Transcript of 'Information and Communications Technology (ICT) and Sustainability'

Season 1, Episode 8, Transforming Tomorrow

[Theme music]

Paul: Welcome to Transforming Tomorrow the podcast from the Pentland Centre for Sustainability in Business here at Lancaster University Management School.

I'm Paul Turner.

Jan: And I'm Professor Jan Bebbington.

Paul: We've got another new subject today, Jan…

Jan: …excellent…

Jan: …we're going to be talking about information communication technology.

Jan: That's an infrastructure, I think? [lightly teasing]

Paul: No, I'm not having this not, not [Jan giggles] from the very start, you're not going to start using infrastructure as a verb again, this is, this is another conversation that no, yes…a warning listeners.

'Infrastructuring' as a verb is almost certainly to come out of Jan's mouth at some point during the next half hour.

[Theme music]

Paul: We'll call it ICT though I think…

Jan: …OK, cool…

Paul: …as in information communication technology, we're not going to call infrastructuring ICT and make it all very confusing…

Jan: … I agree…

Paul: …yes, but ICT because it's much less of a mouthful.

Jan: So who's going to tell us about that?

Paul: Who is going to tell us about that indeed? Well, today we're joined by Professor Adrian Friday from the School of Computing and Communications here at Lancaster.

Adrian is a Professor of Computing and Sustainability, so that's a good job title for this particular podcast, it fits in with everything. His research focuses on things such as understanding how digital systems impact energy and carbon footprint, including but by no means limited to, energy use in the home, sustainable food choices, sustainable transport infrastructures.

He's also a member of the Royal Society's Digital Technology and the Planet working group, responsible for advising on policy for ICT towards sustainable digital society. Sounds like we've got the right guest, Jan.

Jan: We have indeed!

Adrian: I really hope so! [laughs]

Paul: Adrian, welcome…

Adrian: Yeah, no, thank you.

Paul: First of all, how on Earth do you go about getting a job title of Professor of Computing and Sustainability.

Adrian: So, so firstly ICT is totally an infrastructure, we'll definitely end up there. So one of the great things about becoming a professor, and you don't even know this I think when you become a professor, is you get to pick your own title if you like, so I could have been a Professor of Computer Science, but I wanted to make a very explicit statement that I'm interested in sustainability as much as I'm interested in computer science, and specifically the intersection of the two.

And I guess that's controversial, there would be a lot of people who say computing has got nothing to do with sustainability, but I would argue they're wrong.

Paul: I'd also like to think that it also has to have something to do with what your expertise in, you can't just randomly pick I'm a Professor of Cheese and Wombles.

Adrian: I did always like the Wombles [general laughter] but yeah, fair point.

Jan: The original recyclers…

Adrian: …absolutely we need, anyway…

Paul: So can you tell us then a little bit about your career, how you came to be a Professor of Computing and Sustainability.

Adrian: Yeah, no, absolutely, I'll happily share that. So um I, I think, I think a deep dissatisfaction uh and midlife crisis would be the honest answer, but um… So I was working in an area, um let me say what ICT is first right.

Digital technology is everywhere, um it's every phone you use, it's every computer you interact with, um it's the nebulous cloud, the data centres, the networks that make all those things function. But actually it's all the stuff you can't see as well right, it's the 300 computers in your car that blink the indicators and sense when your oil level is too low, or increasingly are communicating back to um software that's helping drive the systems in your car and update the system. So it's, its networks its data centres, it's interacting technologies.

And this very much comes from a branch of computer science which was called Ubiquitous Computing maybe 20 or so years ago, which was very much framed around this idea that life would be so much more convenient if we interacted with computers in natural ways. So instead of keyboards and mice we, you know they're sort of listening to us in in a nice benevolent Silicon Valley kind of a way, and you know they're just responding to cues like um helping you organise your day or be more productive.

And then then later on there were sort of critiques of this of saying, well this is you know just about moving the, the workplace into the home and squeezing more productivity out, out of people and um and, so sort of thinkers at that time were starting to say what's Ubiquitous Computing really for, you know, can't we use it for something actually useful like conducting better science or addressing real world problems, inequity, justice, various other things.

And the sheer embedding of technology into everything we do, and how we make policy and how we account for things and sense our environment suggested to me at the time, that seems really important actually. So, so instead of focusing on these sort of hedonistic convenience workplace type things can I, can I kind of address sustainability problems using technology. So the first bit of work I did with a colleague was, was about putting sensors uh into the home and starting to say so where does the energy go in the home, you know, what are people doing with it, how do I get data that I can take back

to people to build new understandings of what's driving energy demand in the home, and that's how it started.

Jan: And I think what I find really interesting about that is that it, it ties together several things that we might be interested in. So you've got the the you know the technology itself, but then you have things like um the energy use, the materials tied up in making um computing, responsible production and consumption comes into it as well, but also how um industry and innovation happens.

So it's quite a you know a knot of sustainable development themes in there, and I haven't sort of explicitly you referenced the Sustainable Development Goals, because I know that you're not wholly keen on them or there's, there's parts to them that you find a wee bit tough to deal with?

Adrian: Ooh, we've gone right to the heart of the issue [Jan laughs] haven't you?

Jan: Best get there quick…

Adrian: …best get there quick…

Paul: …to be honest Adrian, if you want to offend Jan, by all means offend Jan, it's fine.

Adrian: So, so I love things that are arrived at by committee obviously. So it's very tough to do what the sustainable development goals are trying to do.

They're trying to sort of taxonomise you know areas of social problem and things, you know, things you couldn't possibly argue with like better education or access to water or, you know, fundamental justice issues and climate issues, of course we should want to do those things.

I think where this thing becomes uh very challenging for me is that you, you, it's hugely complex you drop down from the sort of 17 high level things to all the sub goals, they, they overlap with another they conflict with one another in difficult ways and, and then you get things like the embedding of sustainability and growth within the same thing.

And for me I believe we need to shift to a sort of full, er, world economics where we start to think about how do we live within the planetary boundaries, not keep growing, endlessly keep growing, consume more um so, so for me the

SDGs are too much of a compromise, and I'd want to see some better consideration for, for how do we start to live within some boundaries.

Jan: But also there's important tensions within them and, and that seems to sort of be glossed over to a certain extent. No, I think I'm, I agree with you, I mean quite a useful starting point to frame. But when you get into the nitty-gritty it becomes something else.

But this might be a good time to ask some nitty-gritty questions as well.

Paul: Yeah, I'm just wondering if we have to censor the last part of this podcast Jan [everyone laughs] from your perspective, where there'll be a strange gap in the recording as it goes out to our listeners…

Jan: …no, promise we'll put it in…

Paul: …and what happened there, and we'll come back and say, yes the sustainability, Sustainable Development Goals are absolutely wonderful, there's nothing wrong with them at all…

Adrian: …nothing to see here, move along…

Paul: …exactly nothing to listen to. Um so if you don't necessarily like the structure of the SDGs, there's ways though that ICT, computing fits within sustainability and how we might want to move forward even if it's not necessarily sat within that structure of the SDGs.

Adrian: Yeah I, I think it, I mean it's absolutely fair to say the embedding of ICT and how we live work, meet, each other, do everything crosscuts lots of development goals and the policy setting around development goals, so I mean, clearly it is linked with economy and um I, I think there's a more fundamental thing there about how people think of the role of technology.

So it's often thought about in terms of automation and efficiency gain ,and we can see this with this sort of massive shift to AI and replace, you know at some level replacing jobs that were done with people with jobs that were done by technology, but this is part of a march of modernism and progress and how we think about the role of technology and, and industrialisation and these sort of more far, far reaching things.

Um, so it's really tempting, and I think dangerous, to think about keep, keeping gaining efficiency being enough to address climate change, and I think it doesn't address the real scale of the challenge and the really important

question which is, um if you want to exponentially decarbonise and get to a point at which we're not producing more emissions than the planet is able to handle, what are we not going to do?

You know, we can keep making things more efficient and we've, we've demonstrated we, we can do that and technology can help with that in various ways, but it won't squeeze it enough.

The interesting thing for me is, is all the side effects, and the rebound effects, and the what does it do to the, the you know what's the role of, of people and work in in this future, what gets amplified and what gets reduced when you apply technology uh to various domains, and uh I, I guess you know there's probably examples we'll get to later on where but, but I'm really interested in this broader conceptualisation of how does technology change what we're doing now to take you to, you know hopefully a more sustainable or at least not less sustainable future uh than we're currently looking at.

Jan: And that might be a good place to start looking at some of the examples of your work because they, they're very particular but they also tell that story in a, in a very particular way.

So one of the things I found quite interesting of looking at your publications is there's quite a bit that has sort of been inspired by the change in how we have lived and worked since the, the Covid pandemic, and in particular I wonder if you could talk us through your work on energy consumption changes um that came in place as we changed our work patterns during the pandemic, and for those of us who were able to, and not everyone um was able to, were able to take our work home, and carry it on from there which was very much the experience of, of the universities where we moved our teaching online and we, we did lots of stuff from home as opposed from the office.

Adrian: Yeah, no that that's quite a nice recent example actually and, um I think it speaks very well to who got advantage and who got disadvantaged by, by that shift.

And there's often a sort of a bit of a narrative there isn't there about, oh well you know you can drive less if you do video calls and conduct your work at home, which speaks to people who are able to do that and have the kind of work that enables them to do that, whereas you know if you're loading tools in a van and going places, or delivering food on a bicycle even if those people have got Covid, you know that that's a wholly different story.

But yeah so that work is really looking at years of energy data that we've been gathering about the University campus, and what we did is we, we looked at the energy profile sort of before, during and after for, for some representative class of buildings, and obviously there's, like a small city, there's a mix of things going on, you've got most spaces are mixed actually, but you've got flats and offices and lecture theatres, and uh the preschool centre where, where people take their children on weekdays and that kind of stuff.

Uh and then we sort of grouped these things and looked at did, did the energy use dip, I mean the intuitive thing usually is, well everyone went home so the energy use dropped through the floor, right, that's probably the expectation.

But that turns out not to be the case. Um so some, some didn't change at all. Some like the preschool centre, which has a very clear use, you know you take the children away you don't need to heat the thing and use the lighting and all that kind of stuff that obviously did drop, and then did they rebound afterwards, did they come back when, when sort of post-lockdowns and so on.

And some of them came back lower, but many of them came back the same or higher actually, which speaks to all sorts of things, like upping the air change rate to get more fresh air and reducing recycling of air and you know and actually increased you know the effect of the policy post pandemic.

But I suppose one of, one of the interesting things there I think is it highlights just how difficult it is in um uh a sort of smart city type setting, or an office environment, to actually save any energy, because most infrastructures especially if they've evolved over a few years um you, you heat the whole thing you have very poor resolution of sensing of you know, maybe there's one temperature sensor per floor or something, you've got very poor zoning in terms of what can I turn on and off.

So actually as soon as you've got one person in the building it's the same as having you know everyone in the building, almost, because the uplift and energy demand between everyone working in the building and just keeping the lights on, keeping the infrastructure running so that someone can work in the building is actually surprisingly small.

So I mean often there's a narrative around energy saving, you know turn the lights off, turn off your computer blah, blah, blah, but actually the real problem is this this how efficient is the building to run, and heat, and light and how fine is your understanding of that and your control of that.

So yeah, we've done other work which is looking at things like where does the thermal energy go in a building you know, how hot is it and, and looking at that sort of resolution of, of sensing control problem.

Paul: It's fascinating what you say there about buildings responding to just one person being there, and it almost makes you think does that therefore mean there's a bigger impact because all the people who weren't there are now at home using the energy there…

Adrian: …aaaaah…

Paul: …that they wouldn't have been using when they'd have been in the office, so that therefore the overall footprint is bigger than it would have been if no one was in the office, or if everyone was in the office.

Adrian: See that's a wonderful example, you were talking just before we started recording I think about targets, and who owns problems, and what do you account for, and I think that's a beautiful example.

So do you view the organisation's remit as including the home worker working at home, in which case it should really include their heating bill and their lighting bill, as can be apportioned to what they're doing there, or is that somebody else's problem, in which case your institutional footprint could have gone down, but actually really your collective footprint given that the home, you know it's spilled into the home, has probably gone up, actually.

Um so uh yeah, I think that's a really nice example of where you're probably heating all the homes, and the workplace, and you're probably increasing your ICT footprint because you now need a setup at home to enable you to work at home, and maybe have a setup in the office as well. And that has probably increased the overall energy and resources budget, because you've got to build those computers, run those computers, and so on, yeah.

Paul: Also tied in with Covid you've done work on the gig economy, tied around about food delivery systems, which obviously during Covid that spiked, there was a lot more people using services such as [pause] I won't mention the names actually, no I refuse to mention the names of these companies, but using lots of these companies will come to your door with, with fast food ,and so what did you find then when you looked into all of that?

Adrian: So, so I think that's a beautiful example of how technology can reshape a practice, actually. So I think it was probably true to say that before Covid

more people would go to the supermarket and do their shopping, aand you know vehicle journeys to do that, partly due to safety and convenience concerns and lockdowns various other things, people made a pretty big shift uh to using online shopping and mobile app based shopping.

Um and that just seems to have have kicked a, a bit of a revolution really where, where you're now starting to see dark stores you know these shop, shopping uh supermarkets without any customer facing part to them, because they're just there to service the demand for the delivery.

So, so I guess our gig economy work was really ,going back to this method of you know can we work with some workers and see what, what that's like for them to be gig economy work, because your, your sort of interaction, I'll use the word employer although you're not employed, your interaction with your employer is mediated by a digital app.

You're sort of caught in this system where uh the work that's available to you is shaped by algorithms, and um there are more or less desirable uh bits of work available to you, and they might disappear at any time, and then you can get kind of marginalised by people gaming the system, you know trying to get you to deliver out of area or not answering the door and then you couldn't deliver the food and, and it's sort of really exploring that precarious workplace where you're, you're traveling around the city and there's, there's a lot of sort of interesting ways the city could be much improved to make, I mean they're sort of an unconsidered workforce actually and that they sort of exist in this sort of interstitial hinterland, you know where they're just, they've got no place to go they've got kind of no toilet...

Jan: ...yeah...

Adrian: ...and nowhere to wait, and they're not very visible to the developers of the technology, who are sitting in you know shiny offices in Silicon Valley, they're not very visible to the, the cities and, and you they sort of just exist.

And yeah I mean the, the, I guess the gig workers during Covid particularly you know are trying to survive but they're actually having to take some health risks, um and you definitely saw this with things like um Uber drivers replacing ambulances, and having to take Covid patients in and out of hospital and things like this so, so I guess the, maybe I've forgotten the question, but [everyone laughs] but the sort of the technology has all these multiple impacts ,you know it's creating vehicle journeys, some of those vehicle journeys are

increasingly we're seeing more and more e-bikes, which is probably good, because the other thing is lots of really low cost polluting cars that are clogging up streets, so there's sort of these impacts on the workers and what their lives are like, and then there's the impact on the cities in terms of like introducing congestion uh and, and then, and I suppose there's equity issues, sustainability issues and these all come together all because of this sort of convenience technology which, which is sort of reshaping that social practice of shopping.

Paul: It's really fascinating all the different technological aspects that you need to consider that, that where the gains might be and where the losses might be you're, you're not driving out in your car to go to a restaurant ,and you've got someone who's like say might be using an e-bike, they might be in a car when they're delivering 10 different sets of meals there. They're using technology which is different to what you're using, and there's the ups and the downs and there must be so many different factors that come into play in all this that make it, I guess it's not an easy thing to figure out the exact impact of all these changes.

Adrian: No, but I'm fascinated by the design of the algorithm though, although we didn't really get to this well in that, that study. When you make a change to the rules like, uh originally some of, some of the who-will-not-be-named companies had zoning, where you had to sign into a zone, and then there's a pool of workers for the work.

you know if you divide the number of jobs by the number of workers, right, you've got a good sense for how much you're going to make, and then when they got rid of the zoning it's a free-for all and you get people commuting into, into zones to, to compete for the work, and if you have too many workers that's great for you as a consumer because there's always someone immediately there to deliver the service to you.

It's pretty terrible for the worker who's who's trying to string jobs together to have a certain amount of work to, to earn enough money to, to live. And then you get these sort of weird things like well maybe uh students start gig working because it's a top-up income for them, but you've also got people who are trying to do it for a living and, and you've got this sort of competition between the different needs of the people who are who are working in that environment.

And of course the employer, in inverted commas cares, not one jot right, all they need is enough workers to service the demand and deliver against the, the SLAs and the delivery targets and so on, and they can pick them up, they can drop, them they're not employees.

Jan: So we were talking to Katy Mason in the previous um podcast and she was talking about how to make markets more moral, and what morally responsible markets might look like.

Do those ideas come into your field as well about, you know ethical AI or, or algorithms that drive good behaviour. And, and how hard are they to find examples of tha,t and if you do have any examples, or even if you don't, how would we un how would we uncover the things that make this, make sustainability more possible, don't exploit people et cetera, et cetera, as opposed to the, the things that don't work well that we're now identifying?

Adrian: So I think there is concern around AI and its impact, but probably mostly around you know the ethics of how it changes different, different work, and the impact on people. I think there is also work that's started to talk about the, the sort of computational expense of, of things like AI.

So if you take, I mean I don't want to say that AI is totally a hype technology, because there are clearly things it can do brilliantly and we, we've seen it you know doing a better job at screening breast cancers, or whatever than…

Jan: …yeah, mmhmmm…

Adrian: …than humans, and you know there's lots of great things it can do. You I generated a t-shirt picture the other day and it was fantastic, right [Jan laughs] but there is no question that the, the search for bigger and more complex models that do these things is driving massive energy use and massive growth in the underlying ICT infrastructure that I don't think we're talking enough about.

So what happens if these, these businesses which, which are ultimately very rich hoover up all the renewable energy and take that away from that capacity away from other things, or they hoover up all the, the copper and you know the, the rare earths that make up the ICT technology that we, we're increasingly building bigger data centres and bigger machine learning processing units.

And the same is true of other technologies like, like blockchain and things where we're…

Jan: …yeah…

Adrian: …we're essentially profligately using computation because we're not really paying for the externality costs. Uh and we're doing it to do kind of, I don't know sell souvenirs for football teams and things which, which I, I probably have a position on that as well. [laughs]

Jan: [laughs] I think we've finally found somebody who's more grumpy than I am Paul what do you think…?

Adrian: …it's possible, it's possible…

Paul: can you give us anything hopeful…

Adrian: …yes…

Paul: …with regards to what a better understanding of computing and sustainability can bring us as a society?

Adrian: Absolutely. So, so I saw a really beautiful example in a talk at a workshop where someone was showing me series of satellite data over time. I'll do the less hopeful one first, showing deforestation okay, that was less hopeful, uh and showing that the policy to address that was not being effective, which I think is, has value.

But they also showed me this example where someone had done this simple intervention in Africa where they were just breaking the, the crust of the dried Earth uh and letting the rain water soak in, and you could see over a period of years that this was causing more water to stay in the ground, and it was improving the biodiversity, and it was having a regenerative effect.

And I, I think you know the way we see the world is often through computation and you know mining information and machine learning models and, and this, I think this can have a very positive effect.

I think we need to be mindful of the values and the impacts of the technology on, on people and the planet, and it does use energy, it does impact how we do things, which have in turn an environmental impact.

And I think we don't factor that enough when, when you're designing a system you probably have a good sense for whether it's an environmentally expensive

thing into the future, or not. And what I want to see people is, is considering that much earlier until, because otherwise it's too late, you sort of roll out the technology, a billion people are using it, and then you know it's going to have a massive uh additional impact that we don't, we don't need.

Jan: And I like your example, 'cause we're starting to see examples of that type um in extended supply chains for companies, that they're able to use computational means to actually have a better sense of what's happening in remote, from where they are, but also perhaps remote places per se on, on the planet.

That approach though that, that requires many, well I wonder, so I frame it as a question, who gets to design the algorithms and does that matter?

Adrian: Wow, now there's a question. [laughs] Yeah I, I think there's a probably a very interesting thing about who really, how the whole business process and innovation and investment process leads to where you are, and who owns what bit of the problem, now that's really fascinating.

I think quite often there's an aggressive turnover in the companies that are coming up with innovations, and then these are bought or sold and I imagine, I mean who gets to decide the values, right, that's a really interesting…

Jan: …yeah…

Adrian: …question, especially when we start to think about, going back to what I said about what we're not doing or, or who, who gives up on the opportunity and lets someone else hoover up and make the money right, that's a, that's a pretty hard position to put yourself in as a, as a business isn't it to not, not take the opportunity of innovation.

Mmmm, I'm going to have to muse on your question further…

Jan: …I feel, I feel a research proposal coming on…

Adrian: …me too, me too…

Paul: I almost feel like we've reached a perfect end, Jan, but I know you had a very important question…

Jan: …ooh, yeah…

Paul: …that you wanted to ask Adrian before we finished.

Jan: Is beer sustainable?

Adrian: Is beer sustainable? [Jan laughs] Oooh, that is a really interesting question, uh I, I like beer…

Jan: …that's why, that's why I asked the question…

Paul: This isn't necessarily one of those things you're suggesting people will need to give up in order for us to…

Adrian: …yeah I, I don't know, I'm not sure I would survive. [Everyone laughs]

I think, I think beer can be sustainable, I think, I think if you, uh so what are the constituents of beer you need the energy to heat stuff, you need your, your water, so I guess like, like all sustainability decisions the answer is nuanced, right.

If you're stealing the only water available to run your brewery next to a village that you now can't drink, then no, and if you're in the northwest of England where we've got nothing but rain…

[Jan laughs]

[Theme music]

Adrian: …lots of fresh water, uh and probably quite a lot of renewable energy on the west coast, I think beer can be pretty sustainable depending on where we got our hops.

So I'm saying come and drink in Lancaster, that's what I'm saying.

Paul: The essential message, Jan, is you've moved to the right part of the world because you can drink as much beer as you want here…

Jan: …absolutely…

Paul: …and there are many breweries that operate here that can produce it…

Adrian: …but I think, I think there's a semi-serious point there, you know, what are the resources flowing in, how available are they, who gets advantage and disadvantaged if you take them? I mean these are a good solid sustainability considerations.

Jan: Exactly, it's good design, design questions…

Adrian: …good design questions…

Paul: …brilliant. Well thank you very much Adrian for joining us today.

Next time Jan, you're finally getting your wish as we're having another accountant on the show…

Jan: …what can I say, what can I say, happy as…

Paul: We, we've had a couple of shows where accountancy has barely been mentioned, but next time there will definitely be lots of accountancy as we're joined by Dasha Smirnow from here in the Management School at Lancaster. We'll be discussing reporting, benchmarking, and I'll try to make sure that you both don't go off on some kind of mad accounting journey that no one else can understand.

Jan: That's fair enough…[laughs]

Paul: [laughs] …it looked like you were saying 'fat chance' [more laughter] and well, until then, thank you very much, my name's Paul Turner.

Jan: And I'm Professor Jan Bebbington.

[Theme music]