candidate were exactly the same as before, except for Maria Vindevogel. In her case, the recounted number of votes was less than the original by 4,096.

So what went wrong? How had her original tally been inflated by over 4,000 votes? Computer experts were brought in to run extensive tests on the software. They combed through the code, but could find no bugs. They got the computer that had made the initial erroneous tally and tested the hardware again and again, but they could not replicate the error. Everything about the hardware seemed to be in perfect working order. And this left only one possible explanation and it is seriously weird. The clue comes from the excess number of votes Vindevogel received. 4,096.

Computers work using binary, strings of zeros and ones, each corresponding to a power of two. So somewhere inside the computer tabulating all the votes was a string of bits representing the number of votes Maria received. It started the day all zeros, and then as each vote for her came in, it would increment by one. Physically, this is done by turning on a transistor for one and turning it off for zero. What's remarkable about the number 4,096 is that it is exactly a power of two. Two to the power of 12. That is the 13th bit.

So for Maria Vindevogel to receive an extra 4,096 votes, only one thing needed to happen. The 13th bit had to flip from a zero to a one. But why would that happen? Computers work precisely because bits don't flip unless we want them to, or do they?

Looking into the problem, Belgian investigators found reports of similar issues from big computer companies starting in the 1970s. In 1978, Intel reported some strange errors popping up in their 16-kilobit dynamic random access memory or DRAM. Ones would spontaneously flip to zeros with no apparent cause.

The problem turned out to be the ceramic packaging the chip was encased in. With the demand for semiconductor packaging skyrocketing in the 1970s, a new manufacturing plant was constructed on the Green River in Colorado. Unfortunately, this site happened to be just downstream of an old uranium mill. Radioactive atoms made their way into the river and then into the ceramic packaging for Intel's microchips.

Intel scientists investigating the problem found that even trace amounts of uranium and thorium in the ceramic were sufficient to cause problems. In their DRAM, memory was stored as the presence or absence of electrons in a semiconductor well. The alpha particles emitted by uranium and thorium were energetic and ionizing enough to create electron hole pairs in the silicone. If an alpha particle is struck in just the right place, it could create a large number of free charge carriers causing electrons to accumulate in the well flipping a one to a zero. This is known as a single event upset, a type of soft error. The error is soft because the device hasn't been damaged. The bit has changed, but you could erase it and rewrite it with no problems.

Investigators exposed the chips to alpha emitters with different levels of activity. And just as you'd expect, they found the number of bit flips directly correlated with the number of alpha particles the chip had been exposed to. The reason this problem was identified in the 1970s was because chip components had been miniaturized to the point where a single alpha particle could produce enough charge to flip a bit.

Immediately, these findings attracted a lot of attention. Before the paper was published, it was widely circulated in the industry. And as a result, chip manufacturers were a lot more careful to avoid radioactive materials when producing their microchips and packaging. Therefore, the bit flip that gave Maria Vindevogel 4,096 extra votes wasn't caused by natural radioactivity in the computer. So where did it come from?

After Henri Becquerel discovered radioactivity with uranium in 1896, scientists sought a way to measure it. How radioactive were different materials? And one way to do this is with a gold leaf electrometer. When it's charged, the leaf is repelled and you can measure the amount of charge by the angle of the leaf. Now, if ionizing radiation enters the chamber, it rips electrons off air molecules, creating positive and negative charges. Opposite charges are attracted to the leaf, discharging it over time. The higher the level of ionizing radiation, the faster the device discharges.

In 1910, Theodore Wolf took his electrometer to the top of the Eiffel Tower. Since radioactivity was found in the soil and rocks of earth, he expected that 300 meters up, the radiation would be just a few percent of the ground radiation. Instead, he found only a slight decrease. In 1911, Austrian physicist Victor Hess decided to take this experiment further. Literally. He loaded electric scopes into the basket of a hydrogen balloon. In his first two flights, he observed the same thing as Wolf. Up to an altitude of 1100 meters, both trips revealed no fundamental change in radiation compared to the values observed on the ground.

But the next year, he conducted seven balloon flights up to an altitude of 5,200 meters. And here he discovered something remarkable. While there was an initial drop in radiation for the first several hundred meters, above one kilometer or so the level increased with increasing altitude. At his maximum height, the level of radiation was several times greater than it was on the ground. The only explanation was that ionizing radiation is not only coming from the earth, but also from above, beyond the atmosphere.

The source was cosmic rays, high-speed atomic particles coming from space, from where exactly was unknown. Hess's discovery changed everything. Because atomic particles are charged, they are deflected by magnetic fields. And because they are charged, they can carry energy. And the more energy they have, the more they can do when they collide with the microchip, or a human cell. This is why they are problematic to microchips in spacecrafts and critical medical devices like pacemakers, which were failing at an alarming rate. For Maria Vindevogel, the mystery of her phantom votes was solved. The 13th bit in the computer had flipped, caused not by a radioactive decay in the computer itself, but by the ionizing radiation that bombards our world every second of every day.