



London Bridge isn't falling

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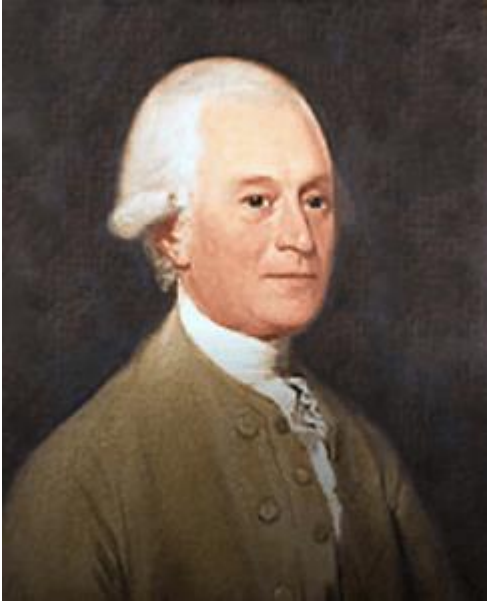
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London Bridge isn't falling down. In fact it's in excellent health considering it straddled the river Thames for two hundred years before being dismantled, shipped halfway around the world and re-erected, stone by stone, in the middle of a lake in Arizona. If you were to take one of the pleasure craft which now ply their way across Lake Havasu you might find yourself looking a little more closely at those stones as you pass under one of the five wide arches of the bridge. It might be worth doing so because they have a fascinating innovation story to tell....

The Romans were the first to span the river Thames around the time of Caesar's invasion. But it took another hundred years before a permanent structure (albeit made of wood) was put in place in AD45. The crossing had a chequered history, versions of it rising, falling, even burning before in 1209 the first stone bridge was built. It must have been good workmanship because it survived for the next 600 years. But eventually it needed replacing and a competition to design a new bridge was held in 1799 and won by the architect John Rennie. Work began in 1824 but it took nearly ten years before the new bridge was opened.



Ten years, and a lot of granite. 10,271 pieces to be precise, each weighing around 1 ton. And the trouble with granite is that (a) it's heavy and (b) it isn't always close to hand. It takes millions of years to form and where it does may not be in the same location as where you'd like to use it. For Rennie this was a challenge – he needed the granite in London but it was actually dug up 200 hundred miles away in Devon, high on Dartmoor. So if he wanted to use it he'd need to solve some big logistical challenges.

Enter the Templer family, three generations of entrepreneurs with a shared instinct not only for innovation but also for moving ideas to effective scale. Grandfather James Templer was born in Exeter in 1722 and worked his way up from being the son of a brazier to become a successful civil engineer with a reputation for dockyard construction. He earned enough money through that to buy a handsome estate in Stover, Devon where he erected a house made of the local granite, quarried from high up on Haytor. He was also far-sighted enough to buy not only the land surrounding his house but also the hills nearby, and their associated quarrying rights.



But it wasn't granite that preoccupied his son, also named James. Or rather it was but not in the form of big heavy rocks. He was interested in much smaller ones, microscopic fragments to be precise which when mixed into a slurry make clay. And clay, especially the right quality and consistency has a useful property. You can shape it – into plates, bowls, mugs, cups, saucers, basins, almost anything – and then fire it in a kiln to bring out its strength and stability. Finish it in interesting ways – paint it, glaze it, polish it – and you have exactly the kind of household artefacts which the citizens of London (and every other growing population centre of the late 18th century wanted in every increasing volumes.

Innovators like Josiah Wedgwood had begun to build their business empires based on manufacture and export of high-quality ceramics for which the UK (and particularly the Staffordshire area known as the Potteries) is still world famous. Brands like Royal Worcester, Spode and Wedgwood are wonderful reminders of the elegance and skill which goes into their manufacture.



To make high quality ceramics you need high quality raw materials. Clay is made up of tiny particles of rock washed down hillsides over millions of years, gathering in plains where it can be dug from pits and open-cast mines. China clay is the most abundant but ball clay is more prized because it is white, pliable and produces the best ceramics. And ball clay – a great deal of it – was what the Stover mansion and extensive surrounding estate, (all owned by the Templer family) was sitting on. It had been there since the Tertiary period, around 30 million years earlier, when the Sticklepath Fault occurred, splitting the Devon landscape from Bideford in the north to Torbay in the south and creating the subsidence which enabled the accumulation of the ball clay deposits.

It was a visit by Josiah Wedgwood to the area which gave James the younger his business idea. Wedgwood was looking for high quality clay and while the china clays in Cornwall (further west) were good they lacked the plasticity and workability of ball clays. Templer realised that Wedgwood and the growing band of industrialists in the Potteries represented a ready market for what he could dig up – provided he could ship it to where it was needed. Not the simplest of challenges.

Horse and cart was the main transportation method for the early clay pits but the roads were rough and ready and the journey to the Midlands prohibitively long (two hundred miles). But if it were

possible to ship it along a canal to the nearby river Teign and then transfer it from barges to ships, they could sail anywhere – Liverpool (to serve the Potteries), London, even internationally, wherever it was wanted. All James needed was a canal – and so he built one.

He began in January 1790 planning to run from Stover to connect with the wide tidal river Teign near the town of Newton Abbot. He invested over £1000 of his own money (close to £1m in today's prices) and even arranged an Act of Parliament to allow him to raise further money. In fact he didn't need it, having completed the stretch to Ventiford (and the river) by 1792. It was an impressive achievement from the engineering side, running a distance of 2.7km and including five locks, drawing water from nearby rivers and lakes. The work required dredging the river Teign near its connection to allow the deeper draught barges and putting in place towpaths and lining the sides of the canal to prevent erosion. One of their many innovations in the construction was the building of a graving dock, a lock which was constructed with a basin to one side into which barges could be drawn and worked on as a dry dock. (His father, with the long experience of a lifetime of building dockyards for the Navy would have been proud of him).





The plan worked; barges could move 30 tons at a time from the clay pits inland along the canal and into the river. There the cargo would be transhipped to bigger sea-going vessels leaving from the port of Teignmouth. In 1798 Wedgwood gave him a major contract to supply clay and others soon followed; not only did he make money from his own clay sales; he also ran a profitable transportation business for others in the area. Not hard when eight out of the ten barges plying the route were Templer-owned. By 1816 trade on the Teign had increased from 400 boatloads of clay per year before the canal was built, to 600 per year, and by 1854 this had increased to 1,000 per year.

James didn't rest on his laurels; he continued to innovate, improving and extending the canal, constructing better loading and unloading facilities, adding boat repair and maintenance and other services and generally developing a very successful business which he ran until his death in 1813.



His son George (who was born in 1781) inherited the estate but preferred to leave the running of it to his lawyer. He continued to make the most of his privileged circumstances, enjoying the early 19th century equivalent of a rock star lifestyle. His was a world of exciting hobbies like hunting, writing poetry, amateur dramatics and cricket! (He also had a mistress installed in his house with whom he had six children).

But rock and roll also had a rather literal part to play in the next phase of his family's entrepreneurial journey. George had lived all his life amongst Devon granite and was aware of the growing demand for it as a strong, workable and elegant building material. It was just unfortunate that it was in the wrong place – most of the demand was far away in cities like London. But he'd also seen what vision and some systems thinking could do first-hand, with the example of his father's canal and so he sought to apply the same principles to rocks.



The problem, once again, was all in the logistics. The Templers owned the granite quarries and the land around them. But transporting heavy rocks down a steep hillside isn't easy, even with sure footed ponies. (It's the kind of problem the railways would be good at but they'd only just been invented and weren't anywhere near ready for this kind of work). But the germ of an idea lay in the idea of using tracks along which the rocks could be carried. What if he could create a tramway along which carts could bring the stones down to sea level? Then he could then use his father's canal to transport them to ports and wherever they were needed. It was really just adding another link to the logistics chain which the family had already built.

Though not a simple link. Haytor, where the quarry lies, is at the top of Dartmoor, about 450m above sea level so the tramway would have some steep descending to do. And iron wasn't really an option for making rails – too costly and still an immature technology. But there was plenty of alternative material around – in the form of the same granite stones. Suitably shaped and laid as tracks could they form the basis of a granite tramway? James thought it was worth a try.



He succeeded and it was an impressive sight on top of the moor. 10 miles (16km) of it, complete with sidings, switches, passing places where descending teams could pass those coming back with empty carts. You can still see it today, a testament to the design and durability of the idea and its construction. It was built in 1820 and quickly helped establish the business of granite quarrying and shipping; by 1850 the quarries employed over 100 men and stones were exported around the world.

Wooden carts were pulled in trains of twelve pulled by a team of 18 horses walking in single file. They were hitched to the rear of the train on the downward leg, essentially acting as brakes to slow the descent from the high quarries; on return (thankfully pulling empty wagons) they would be walking in front.



But it wasn't just the tramway – George also oversaw extending the canal and building better barges which could take the granite all the way along the Teign river to the port of Teignmouth where a new quay was built in 1827 to handle transshipment to sea going vessels. This opened up not only the whole UK market but also opportunities in exports.

Which brings us back to London Bridge – and indeed to the many other construction projects happening in the capital in the heyday of the 19th century. The British Museum, the General Post Office, Ludgate

Circus – all built of Haytor granite. The stones themselves are just a symbol of the underlying business model – a system for creating value by getting the stones to the right place at the right time and at the right (profitable) price. What the Templers did for clay and then for granite was create an ecosystem, connecting resources and activities to specific and well understood needs to create value. Not a single bright idea but a system.



In many ways the Templers built an early version of a platform business. By laying down the basic logistics infrastructure – canal and tramway plus shipping – they could then add other value adding services. Freight haulage, clay and granite sales, docks, ship brokerage and repair. And they opened up their platform – other ship-owners, clay and granite dealers could use it. Nor was theirs a one-way system; archaeologists have found evidence for coal and flint cobbles being transported inland from the coast, for use in local industries.



A key innovation lesson emerges from this – think about *systems* even at the outset. Think big by all means – vision is essential. But also think in terms of the bigger picture, how the different parts of the business model are going to come together in an architecture which creates value. Smart entrepreneurs find ways to leverage returns not only from their core idea but from the other players in the system as well – they build platform businesses.

Canals seem to attract systems thinkers. You can't simply dig a trench and fill it with water. You need to think about flows, water in and water out and raising and lowering through lock systems. You need boats shaped to use this efficiently. You need to have a value proposition which is based on linking markets who need stuff with suppliers who want to ship and sell it. And you need to have the capacity to engineer across those multiple innovation sites.

Like the Templers did.

- [*You can find a podcast version of this blog here*](#)
- [*And a YouTube video of it here*](#)