



Sandford Fleming

1827 - 1915

An amazing story about time



What would Sandford Fleming tell us if we could travel through time and ask him about his work on time and time zones?

It was 1876 and I was in Ireland, waiting for a train. Looking at the station clock, I enquired about its whereabouts. I was left astonished when I was told I was a full 12 hours late! It turned out that the timetable had a misprint – it said 'pm' instead of 'am'. Upset at my bad luck, I thought long and hard about time and how much easier it would be if everyone could refer to the same 24-hour clock. This led me to an idea that would change the world forever.

Before I tell you about my big idea, I need to explain how confusing time used to be. Long ago, towns used *Solar Time*, setting their own clocks to the Sun, with everyone knowing when midday was by the position of the Sun directly overhead. This meant that the time varied depending on where you were and your view of the Sun in the sky. For example, Oxford Time was over five minutes behind London Time; Leeds Time was over six minutes behind; and Barrow almost 13 minutes behind. As you can imagine, once railways arrived, this was highly inconvenient when working to timetables! Many people had to carry several watches with them to be set to different

local times. Imagine being on a train and having to reset your watch at every station! To help resolve these differences, Britain and other countries started using a system called *Railway Time*, to try and make timetables work more efficiently by making sure all trains ran to the same clock.

Having worked as a surveyor, engineer and scientist, I understood the importance of being on time and organised. My big new idea was to unite the whole world in one single international system of time based on a 24-hour clock, so that everyone could understand each other when they said what time it was where they were in the world. I wanted to give people an improved and more efficient way of managing time. I called my idea *Cosmic Time* and said that we needed 24 time zones (one for each hour) around the Earth, each measuring 15° of longitude. This would cover Earth's 360° circumference, with each time zone having its own local time. I made my suggestion in 1879 to the Royal Canadian Institute but many members were not keen at the time.



I kept on pushing my idea and five years later, in 1884, 26 nations met at the International Meridian Conference and broadly agreed to put in place my vision for organising time. They agreed on a starting reference point to be called the **prime meridian** located in Greenwich, London, where the time zone was referred to as **Greenwich Meantime (GMT)**. All countries in the world could refer to GMT when discussing the time of day and set their clocks a set number of hours ahead of, or behind, GMT. In order for this to work globally, it was also decided to locate an **anti-prime** reference point exactly 180° away from GMT, which is vertically half-way around the Earth's circumference. Here the clocks would be set at a 12 hour difference to GMT, but whether they were set 12 hours ahead or behind depended on whether they were east or west of the line. Generally, countries to the east of the line are 12 hours behind GMT and countries to the west are 12 hours ahead, meaning that countries on either side would be set to the same time, but one day (24 hours) apart. Because it marks where sets of countries are one calendar day apart, this point would be known as the **International Date Line**.

Although my system was understood in principle, there were difficulties, as some countries did not accept these international time zones. Some adjustments were made

to cater for the needs in different places, so not all of the time zone lines ended up being straight! Nowadays, some countries even have half- and quarter- hour differences, and to complicate matters further, some change their clocks for Daylight Saving Time. However, all of the countries recognise the international time-zone system, supported by the use of the 24-hour clock.

During my life, I had many exciting jobs and achieved a great deal. My career began back in 1845, when I moved from Scotland to Canada. I worked hard as a surveyor and as an engineer on the railways, and even designed the first Canadian postage stamp. I was a founder of The Royal Canadian Institute, which became the first Scientific Institute to support international time. Other projects included connecting the British Empire with a submarine telegraph cable. Queen Victoria awarded me a knighthood in 1897.

But, I never forgot missing that train in Ireland, which inspired me to develop an idea that became useful to mankind. Helping shape the world's understanding of 'time' was one of my greatest achievements, and as a result of using my own time well, other people could use their time well too.



Glossary

Railway Time

A time system applied during the Industrial Revolution by railway companies, and used to manage the timetables of trains, ships and steam engines.

Cosmic Time

Also known as Universal Time, and the term used to describe the project of reforming to the new 24-hour international time-zone system.

Longitude

A measure of how far east or west of the prime meridian a place is, useful for defining time zones. Measured in degrees.

Prime Meridian

The zero degree point, where the time zone is known as **Greenwich Mean Time (GMT)**. An imaginary vertical line dividing the earth into Eastern and Western hemispheres (halves).

Anti-Prime Meridian / International Date Line

An imaginary line of longitude located 180° west and east of GMT that divides countries on different dates.

Time zone

A defined area of the world where clocks are set to the same time.



Timeline

- 1827 Sandford Fleming was born in Kirkcaldy, Fife, Scotland.
- 1845 Fleming moved to Canada and worked as a surveyor.
- 1849 Fleming became the engineer-in-chief of the Royal Canadian Institute. This later became the first scientific institute to support international time.
- 1851 The first Canadian postage stamp designed by Fleming went on sale.
- 1855 Fleming married Jeanie Hall and they went on to have nine children.
- 1862 Fleming was promoted to Captain, during his military service with the Volunteer Rifles Battalion.
- 1871 Fleming became the engineer-in-chief of the Canadian Pacific Railway.
- 1876 Having missed a train in Ireland, due to confusion over times, Fleming was inspired to develop a 24-hour international time system.
- 1879 Fleming presented his idea of Cosmic Time to the Royal Canadian Institute.
- 1884 At the International Meridian Conference, Fleming's Cosmic Time system was accepted.
- 1897 Fleming was knighted by Queen Victoria.
- 1915 Fleming died aged 88, in Halifax, Nova Scotia, Canada.



Exercises

- A. Explain why Sandford Fleming suggested that each time zone should be 15° apart. Use your knowledge of the circumference of the Earth and your understanding of the 24-hour clock in your explanation.
- B. If the time is 6.12PM in Oxford, use the old local time differences to calculate the times in London, Barrow and Leeds.
- C. Put yourself in Sandford Fleming's shoes. In your own words, create a presentation for the International Meridian Conference outlining why the concept of an international time standard is so important and what differences it will make in the world.
- D. On New Year's Eve in 2011, one country 'jumped' the International Date Line and, in doing so, forever missed a whole day. Do some research to explore which country did this and why they made this decision.

