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Deep Digitality – fate, fiat and foundry

Alan Dix

The wand lies on time-darkened wood, strange-coloured stains tell of past experiments. I touch it gently, magic tingling beneath my finger tips, but, for now, leave it among retorts, dried frog skin and tools of alchemy. Instead I take a simple spyglass and look north towards the hills.

Between Swansea and Cardiff, the Tawe, Neath, Ely, Taff and Rhymney rivers flow grey-silted into the sea. They rise inland in low mountains to the north, Hydra-like splitting and bifurcating, running up deep-gouged vales that once were the South Wales mining valleys, the powerhouses of industrial revolution: copper, iron and steam coal, making first Swansea and then Cardiff the largest ports in the world.

The pattern of water flow is much as you would expect from any mountain area: myriad tiny streams tumble down valley sides, joining to become rivers, yet choked with coal dust decades after the last deep mine closed. I remember as a schoolchild falling into the Taff whilst rowing, and finding the mud below the river bottom as deep as the water above, a thick, oozing substance, which seemed to want to hold you, sucking you into its pungent heart, just as the flowing slurry of coal-tip had claimed the children of Aberfan years before.

It is a river pattern much as you would expect from a mountain area, until you look at the underlying geology. The area is a syncline, a basin-like structure where the inner parts sank and the outer edges rose, exposing easily accessed coal measures at the periphery and suggesting the potential for deep mining within. It is the geology that made the industrial history of the area possible in the days before seismic surveys, but it is also a geology at odds with the rivers that flow over it.

Given the basin-like structure of the rock layers, you might imagine a large lake with a single outflow like Niagara Falls, or a circular fan-like pattern of smaller rivers running toward one another into a single massive water flow that punches through to the sea. But this is not what the maps show.

In school we were taught that the rivers form what is known as a superimposed drainage pattern: they were there before the syncline formed, and, as the geology shifted beneath them, they cut their way through the shifting rocks, leaving a legacy of the landscape before [1].

A few months ago I became Director of the Computational Foundry at Swansea University, a new initiative to grow digital research capacity in Wales for the good of the region, nation and world. Swansea was once known as 'Copperopolis', the heart of the global copper industry, and the Foundry takes its name from the numerous copper works that lined the lower reaches of the Tawe bringing jobs to many, wealth to some and ecological despoliation to all.

Looking at digital technology I wonder if the patterns of digitality are merely a relic of the industrial revolution and the merchant age before, just as the rivers of the South Wales valleys reflect a one-hundred-million-year old topography. Despite talk of 'disruption', it often seems that digital technology simply reinforces and reproduces the existing patterns of industry, commerce, health and government. The patterns remain whilst the digital geology has shifted beneath.

What would these institutions be like if developed from the digital ground up?

In health the demarcation between medical doctor, nurse, surgeon, family doctor and health visitor is partly due to different and essential abilities, skills and experience built up through training and practice. Yet it also reflects more superficial delineations: the physical boundaries of hospital walls, and the information boundaries between specialised, but often rote, knowledge of bone, tissue and drugs. Digital technology transcends walls and distance, and makes raw information available to all. A new Wellness Village at Llanelli will challenge some of these boundaries, and, of course, digital technology will be at the heart of this transformation [2].

Large factories and mass production harness the efficiencies of scale, through continuous production with specialised parts shipped around the world, but flexible manufacture and digital fabrication remove many of the drivers for size.

More radically the centralised logistics of production and distribution, replicated by global corporations no matter how disruptive, are but a relic of a financial past, and crucially due to the fundamental nature of money.

Money has two roles: the transfer of value and the transfer of information. The former was the oldest reason for coinage or tokens of value, but it is the latter, the hidden hand of economics, which has driven the success of market capitalism. The cost of raw materials and consumer goods is an indicator of the availability, demand, and worth to individuals of different products. This then allows industry to match itself to the market without centralised control. However, money is a lossy information conduit; the very fungibility of coinage, which is essential for the transfer of value, means that it only gives knowledge in the aggregate. Centralised logistics are an accident of information paucity – only in the lumpen can the depleted knowledge of supply and demand be matched.

With colleagues at Cardiff School of Art and Design, I have been considering how consumer goods and fashion could be re-imagined for a digital era, using information technology to break this legacy of centralised logistics: allowing local-local connections as well as global ones, creating new roles for digital artisans, and refilling the gaping hole of semi-skilled and skilled blue-collar employment, which is driving the cataclysmic political changes that rage about us [3].

My fingers close again on the wand, its surface smoothed by aeons of past abracadabra columnists, ebony or blackened ivory, too old to tell. There were once four letters on its surface, the last now worn thin, so only the inscriptions 'A', 'C', 'and 'M' remain [4].

With one word 'abracadabra', one sweep of the wand I will reverse the ages of steel and silicon, let mass computation precede mass production, and see the patternings of life that would instead emerge.

Is even a magic as powerful as ACM enough to invert the flow of time?

If not, if the past is immutable, for us now, the future is in our making.

Join me in forging a new digital future.

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