

"High Heels in Technology Fields: the long walk to equality?"

Understanding the Role of Women in Technology Innovation

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Presentation overview

- Part I: Overview of the Issues and the sector
- Part II : Major themes from the literature
- Part III: Empirical Observations
- Part IV: Ways forward

Part 1: Overview of the Issues

Facts and figures: A low proportion of women in the high tech industry...

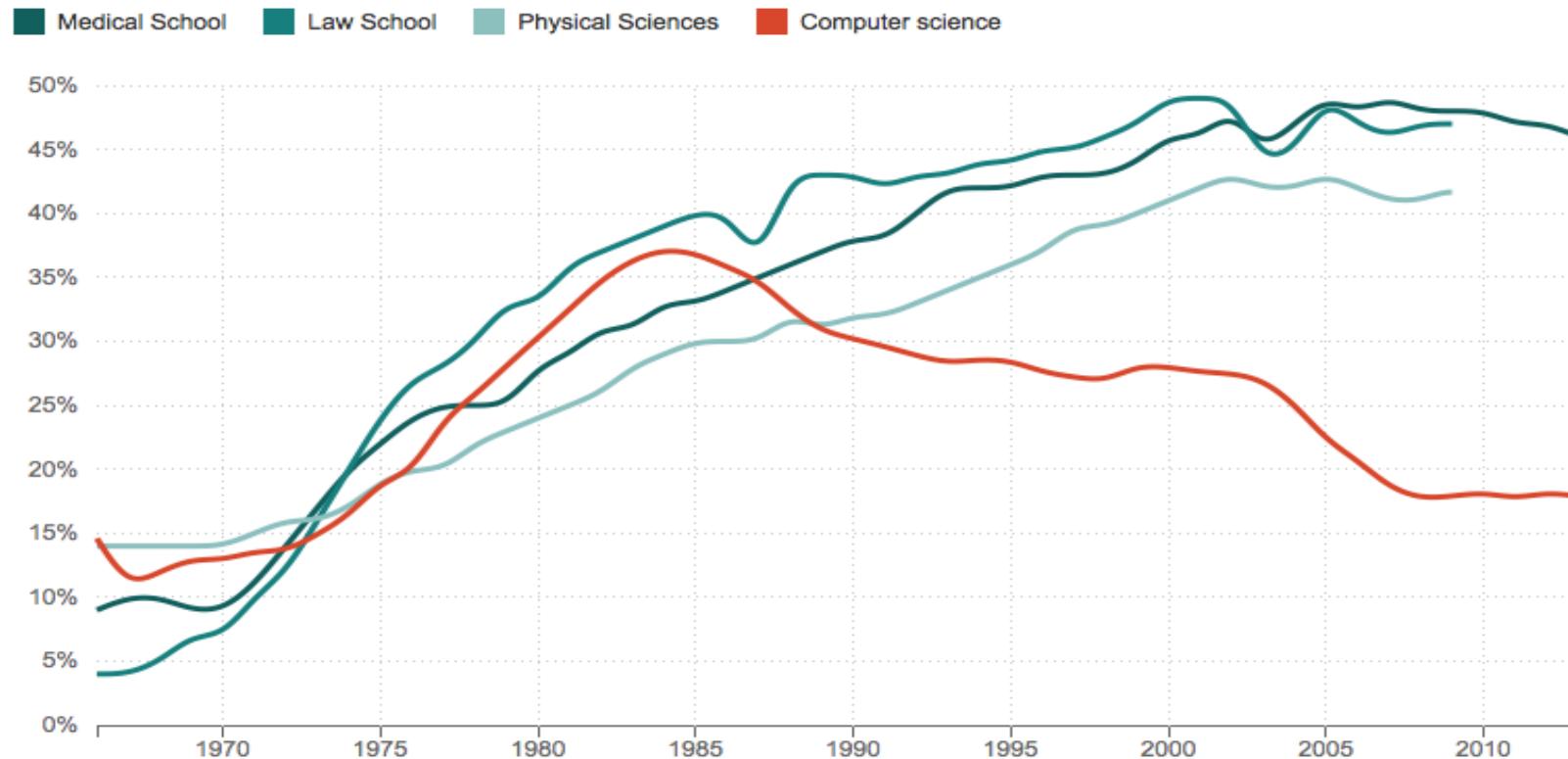
- France
 - 20,3% of women among computer science engineers (Stats DARES 2011);
- Royaume-Uni
 - Women represent 16% of people working as IT specialists (e-skills UK 2013)
 - ...and 20% of people working in IT sector (e-skills UK 2013)
- Union Européenne :
 - Women accounted for 30,7% of the workforce in high-tech knowledge intensive services (Eur. Commission, 2013)
- Etats-Unis
 - 26% of salaried workforce in IT are women (National Center for Women & Information Technology, 2013)
- In countries such as Maghreb, Asia, Eastern Europe, the proportion of women is much higher in the IT workforce.



... And it's getting worse over time!

What Happened To Women In Computer Science?

% Of Women Majors, By Field



Source: National Science Foundation, American Bar Association, American Association of Medical Colleges
Credit: Quoctrung Bui/NPR

According to you why is this a problem?

So what is the problem?

- Is it a problem of lack of equal opportunities?
 - Do women have the same opportunities this sector?
- Is the problem an institutional systemic one?
 - E.g. Education and developmental
- Is the problem a social/early developmental systemic one?
 - E.g Conditioning of girls and boys at a young age
- Do we actually know what the problem is?



So what does the literature tell us?

PART II: Literature Review

The IS Literature

- Research on gender and IS is under theorised, under researched and largely marginalised

WHY?

- It's not considered a cognitive field
- Rather it focuses on IT as a function within organisation and use of ICT (Adam et al. 2004)
- Gender analysis is highly political even in the area of scientific research
- Gender and technology tend to be seen as fixed entities and the focus is on their economic impact e.g. skills shortages



Positioning the research

- Gender essentialism assumes fundamental inherent differences between men and women
- In our context of ICT this is found to guide research in a gender essentialist direction
- Tensions can arise when splitting people into feminine and masculine
- By recognising there are variations within and between gender categories – which reveals much about social organisation, hierarchies, power etc.
- What is masculine and what is feminine?

A review and IS studies

- *These are few and far between 29 out of 862 papers in IS journals up to 2009*
- *Since then, there has been a special issues ISJ in 2012*
- *Mainly quantitative studies and some qualitative*



A review and IS studies

- Quantitative Studies e.g. Venkatesh and Morris (2000) tend to essentialise gender characteristics and reinforce (differences) and stereotypes i.e. Gender Determinism
 - Focus on essential psychological characteristics (differences)
 - Split of gender through statistical analysis
 - Women held to a negative stereotype against masculine behaviour
 - E.g. through human capital theory (women spend less time and resources achieving qualifications and so don't achieve; women are worse at networking than men)
 - They predict and affirm aspects of technology acceptance TAM/UTAT
 - Implications of this research:
at best a call for the sector to do better in terms of discriminatory practices and at worst they reinforce dichotomy and enhance negative gender stereotypes



Qualitative IS Studies

- Gendered genres in IT cultures which excludes women (genitalia speak) Harvey, 1997
- Modelling of social and structural factors 3 career development stages
 - that women will experience work-family conflict more than men,
 - prevalence of an occupational culture involving late nights, long hours and obsessive behaviour and
 - predominance of male dominated informal networks

Structural barriers (Wcycman, 2007)

- Socialisation in education
 - Namely sex stereotyping at school
 - Segregation of labour market
- Sex discrimination in employment
- Construction and character of femininity encouraged by our culture

Special Issue ISJ

Hellens, Trauth and Fisher, 2012

- Looks at interventions designed to change a state of affairs
 - Gender segregated classes
 - Specially designed curricula
 - Videos promoting ICT careers
 - At university – mentoring programmes, curriculum changes and networking events
 - At industry – networking groups and conferences to “support women” in the industry
 - Other initiatives e.g. scholarships, awards, mentoring, gender equity training, developing books and websites to dispel career **myths** and highlight benefits of a career in IT

Some of the criticisms of interventions

- One size does not fit all
 - When looking at work-life balance, org climate and mentoring including child care, elder care, job sharing flexible working and leave policies.
- Organisational climate
 - If you create a gender inclusive climate you need to manage the process of achieving it; mentoring for both men and women and barriers to networks and negative mentoring
- Gender interventions often lack funding, lack coherence and lack evaluation – without theory interventions are adhoc and difficult to replicate

Many feminist lenses:

- **Liberal feminism:** equality of access and opportunity
- **Socialist feminism:** fears that introducing new technology within working organisations would lead to 'deskilling women' influenced by Marxist analyses of technology
- **Radical feminism:** western technology, like science, is deeply implicated in the masculine project of the domination and control of women and nature focusing on women's bodies and sexuality
- **Post modernist cyberfeminists:** more positive, embracing technology "the Internet and cyberspace are seen as feminine media, providing the technological basis for a new form of society that is potentially liberating for women"
- **Techno feminism:** gendering involves several dimensions, involving material, discursive and social elements. An intricate interweaving of artefacts, culture and gendered identities in technoscientific practice

"technofeminism exposes how the concrete practices of design and innovation lead to the absence of specific users"

It seems we have solutions but have we diagnosed the ‘patient’ correctly? Examining the patient

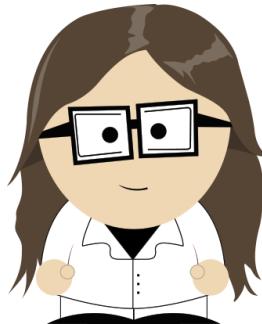
PART III: Preliminary Empirical Observations

The Project: An Overview

- Funded by the British Academy
- Exploratory initial study based on qualitative empirical data to understand:
 - what it is that facilitates women's working in the technology sector
 - how gender influences technology innovation
- A cross country comparison, UK and France, to explore cultural and social issues in influencing women's working as technologists.



The Team & the Approach



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- Interviews & Focus groups
 - Face-to-face interviews with men and women technologists (24)
 - All female and all male focus groups (4)
- Some early findings

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Early Interest and Influence

SOME QUOTES FROM THE UK

Basically, **my dad** was interested in electronics when I was a kid ... I went to night school with him.

It was mainly my **home environment** that gave me the leg up, and pushed the IT and the computers

I was always **weird** with how I played with numbers even as a child ... Hobbies would have been filling up lots of pages full of numbers

I guess my **elder brother** might have had an influence ...

a combination of aptitude and exposure to bits of stuff in someone's garage, ...nothing more than that really

I did really **sad stuff** like ... when I was younger I used to write maths books,

My dad is a software developer ... so we've always had computers and technology in the house

[Dad] bought me my first computer when I was 11 ... I remember spending hours typing all the codes in ... it was brilliant ... to get the little man to do the little dance

girls weren't supposed to be into computers and technology, ... but **I was lucky** enough to be pretty much shielded from that lack of expectation of me

my brother ... was learning technical drawing and computer studies ... I was lucky my family were wealthy enough that they could afford to buy a BBC micro-computer

My father ... enjoyed technology and that kind of stuff ..

at school I was always being almost like singled out for being good at maths, so that sort of encouraged me as well

Early Interest and Influence

SOME QUOTES FROM FRANCE

Well I guess computers have always been in the family, because my dad is a programmer – a senior systems engineer.

When I was 6 I began to do robotics actually, so it is a very very long story. I hacked some things and my cousins too

I spent lots of my spare time on my computer and it made my parents quite crazy because I was spending more time on my computer than working on my classes,

I learned how to use computers, it was more at home actually.

computers are so much fun you could basically just tell them want to do and they would do it. And Humans weren't like that, humans would ask questions, but computers would just do things

for once the elder was not a boy, so I became an engineer like the other oldest in the family

What we do as a kid can be found again when you are an adult.

I wanted to make dad happy

I had that technological background from him [father], so the whole interest in technology and the sciences comes from that family background

My dad is very into DIY, so we were doing electronics together, welding stuff and un-welding other stuff

The influence I think is from my little neighbour who was creating games. And I think it made me want to do it as well.

School & University Experience (UK)

I wasn't much good at school to be honest, but this was one area ... I began to enjoy it, when you're good at something you enjoy it, and I enjoyed showing other people things ... and seeing people's reactions

the computing teacher at school would call me out of lessons to fix the computer networks because I knew more than the teacher at school

we were taught by men at School and University but it was a challenge ... the teacher was just confusing ... he wasn't a very good teacher, .. I think I would've done better if I had understood him better

... I discovered that I was a lot more technical than I'd ever understood
... I was routed badly through the education system, there was an affinity, but it was never recognized

I think the teachers helped a lot ... They said 'you can do it , you don't need to be macho or anything else, ... you've got the intelligence to do it, just go ahead and do it'.

the guys just seemed to pick it up so easily and us girls were sort of "do you understand what's going on? "

I liked the way software was able to make things out of nothing really. It just attracted me. In fact, I neglected some of my other subjects and got a telling off once or twice.

I went to University, lasted 2 months and then dropped out because I couldn't be taught anything by the guy So I have no education and yet I run a successful technology company because I taught myself

I didn't get on with academia and that was more to do with the way that they taught ... so I kind of rejected education but I got into games at 15 only until years later did I realise it wasn't something girls commonly did

School & University Experience (FR)

the teachers do not know about coding actually. So most of the time coding for the teachers is a way of solving mathematic problems.

it is very very theoretical, like sometimes you ask 'where is the computer actually?

but it was so antique it wasn't applicable [sic]. So basically it was just like learning to type on a keyboard.

I went to a business school with telecommunications and I was interested in IT at the end of my studies

We had IT classes it was nothing, it was nothing, but they were really nothing, it was just Word but how to open a computer and how to close it.

... when you are in a school there is a strong specialisation and **you cannot switch**, it's not like in the UK and in the US you can switch between humanities and other subject areas, no, here it is impossible.

It is very bad compared to teaching in the UK. I am a teacher and I can tell you as a teacher they are very very bad actually

I refuse to be put in a box

I don't fit into the boxes

they cannot put me in a box and in France they don't like that.

University is very complex in France – it is craziness – well certainly compared to other countries

you're asked to choose when you are 15 and I think there is a lot of pressure at this point, ... you're at an age where you really want to conform, because you're a teenager and teenagers strive for conformity,

[Learnt how to use programming languages] just by using it, I never learnt, it's not that complicated, commands are not hieroglyphs, you know".

Careers: The great escape from coding?

UK WOMEN'S
PERSPECTIVE

you have to have a real **interest** and a **real desire** to be there, otherwise you will give up and go and work somewhere else

it does seem to be the case that pretty much **ALL** the women who go in, at some point **come out as a manager** or something else, they don't tend to stay in development.

it seems unusual that **every woman** that goes into software has the aptitude to be a **manger except that experience** tells me that pretty much all of them at some point do,

*I got quite bullied in a sense, by some of the other women [engineers]. It was ... almost like **every woman for themselves**, in a way that it wasn't for the men, ... they supported each other and helped each other out ... it was a really **toxic environment***

*I did bits here and there, but **never to the obsessive exclusion of everything else**, which I think a lot of people do*

*I am **not that single minded**, I like to have other things to do ... Even now, I wouldn't want to sit and focus on code all day.*

Not the case in France

Careers: The great escape from coding?

FRENCH WOMEN'S PERSPECTIVE

– In France it is a very **elite system** where all the big positions are only reserved for the people who have a certain education
she knew that she would never be promoted to CTO or CEO – absolutely no chance.

there is also a difference between the income of the woman and the man

Being a woman, ...I had to prove that women are brilliant, that they can do plenty of stuff, that we can manage loads of things, that we are as strong. And so I put myself under so much pressure, I was always thinking 'If I do that, they're going to tell me that it's because I'm a woman and so I can't make it etc

the rare women I came across in IT, where **obnoxious, unbearable**. It was a power issue

One girl told me 'Because I was in a company where I was told 'As you are a woman, you won't move up, you won't be project manager' and I knew that ACorp was different.' It does happen! But there are old farts everywhere!

we can have the feeling that as women we are more scrutinized. We are asked more to access the same level of responsibility. Because they assume that we are women, we have a family life, and that, by default, this (family life) will be the priority".

Yes, we are head hunted...Because **it's not a sexy job,**

*"I know a woman, she had been a project manager for years, doing exactly the same job as a man. But she had to **spend hours** in the Manager's office to **convince him** to give her the actual status of project manager".*

*people often feel that this kind of job cannot be done by a girl. ... on the phone at work, ... they are really surprised that I am a woman, they say '**I didn't know that a woman can do this job!**'*

What men really think of women coders?

A MAN'S PERSPECTIVE FROM THE UK

But they are not very good coders... I don't think they were good problem solvers.

the last place I was at there was only one female there that was doing software development, and she was not good.

The women say 'oh haven't you got a life' and it's taken the wrong way ... so they're never really going to fit in, unless they are really really really really good

I would say they [women] are under greater scrutiny there are some sort of male chauvinists that want to prove a point.

*the guys you're working with have got nothing in common with you, because they **are** techies and they're more interested in what level of Grand Theft Auto they're at*

I think their priorities are more around the life, as opposed to just focused around proving themselves that they can do IT.

I think there are a lot of female people in IT who are better at persuading people and managing people. Doing that sort of person management.

The women that I've met .. Are permanently relying on you to tell them, to direct them how to do something.

I don't think they loved it like we did. and I don't think they had the passion for it.

I've never really known women to stick at it long enough

a lot of these IT men are quite disorganized and are not very good communicators, and I think that's where the women's strengths are.

What men really think of women coders?

A MAN'S PERSPECTIVE FROM
FRANCE

... I didn't meet many women who had a profile like... well the trendy word is Geek

it was normal to start with pure coding, to learn the ropes. But I soon felt that when they are interested by IT it's not really for coding.

It's really hard for a woman to be feminine and a good developer at the same time Some people just don't get it.

And it's really frustrating to see it because ... these women were amongst the best developers I have worked with, so to see them struggle with this was kind of heart breaking.

men code and women decode

I found indeed that it was harder for women to follow the strict rules of coding. They didn't really understand their importance

I remember in my previous company she was the best programmer of the team. In four hours time she was doing like a day of one of us.

In France ... [men] love to work with women, and they are not so bad looking generally, yeah really they have a reputation French women, and a lot of them are very very good looking

in France, being a developer at 40-45 years old looks like a failure. It's not in fact. But I don't know any women who are older and still coding.

she was a typical girl – she was very strong but she did not know it

But I have seen genuine problems between male and female developers.

From my point of view, the best developers I have worked with ... I personally enjoy having to work with women not because they are women, but it brings a more stable environment

Workspace: Environment & Culture

MALE DOMINATED ENVIRONMENT

sweaty guys in t-shirts and pimples ... I mean it **can be very male**, it can be very functional, ...

it is a **zone of war** for many of them, so they're not particularly built to be attractive, or ... female friendly ... in the sense of being nice environments.

I do think there is a real **neglect around people management**, people development and there's a huge focus on technical delivery en masse

well to be really **crude** but a bloke wouldn't let it out in the open if there's a woman present, but these things start to, **become quite feral** without that balance

... **Untidy** ...piles of paperwork all over the place and they are the **messiest** people going

it's a **very detached unhealthy culture**

there's a **lot of bravado**, ... its very much like sort of machismo sort of male stock broker type

when I had my interview they asked 'do you have a problem with **bad language**?' I do not have a problem ... But they would use female body parts as insults and I'm not just talking about the actual offensive word, but the actual technical name it was **more offensive** for him to use the word 'vagina' I don't think he understood that.

all these **physical barriers** in open plan workspaces, obstruct eye contact and enable people to, again, become more introverted and it kind of **accentuates the introvertedness** and reduces collaboration and then no communications and no talking

Workspace: Environment & Culture

A TALE OF TWO EXTREMES

it's management and developers that I have worked with, tend to be less sexist the younger they are in my experience

the developer culture is kind of **dude/bro culture**. I'm talking about the pizza and blah blah blah and these are the kinds of stereotypes we [male developers] also have to struggle with

*if you were working on a really hard problem and ... don't want to be disturbed, we used to have flags stuck behind our computer screens and if you upped the flag, it would mean **do not disturb** ...*



I just received an email ... 'I couldn't talk like this – even to my dog ... He told me ...they teach you how to humiliate people It's just about humiliation and pressure and it's **Gestapo techniques** in France.

it was really an **open environment**, people could nap, they could come and go when they wanted, the only thing that mattered was the work done and was it done well ... Do your job well and then you're free.

they do their job and that's it and when you have lunch with them, you have to talk about soccer and tennis ... **you can't have a constructive discussion about ... politics .. or about life** ...that's why I'm not happy in this field. I'm really not happy at all, but I know that in this field there are a lot of really **depressed people**, there are real problems with drunk people

the developers were all **crammed in an office** and left to do what they do, hoping for the best,

good developers are wanted and they are starting to get more and **more picky about their environment**

Workspace: Environment & Culture

WOMEN FITTING IN?

it didn't even register that I was the only girl working in these environments,

it did get a bit sad, I guess. Some days when you walk in and you hardly speak to anybody all day, which is kind of weird really

if you want to talk to somebody you type in chat ... Even if they're in the same office, even if they're sitting next to you

where 70% of the people in the room were women, it was much more of a kind of collaborative style, and there was quite a lot of focus on making sure that people were included because of what their skills were

I feel I have to change my style a little bit more and ... I have to cut through the crap when I'm talking to them and I have to just come out with it ... But I do love working here.

*I hadn't even thought of myself of being a girl in a male environment. I've never been held back by it, I have always felt different for it, but I have never had a problem with **being** different.*

conversations will very rarely take place in the open plan office. People will either move to ... one of the sofas, or come to a meeting room

here it is almost cultural that we don't talk unless somebody has already come away from their desk and is obviously already not looking at their computer screen

[for the women] I think it is something they see other people doing and fit in with...

It's open plan which I have never understood as a seating concept with developers because they never talk to each other anyway and noise disturbs them

Workspace: Environment & Culture

WOMEN FITTING IN?

There is no recognition of the work the woman did or she doesn't dare say 'I did that'. It's always the boss who will take the reward or something.

[a girl wore a skirt to work] boys are doing some noises and they tease her, they told her that she is not like the others, she is special with this skirt and she doesn't want to feel special, she wants to be what she is. But they made her not feel comfortable with being a woman.

girls because they are isolated in a team .. they are alone so there is some kind of loud laughing, whistling, and laughing between each other with sexist comments and making jokes

they are not sure of the quality of the work of the woman - and they have to be supervised by other men, so it is difficult for women.

All the females above you were nasty, the senior and executive females were quite simply nasty .. and so I didn't feel like I wanted to be an exec at xco. at that time, because I'm never going to be like that

women have been promoted in the image of their promoters because they shouted louder than the guy next to them, so you get a bunch of battle axes in higher management positions that nobody can related to.

I found the team I was working with not very open... a little self-centred. And if we work on someone else's area, we would not dare and admit it. So we had to find the solution by ourselves

Ten years ago I thought the best person gets the job male or female, but now I say there is a need to get more girls into technology not women disguised as men

I once worked in a building of 100 people were I was the only women : I had my own private bathroom

There wasn't any open discrimination but the pressure that we put ourselves and from the context, we had to prove our worth as a developer.

So having established some issues would there be a difference if more women were involved in tech development?

What would technology look like if more women were involved?

- Most **men** could not see how there would be a difference in the actual technology
- But changes to the workplace
 - More ordered, more balanced
 - Less risk taking
 - There are abnormal cultures in IT
 - Fewer failed projects – they would be able to stabilise them more
 - Women were seen as not “allowing” things to happen and changing trajectories
- **Women** were clear about fundamental differences
 - Focused on functionality and usefulness not just technology for technology’s sake
 - Over emphasis on specifications
 - Targeting the wrong markets because focusing on spec
 - co-creation and co-production of products, which potentially would then mean that the product at the end of it would be much more user friendly
 - Technology would definitely be different – “it would work for a start”
 - More efficient/more practical / it would do what you wanted more quickly
 - More intuitive

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**The symptoms are well recognised, but
has the disease been correctly diagnosed**

PART IV: Ways forward

But do we need more appropriate gender theories?

- There is no gender lens to guide the conceptualisation of the gender dimension of the research.
- Does this under theorisation mean future work is limited to compiling and representing statistical data regarding differences between men and women with respect to tech adoption use or org impact
- Insufficient theoretical research where gender theory used, but they don't fully account for observed differences in men's and women's relationships

So this piece of work has raised more questions than answers

And more opportunities for us to make a difference

Merci pour votre attention



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