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AI, EMERGING TECHNOLOGIES, AND THE DIVISION OF DOMESTIC LABOR

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WELCOME AND INTRODUCTION:

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KEYNOTE REMARKS:

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PANEL DISCUSSION:

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SANJAY PATNAIK: Hello and welcome. My name is Sanjay Patnaik and the director of the Center on Regulation and Markets here at the Brookings Institution. We are here today for a very interesting event on AI, emerging technologies and the division of domestic labor. For decades, if not centuries, women have disproportionately managed household labor, including domestic tasks, child rearing, eldercare and many other caregiving activities. And even as women's participation in the paid labor force, mainly in a lot of developed nations, has increased, the gendered division of unpaid domestic labor persists. And so now we enter an age where we have a lot of advances in artificial intelligence. And so the questions get raised Might these advances in A.I., for instance, autonomous vehicles or delivery robots for food and groceries or large language models, might those impact the evolution of domestic labor and the unpaid domestic labor that we have seen the burden falling on women for such a long time. And so today I am joined by three really distinguished, outstanding experts here, and we will explore questions such as to what extent have scholars considered the role of AI and domestic labor? Are there specific areas of household labor tasks that can benefit from the application of emerging technologies? And what impact might these have on the gendered division of household roles that we often see? And so we are starting off with a keynote address by Dr. Ekaterina Hertog. She's associate professor in AI and society at the Oxford Internet Institute and the Ethics and A.I. Institute at Oxford University. Welcome, Ekaterina. It's a real pleasure to have you here, and I will hand it over to you for your keynote remarks before we dive into the panel. Thank you.

EKATERINA HERTOG: Thank you very much for the introduction, Sanjay. I'm really excited to be here. So give me 10 seconds to share my screen. Okay. All right. So really great to be here today to talk about A.I. emerging technologies and the division of domestic labor. I'm based at Oxford University, and today I'm largely going to be presenting my research funded by the Economic and Social Research Council. So, Sanjay, I already touched upon this, but I just wanted to spend a minute or two talking a little bit about unpaid domestic work and how it relates to beadwork and so on. Many of us would have come across newspaper articles, academic research, policy papers on beadwork and ordination. What what are the implications? How much of the currently of current occupations paid jobs could be overtaken by smart technologies in the near future? What would that mean? How would we care for people who have lost their jobs? I haven't seen much research yet looking at the similar consequences in case of unpaid domestic work. And yet, as I think is captured very nicely in this image on the left here by the Red Women's Workshop. Unpaid work or sometimes that's sometimes referred to as reproductive labor are really essential. No societies can continue, no paid work can really be done if no one's cooking meals, keeping homes warm and tidy, caring cares for children, raising new potential new workers for all their sake or anyone, any family members in need of care. Not only unpaid work is very important. It's also very time consuming. And this is I pulled the numbers from time use surveys in UK and in Japan and looked at them by gender, so by men and women. And this takeaway from this bar chart, they really took four points. First of all, unpaid domestic work is quite time consuming and at some stages of life, for some people it's comparable or takes longer, more time than paid labor. It's also shared very unequally, as you can see in both sort of example, countries here in Japan and in the UK, men do more paid work and women do considerably more housework and care work than men. This is true everywhere in the world, but there are differences between countries in how big the gap is. But women always do. Again, as Jody highlighted everywhere, women spend more time on housework and care work than men, and this comes at the price again. Many of us have heard about motherhood, penalty or caregiver penalty. And for example, this refers to the loss of wages, lifelong earnings, career progression and other consequences that serious care responsibilities, childcare responsibilities have on sort of one's career and work trajectory. Well, digital technologies, new smart emerging technologies, AI seems to hold promise to address some of those issues. And while, as I've said, there hasn't been much direct academic research that I've seen that sort of addresses the issue head on, companies and consumers have really taken notice. This graph I created based on the annual reports of the International Federation of Robotics. So a couple of caveats. These are this International Federation of Robotics counts, just the number of robots which it divides into four distinct categories household service robots. These are largely vacuum cleaners, lawnmowers, slow mops and such household entertainment robots, professional service robots. Here you could think about sort of robots moving around, sterilizing hospital equipment or robots used in elder care homes, for example. And finally, industrial robots, perhaps building cars and so on. These numbers don't think don't include any sort of smart algorithms that we use, for example, when doing our grocery shopping and that also are type of emerging technologies that can be save time spent on domestic labor. So this is sort very much of an undercount, but I think the picture is instructive. This graph is instructive as it

documents an interest, as we can see from 2010 up to 2019, which are the years for which I had the relevant reports. There have been more households service robots sold in in terms of units than any other type of robots. Moreover, as we can see from around 2017, there's the interest and the sort of purchase of household service robots has really accelerated that. We haven't seen quite such a rise in uptake in other types of robots. So when this technology, there seems to be a huge interest in this technology as it becomes available, consumers are keen to take it on. So this seems to be solving some kind of problem. There are some examples of robots that exist we've heard on we've heard about that as they come in on the left, the sort of child's teaching tag got all but on the right, the smart baby crib that has a technology to adjust. That's how it will rock the baby to make. It's promises that the baby will sleep more and kind of become more because of this smart crib. And I bought a dog which has been used in elder care, for example. So in my project, Domestic I project, and you could see there's a project website at the bottom of this graph if you would like more details or look at some of the papers we published. We've started by sort of and we started with an expert survey just it was we were really sort of interested in the question, well, if robots are going to take away paid work, can they at least also take out trash? Can they take away some of the sort of less glamorous domestic drudgery maybe. So we have divided all housework and care work tasks into about I think this is 17 tasks. And we came up with this categorization based on the categorization of unpaid domestic labor and time. Your surveys, which is the most widely accepted and common way of measuring unpaid domestic labor and came up with the 17 tasks. And then we approached experts working broadly in a smart technologist field. We try to look for people who worked on technologies that would be relevant for domestic automation. In UK and in Japan, and we asked them a number of questions, one of which was, well, what proportion of time currently spent on a given domestic task cooking, dishwashing cleaning could be saved throughout the nation in ten years time. The question use the current situation, for example, the current technological situation as a sort of as the basis. So not washing dishes by hand, but we already have dishwashers for long. Do we have washing machines? So given that, what how much more time proportionately could we spend in ten years time? And there are two, I think, important takeaways from this bar chart. First of all, across all the tasks, we can see that experts predict a significant amount of automation in ten years time. So a lot of time saved. Even in the most, I think the lowest prediction is physical childcare, about what they expect. About 20% of time can be saved through technologies as they develop currently and the current trajectory in many other tasks, especially housework tasks, they see as much more automatable. So the first experts predict a fair amount of automation across the board in domestic labor. And the second takeaway is very broadly speaking, housework tasks, especially routine housework like dishwashing, cleaning, cooking and grocery shopping, are seen as much more automatable than broadly speaking care tasks that you can see on your right with a kind of pink and purple bars. So housework unpaid work is automatable, especially housework. But even even a. Iraq Automatable, although we should add, this could have a potential to transform our everyday life. What about. So what are the social, the possible social consequences of it? I think this raises many questions. As we have seen, unpaid work takes a lot of time, plays a major role in our life. There could be really positive social transformations as a result of this. These developments, for example, as I have pointed out already, domestic work is shared very unequally between how between household members. Women do a lot more of it at the same time. The prediction is that routine domestic work, which is actually particularly dominated, tends to be particularly dominated by women and also the kind of domestic worker type of housework that's the most automatable. So theoretically, for think about this trajectory, but actually women stand to benefit the most. If everyone who wants could adopt any household and individual could adopt this technology. Then to some extent we could. For example, you could reduce the issue of gender gap in domestic labor. Women disproportionately benefit from this time savings. Of course, there is an important caveat everyone can afford and adopt this technology. As we know. In reality, that doesn't necessarily work out this way. If, for example, this technology, as is emerging technologies come with serious price tag, we're going to have we could potentially result in access inequality where richer households but benefit, save time and simultaneously sort of stop employing poorer women. It's usually tends to be women to help them with cleaning, cooking and babysitting, and now have the shiny new robots to save time and increase their free time. While poorer households can benefit from the technologies and from these emerging technologies and also potentially lose some of the jobs that they have been doing. There are also other potential consequences, darker consequences as well. Unpaid domestic work is similar to work in some ways in that it's time consuming and can be some some of it can be quite repetitive and can be unrewarding, like floor cleaning, for example. But it's also it's not just the work. It has a big component of caring to it. It's how people express love, how they build family, relationships and so on. If significant amounts of of all of these tasks or maybe especially the caring tasks taking over are taken over by

technology that could lead to a long term change in domestic interactions and then family relations. Another thing, because domestic work has such a large component care component to it, it's usually anyone providing that care needs to know a lot about the individual they're caring for. So maybe my vacuum cleaning robot doesn't need to know too much about me. But what about the cooking robot? It probably needs to know about the allergies in the family, any health conditions, food preferences and so on. This information for this for the new cooking robot to do its work well, it will probably need to know this information. And then who is going to own it? Where is that information going to go there? This potential risks of severe loss or gigantic loss of privacy. Another thing, again, as we know from some of the domestic technologies, and that is, I mean, when is a doorbell, a smart doorbell comes to mind, the ring, which on the one hand has a potential of say, I need to go to work and yet I need to let the plumber in because they've got a problem. Well, I can use my smart camera and let the plumber in remotely. So could could let me stay at work and not sort of spend time commuting. On the other hand, of course, this type of technology is have capabilities for surveillance. They enable me not just to let the plumber in, but I could watch anyone who enters this household who is visiting my family when my family members are moving in and out of the house. And perhaps what are they doing on the doorstep? Whom are they talking to? And so on. And in certain situations, especially when there's big power inequalities between family members and in extreme cases of this abusive relationships, there again, big risks associated with these types of emerging technologies when they're employed in private homes. We are we're not quite yet ready for that. I don't think we've thought quite enough about that at this point. And yet this technology is very much available now already. Finally, one of the things that discussed a lot at the Ethics and the Institute in particular, there's a concern about emotional attachment to caring technologies, as we I mean, many of us have sort of been exploring to DVD, for example. It's amazingly well chatting and it's very good at chatting and kind of perhaps can appear caring if I ask it to sort of sound like that. For example, it can seem to give a semblance of human interaction if if these technologies improve. And I employed in Canada as a conversational partners at some point, for example, through a digital voice assistant, there's a technology like that that is a risk of some family members of an individual developing an emotional attachment to a caring technology that if that technology is produced by a sort of profit oriented company, again, there are risks arising there because the company owns the technology. If I have an emotional attachment to it, I could end up in a situation where I'm willing to pay quite a lot of money to not have it switched off. I need regular updates and who knows what. So there are many sort of possible positive outcomes, but there are many risks that that come from the fact that this domestic work is very rapid in households and well-being. And these are the points that I think it's it's high time that we start thinking about. Thank you.

SANJAY PATNAIK: Wonderful. Thank you so much. Really interesting statistics and interesting thoughts here. I want to turn it over to our other two panelists, which are really distinguished as well. We have Dr. Beth Humberd, associate professor, department chair for management at the Manning School of Business at UMass Lowell. And Elizabeth, Dr. Elizabeth Altman, associate professor of management at the Manning School of Business, University of Florence Lowell, and also guests at the Future of the Workforce and an MIT Sloan Management Review. Welcome, Beth and Elizabeth. Thank you so much for joining us. I'd like to turn to you because you have you have you're working on a paper, actually a Brookings paper that talks that really focuses on the gender division of household labor and emerging technology and kind of like what promise AI has in that space. So can you tell us a little bit about kind of like the research questions that you're interested in here, maybe, Liz, if you can ask?

ELIZABETH J. ALTMAN: Sure. I was actually going to pop it over to Beth to start off, but that's fine. Beth, why don't you take it to start? Then we'll come back.

BETH K. HUMBERD: Sure, sure. So thank you, Sanjay. And that was great presentation, Ekaterina. So, yeah, so I think it actually dovetails nicely with what Ekaterina was sharing in terms of some of the statistics. What was it I have looked at is our kind of first research question builds on what you just saw in that presentation, looking at how might these emerging technologies have an impact on domestic labor in the household, which is what some of what the Ekaterina was getting at. But then the second part is, and in what ways might that impact the gender division of domestic labor? And so we've been trying to look for kind of those nuggets of promise, as Sanjay has said. And we think that we are finding some interesting possible areas that make these technologies different than kind of labor saving devices in the past, which Ekaterina touched on. And also, even though I tend to be I am kind of more of a researcher on looking at gender and

professions and occupations and tend to be somewhat pessimistic that we're ever going to break these kind of persistent barriers. We did find an area that we feel like there could be unique promise of these technologies. So those are kind of our research questions. I'm teasing a little bit of our findings, but I'll pause there, Sanjay, and see where we want to head next.

SANJAY PATNAIK: Beth that's great. And so maybe, Liz, if you could talk a little bit about what kind of groupings of technologies do you see there having a potential impact on domestic labor and on that gendered division of household labor?

ELIZABETH J. ALTMAN: Great. And also, first of all, thank so much for having us. It is a pleasure to be here and always fun to be on these types of panels with you, Sanjay. So we started looking at AI and looking at autonomous vehicles, both because we think there are a number of emerging technologies here. We just heard a lot about robotics from Ekaterina, and AI and autonomous vehicles are two other areas that we think hold a lot of promise in terms of A.I.. One of the things that we've and again, starting to tease towards our findings, it's hard to discuss it without where we're going. One of the things we've started to do is look at not only technologies that are within the house, but also technologies outside of the house that affect the house. So very simply, for example, GPS navigation technologies are not a technology that we would normally think of as within household labor or domestic labor. On the other hand, they have a huge impact on convenience, on scheduling, on planning and how we kind of think about how we get places and how we get other people to and from places. Same thing with other types of platform technologies Uber Eats or GrubHub or delivery platforms any around the world. Those types of platforms are not technologies that we specifically think about as useful in the home. However, we use them to help domestic labor situations. So those are types of technologies that are AI driven in many instances and are outside the home and affect what happens in the home. We're also looking at technologies that are AI powered, that are within the home, and we're again looking at autonomous vehicles. So I'll stop there, and, but I can keep taking it further, if you'd like. As you wish.

SANJAY PATNAIK: Perfect. That's actually a great opportunity to bring in a Ekaterina. I was struck by your graph that you're sure? I love that graph to kind of really broke down the different tasks. And so what what stood out to me is that it looked like the biggest savings of time that I new technology is promising. Looks like it's grocery shopping, cooking and service. You was. Can you talk a little bit about collect three categories what the technologies could be that can really save the time and and what is that service use category. I guess grocery shopping is like delivery robots, things like that. Cooking would be cooking robots. But I'm curious to hear what kind of like what technologies you see emerging in that space and where that big potential is coming from.

EKATERINA HERTOOG: Yes, I think the experts generally, as they've seen earlier with the paid work, the predictions have always been more predictable, more routine, very repetitive tasks are easier to automate. A particular grocery shopping as opposed to other types of shopping is a good example because most of us cook fairly similar types of meals over a sort of finite length of time, I don't know, repeating every couple of weeks and so on. So there could be better meal planning, for example. I mean, nodding to what Liz and Beth have been saying. So taking technologies that are sort of organizing things, perhaps taking out I mean, maybe they could be machine learning algorithms that are trying them kind of know that, you know, you need yogurt every week, milk every two weeks, and the flour runs out after a month. So that could take all this mental load of planning and thinking about ordering is very difficult to implement. So I'm unpredictable things, but repetitive orders are much more open to that. When we think about cooking and I've been actually quite struck by Liz's best comment about thinking about technologies that are inside the home versus outside the home. We had the parallel to that when we were talking to the experts and we also thought that, well, some of this domestic automation, I mean, has to happen in the home. My floor can only be washed by a robot that it's in my house. However, things like cooking, for example, could be done theoretically. I mean, they are already done. We've got Deliveroo that solves some of the problem. It's not, you know, there's a lot of human labor involved. It's not really only smart technology, but it solves some of the problem. And we could have factory sized sort of laundry spaces with humans or drones just sort of picking up and delivering, dropping off the laundry. Similar sets up could happen for cooking. And I know that at least for laundry, there has been this really interesting because we were comparing UK and Japan and in Japan they keep trying to come up with a robot that can do all the laundry. You know, they throw everything in. It's so odd. Supplies the right

detergent, washes, irons, balls and you come up and I think a robot like that exists. It's the size of a room, the house, it's very, very expensive. So while technically it's possible, it's hugely impractical. And that's that that's the obstacle in the UK. I've heard of a couple of models that are really delivery based at the moment with humans, but the idea is to build a kind of a smart factory or a big space where everyone's laundry comes in and then you know, it's delivered back to you so you don't have to happen in the home.

SANJAY PATNAIK: That's very interesting. So kind of like it's a combination probably of of of some of the back end work outside and then automated delivery vehicles that bring either food, cooked food or groceries or something, maybe in conjunction with a computer in your home that like automates your shopping list or whatever you need this model done in this case. Wow that's interesting. And maybe like turning over to you Beth. Could you talk a little bit of kind of like the aspect of automated vehicles and kind of like both like automated vehicles sort of for transportation of people, but also kind of like transporting stuff like Ekaterina alluded to?

BETH K. HUMBERD: Sure. So so actually, I want to build a little bit on Ekaterina's point, then maybe pass that to Liz. But what I wanted to draw attention to. Based on what we've been talking about here, is this idea of time saving, which Ekaterina is talking a lot about and I think makes sense for those that don't know a lot of the research that kind of finds this persistent gender division of domestic labor is based on time use studies, at least here in the U.S. that's run by the American Time Use survey by the Bureau of Labor Statistics. And a lot of researchers and scholars and policymakers kind of scrub that data and look at who's spending time on what tasks within households paid labor unpaid they were. And that's where a lot of these trends come from, very important. And of course, a huge area for labor saving devices is, as a Ekaterina has been saying, how can we save time and make things more efficient? What a Ekaterina just teased up and I'm going to kind of tease up to have let's talk a little bit about autonomous vehicles. We see the real promise with these emerging technologies less on that efficiency focus. There's obviously something there, but more on the managing the cognitive offloading that some of these tools allow for. So artificial intelligence and applications that might help. I'll use personal example. I have two children. They have a lot of activities each month. They have to scrub through various emails and different sports platforms to gather their schedules. And there's a change in schedule and update the family calendar. This sounds, you know, great, what's the big deal? Time saving. But if I could have some sort of tool that can find all that information for me, update some automated whiteboard on the family mudroom wall and handle that for me. That would take a huge cognitive load off of me. That happens in kind of the managing of a household that isn't really it is efficiency focus, but it's also me being at work. Oh, so-and-so needs to get here today. Who's going to pick them up for carpool? So we've kind of been trying to focus on we've had a lot of labor saving devices in the past, the washing machine, the dishwasher. Right. From what I can tell in a Ekaterina can correct me if I'm wrong. These have shifted where people spend their time but haven't necessarily increased leisure time like we thought they would. Right. Or maybe it allowed women to enter the paid workforce. However, then we have lower socioeconomic folks kind of in the home helping with cleaning and other things. So we're really trying to find what is that unique aspect of these emerging technologies that might offer promise. And if you Google anything about kind of women second shift and what working women are kind of plagued with these days, there's a lot out there and public conversation around that mental load. The cognitive and emotional labor that's involved in managing a household that maybe isn't captured in those time use studies. And so we think there is some promise there. And I'll pass off to Liz, if you want to talk a little bit more specifically about autonomous vehicles.

ELIZABETH J. ALTMAN: Sure. I will get to autonomous vehicles, but I also want to build on two points that the two of you just made. So back to meal planning, for example, I thought it really struck me a few weeks ago, some of my students were presenting about a meal service in the U.S. HelloFresh and we think about meal planning as what we do again within the household. Right? And as Ekaterina said, you know, maybe we only order the same things relatively repetitive, then cook the same things over time. But. More and more people are using, for example, mail services. And as they become more effective and more efficient and more cost effective, and this is where autonomous vehicles and delivery services do play a role. That's all AI powered. And it's one thing. Now, these days, if you're going to use a meal, serve most of the meal services, at least again in the U.S., you need to put in a lot of preferences. Right. And you need to go in and choose. You know, we have a milk allergy. We have a this allergy. We have it that allergy. You know, we are a vegetarian. We have one vegan in the house, whatever the case may be. But if these systems, as they

improve and they already are, start to know, this family tends not to like food that's very spicy. This family always ranks low or doesn't reorder things that have a lot of garlic or a lot of onions, whatever the case may be. Then the system starts to know you much better than it ever has before. And eventually the system just sends you what is appropriate for your family. And again, so we think as those external systems improve, that does also help within the household. And the same thing, I guess, with autonomous vehicles we've looked at and we're starting to look more and more at how a family would use them not only to move people but to move goods. So to go pick up groceries, to go pick up dry cleaning, to go as infrastructure evolves, to be able to go out and get things for us, and similarly, to have other entities bring things to us. And I think as we're looking at autonomous vehicles, we're looking at autonomous vehicles that might transport humans, but we're also looking at autonomous vehicles that transport goods, and that also includes drones. So it's in they don't have to all be land based autonomous vehicles. They could be Airbus autonomous vehicles. And those also are helpful and becoming much more available, accessible and useful as these technologies continue to emerge.

SANJAY PATNAIK: Great, I want to see now. Please, Beth, go ahead.

BETH K. HUMBERD: I was just going to bill one quick thing, cause it kind of bridges Liz's comment and Ekaterina in terms of looking at kind of the darker side or, you know, not necessarily danger of darker side, but unintended consequences. I think when we talk about autonomous vehicles in particular and the moving of people, we do, we always say research is research. And we've been having a lot of conversations with people kind of in our personal spheres as we're digging into this. And I had a friend immediately jump on. I told her when I was working on an autonomous vehicles popped up and she said, you know, I don't I actually busy working mom, three kids. I really like that 10 minutes in the car with my son to drop him at practice because it's one of the only times we get to connect. So I actually think, again, the cognitive emotional offloading, the, you know, or the tasks face that are kind of bringing goods that allow people to still have those relational moments with members of their family. I don't think that the gender division of domestic labor is looking to shift in a way that takes out the relational component of family life. It would be nice if it could take out the, you know, the time suck and the cognitive load. So again, to this point, I think the moving of goods and and product, it would be probably more palatable to a family than necessarily the moving of humans unless another one lives and I talked about is multitasking right. If I could I guess you could do this with Uber right now, but long commute if I could be driving work while I'm being driven somewhere. Sure. That in that sense the moving of humans, but not necessarily offloading care to autonomous vehicles.

ELIZABETH J. ALTMAN: And I guess I would just add to that, you know, as we so far even in this conversation, we've considered autonomous vehicles one category. But even in there, as soon as you start to do more research on this, we have the essay, different levels of autonomy, right? So it's one thing if you have more like an autopilot. So, yes, you know, these conversations that happen in a car among family members are important. And I think many of us have had some of our best conversations, but they also are distracting. And so if you can be an anonymous vehicle that is essentially driving itself, but you're kind of keeping an eye on it. Right. And, you know, one of the middle more middle levels on the scale then that I can see happening, I mean, that can happen right now, essentially, right when we have the technologies. And as those technologies become much more, again, available, accessible and prevalent, then I think that becomes a much more normal situation where a mother or father and child, for example, or other family members get in a car together and can do other things, they can be doing homework, etc., while the car is driving them, much more So then I think at least in the shorter term than putting someone in a car and taking them somewhere else.

SANJAY PATNAIK: Ekaterina, I want to move over to you. Kind of I can bring you in here on this debate, especially on this distinction between kind of like the managing the mental load and the doing. And I think how do you see kind of like this, Beth and Liz mentioned earlier, we have this two components. We have the domestic labor itself where we have the technology that can really save it. But then we have the gender division. And even though we have seen a lot of technological advances over the last six years, let's say washing machines, dishwashers, etc., the gender division has persisted. And I think oftentimes it's probably also driven partially culturally. So what do you see kind of, I guess, some of the main factors behind that? And how do you see technology kind of impacting this at all?

EKATERINA HERTOG: So that's interesting. And looking at looking historically, you are absolutely right. We had quite a big change over the course of the 20th century when washing machines, tumble dryers, you know, refrigerators, loads of technology emerged, particularly household appliances. And before that, you know, electricity and running water. They changed the way households operated, which kind of jobs had to be done within households. And what we saw that, of course, on the one hand, there was a big transformation and there is some research showing linking household appliances with women being more able to join the labor market. But at the same time, those huge inequalities persist. And one of the big reasons there is that is appliances change the way we think about tasks as well. And this is what I expect to happen with the new smart technologies to what happened with the washing machines, for example, is, yes, they could free up and, you know, individual time, mostly women probably, who were doing, you know, all this laundry by hand, but they also raised the hygiene standards. So now they the core task of scrubbing sort of timers saved by all the surrounding tasks. So by reciting the laundry, arranging it, finding like they all there and they've multiplied because we're now doing it not once a week, but in. I also have two children that I do it pretty much every day, my boys as well. So I mean, drawing a parallel there is of course, it's very hard to predict in which way is the tasks will be transformed, but it will be very interesting to see. And I definitely expect them that the tasks we're doing now will be transformed and in some way as well, we might have higher standards like if now I generally try to insist with my family that we try to share the dinner. I really, really don't like cooking delivery dinners, although I do end up doing that every so often. I think if there is a really smart technology that's able to cater for everyone, we might end up with every family member being able or feeling that they're able to order a separate meal for themselves and have one that fits their current mood or their food preferences, and that will raise the tasks rather than organizing tasks around them. And I think one of the audience questions that you mentioned to me before is whether we think, I mean, how would what would be the knock on effect on gender inequalities? Would we see what this technology is, you know, transform the domestic sphere? And as I mentioned in the presentation, women stand to benefit disproportionately because they're currently doing this jobs disproportionately. However, some some people anticipate that all men tend to like technologies. If we look at surveys and so on, they tend to be more positive, expected to be more confident, more capable with a variety of including domestic technologies, actually. So maybe now if we get more robots, more gadgets doing domestic work, they would feel more sort of professional. They would feel that this is something that the men could and should be doing and would feel more professional about it and that we would see a broader gender equality. On the other hand, as we've seen in the past, sometimes the new emerging tasks get allocated very much to women as we have more smart technologies in the home, as all of us, you know, experience the lockdown. Managing remote technology is often remote schooling. There's a whole new job where you ensure your round the wags, everyone's gadgets are updated and so on. And if we have more of the gadgets, there will be a whole new job of keeping them up to date, keeping them serviced and so on. And whether it's going to fall, you know, to men or whether because it's domestic sphere, it will get offloaded on women, the jury is probably still out.

SANJAY PATNAIK: No, this is very interesting, especially like if I remember correctly, when I looked at your graph, I do think in the UK it showed that women always work the same number of hours into paid professions, but then much more in a domestic, which is kind of crazy and really unfortunate because they have the double whammy when you think they would be freed up and they work now in the regular jobs and then they come home do have to do much more of the housework. So it's really like hopeful hopefully that some of the technology can really change that. And I want to turn back to listen. And Beth, you came up with a in your paper that you're working on. You're coming up with kind of a very interesting framework.

BETH K. HUMBERD: Yes.

SANJAY PATNAIK: How you can integrate kind of like emerging technologies at the. But can you just talk a little bit about it and how you think through this problem?

ELIZABETH J. ALTMAN: Sure. So I think we came up, we slightly surprised ourselves and came up with two kind of aha moments as we've been going forward with this. And so I'm going to talk a little bit about the first part of that and then I'll hand it over to Beth and then that will also wrap in with the framework. Right? So the first kind of "aha!" for us goes with what I was saying before, where the it's not only the technology within the house, it's outside of the house, but it's also not only the technology affecting the person who's using the technology, but those related to or connected with that person. So we're essentially putting a relational lens

on it. So in a way to explain that is a very quick example that we've used, which is and so one way to think about this is kind of first and second order effects or direct and indirect effects, right? So most of the I writing articles, academic literature, etc. just presumes that the benefit accrues to the person using the A.I., right? So we talk about like how that person's productivity will increase, but we don't talk much about that potential effects on those around that person. So this came up because we have a colleague who is using chat, GTP chat GPT a lot and he was at home with his son one day while our female colleague was with us at work and they couldn't figure out what to do. So he used chat. GPT GP suggested a bunch of activities. Then he said Well actually it's raining outside chat. GPT said, Well, here's some activities, here's a you could bake cookies. They said, okay. Then they realized they didn't have all the ingredients so they had to ask child GPT You know, we don't have all the ingredients, but can you give us a recipe for only these chat? You sent it to them. Then they realized that cookies weren't actually getting done. The cooking time was wrong, so they had to ask again, you know, can you help us adjust the cooking time so that it may sound all very boring and and, you know, normal. But none of those then required a call to our colleague where in other cases, yes, he maybe could have used Google. That's also quite possible. He would have called our friend. Right. And so in this case, she was able to stay focused because of AI helping her partner. Right. And so that made us realize is not only help the partner, her husband, but it helped her as well, because it kept them much more able to keep doing what they were doing. And you can imagine the same thing with tutoring. You know, Khan Academy has a new system. Conmigo that is supposed to be I've only started looking at it's supposed to be fantastic, right? And this we can just imagine, is getting better and better. I heard Ethan molik speak yesterday and he said, you know, don't forget, whatever I use today is the worst air you will ever use, Right. Which I just think is it is an excellent way of thinking about it. And so we've been thinking about these kind of second order effects. Right. How especially, again, if you think about a family as a system. So I study ecosystems and platforms. I normally study workforce ecosystems, but if you apply that same thinking within the family, you have these interdependencies, complementarities, relationships within the family. And so so that's one of our ahas is how does this affect not only people using the technology but also the others? And I will let Beth talk about our other. Aha. And that we then kind of roll together into a framework.

BETH K. HUMBERD: Yeah, great. And I think it is a good example. Again, it's kind of one that came up haphazardly and you could say, well, there was other ways to do that. But the kind of illustrative point there is it wasn't necessarily a task savings for our friend, the working female, but rather kind of a cognitive savings. And so what we've been trying to do with our emerging and framework that Sanjay mentioned is really separate out the doing of domestic labor from the managing. And then as we delve further into some of the literature on gender division of household labor, scholars are starting to look at that well, in the managing our components of that cognitive and our components of that emotional managing. And so our emerging framework kind of looks at AI and AV and then some of the capabilities within that, you know, visualizing, predicting, deciding, leading, assisting. Right. These, you can imagine, are different capabilities of the technology and kind of intersecting those with components of managing household labor. So the doing is the task. But then within managing you need to. Kind of anticipate, like who's going to need a ride somewhere this week? What are we going to need for food? The planning, Right. Well, once we understand who's going to need a ride, where we need to engage in planning for that, the deciding, well, how are we going to decide who ends up here, there, what we're going to have for a meal, or who manages the broken, you know, the appliance named Cummings, the dishwasher broke. And then finally overseeing. So those are we kind of have anticipating, planning, deciding and overseeing as sub sub pathways of managing domestic labor and our intersecting, for example, artificial intelligence under planning. Virtual assistants scheduling as it improves. In what way might it predict? Right. You know, last week, X, Y and Z happened in the household. We are going to give you kind of a starting point for next week's family schedule. I'm obviously very kind of biased by my own situation, but that is for me where the cognitive load comes in. I will be working, but I'm tabulating all of this in my head and take a break and make sure that somebody is anticipating or has scheduled or has planned. Right. Already texted my mom for next week. Hey, are you going to take the kids off the bus on Tuesday? So this is very now focused. But to this point, as the technology improves in its ability to visualize, predict, decide, lead, you can imagine those components of managing potentially this idea of cognitive offloading that we've heard some of the folks in the world talk about becoming more synergistic with the area of domestic labor and not discounting also the efficiency based time use savings that are there as well. We're just trying to emerge on this framework to say conceptually, what are some areas where the promise of these emerging technologies may lie in helping to manage that gendered division of labor? And I do just want to give a little bit of a plug here. I have an area of research with some colleagues that has

looked at the changing nature of fatherhood in the context of women's increasing paid employment. We have seen this gap in the time spent on domestic labor narrowed somewhat. Fathers are more involved than they ever have been before, more involved in caregiving and managing of the household. And so to Ekaterina point, you could see as much as kind of the output of that is. Yes, but women still do a lot of the cognitive managing if there are technologies involved. Our friend said her husband's like a chapter deep, so he kind of just stumbled on doing this right. So you might even see that kind of nagging gap take hold if the technology becomes more attractive to men who are interested in it, and then can, by nature of that, take some of this anticipating, planning, scheduling over.

SANJAY PATNAIK: That's actually a really interesting point. And also about the changing world of fatherhood, because I do think we see significant changes to where if we look at our grandfathers generation or even our father's generation. Right. And so what what always strikes me as very interesting about the current times we live in is that the changes we are seeing, the rapid technological changes I think are on a scale and speed that are unprecedented. Even if we go back to the Industrial Revolution and most people, I don't think, realize it. And so I want to go back to a country and because you brought up a couple of things that you called kind of like the dark side. And so I want to turn a little bit to the risks and also the policy implications since we are here at a policy think tank and how policymakers can think about these issues. And so, Ekaterina, we got on. We've got a couple of really interesting audience questions I want to ask one here. Are there any unintended consequences that you see that could arise from that widespread adoption of domestic automation and particularly in terms of like employment, social dynamics, etc.? Because obviously a lot of the domestic tasks, especially in wealthier households, are currently being done by employees from lower socioeconomic ranks like Beth had mentioned. So how do you see kind of like these employment dynamics? Do labor market dynamics and also social dynamics play out as the technologies become more available?

EKATERINA HERTOOG: Yeah. So thanks for the questions. In terms of the social dynamics, kind of currently, it's not unusual to for middle class, at least for middle class households to employ lower income, usually women to do some of these jobs. And these are the jobs that will of course, could, of course, disappear as these technologies get better and can take over. The interesting question there, and that's why I think the future research should go to, is to see whether whether we are going to be also equally open to replacing human labor with technology. Labor. So say I don't care who scrubs my floor as long as it's not me. If it's a vacuum cleaner or if it's I mean, I feel bad, but like in terms of morally, if it's a human cleaner or a robot cleaner, I don't mind the AI, but if it comes to a nanny, for example, I'm much probably at the moment would be much more comfortable leaving my child in the care of a human. I would sort of do a due diligence, but after that, the just the initial response is I believe the human care would be, you know, would provide better care. I would be able to be more flexible, anticipate sort of emergencies and so on in the way that, you know, a robot robotic gig might not necessarily be able to. So in terms of social consequences, some of the jobs might disappear, others might increase, or perhaps some of the is what we've seen in the sort of in the more paid labor market of similar technology is, which we could think about educational technology is that have parallels that used in schools and they use they can be used in the home as parents are trying to teach children different skills. What we see is that the moment that technologies come in, in schools, what happens is the killing to some extent where teachers are drawn upon, you know, teacher to student ratio, could change in an unfavorable way. They're more students, they're paired with technology, and the teachers becomes the instructor who makes sure everyone's connected. The technology sort of works and there's and there is a parallel to that again, with elder care homes. A colleague of mine that very interesting work published a book saying Robots won't save Japan. The fieldwork happened in Japan and he looked at all this fancy robots that are used in elder care homes. And the idea behind them was everyone's better off. There's this cuddly robots or interactive robots, and then the social workers can do their job too. But then the social workers labor gets even up because they have to make sure the robots work, that the technologies are compatible and so on. So I think these are some of the unintended consequences that we are likely to face, at least in the initial as these, you know, different providers don't necessarily all speak to each other and so on, and people are less familiar with them.

SANJAY PATNAIK: This is actually really interesting. I want to pick a little bit on that on that issue of like caregiving. Right. There was another question from the audience, which I think is important, especially when you look at Japan, where they as you say, they've already done a lot of advances in that direction. So what

protection or boundaries can you think about put in place to ensure the safety of children or the elderly or people with disabilities? When you have to start having these robots take care of people, right? I mean, we do something similar for humans only. If you hire a nanny, you do a background check, you make sure like they have a good driving record, things like that. So what would be the equivalent for technology and who would have the liability in this case? Right, if something goes wrong? So if the robot like mood malfunctions or something, you drops the baby, things like that, that you can think of. I'm curious how you think about that.

EKATERINA HERTOOG: So that's that's again, a very interesting question and makes me think of some of the points that Liz made also about autonomous vehicles, because in my head that autonomous vehicles are a nice parallel layer. So on the one hand, there's been huge technology development in that field. You know, there's the cars, I think have a lot of autonomous vehicle capabilities. We have been promised self-driving cars on the roads, I think for decades by now, and we don't quite have them. And I think one of the big issues there is exactly those guardrails and who is going to be so that. Hopefully not, but perhaps a very big percentage of the time. But when things go wrong or when the self-driving car has to make a decision who is going to be damaged because an accident is inevitable and you know, it's a human way, we somehow make it. But usually it's a perhaps even sometimes we don't think it through. We just have some kind of that response because the time is very short. The car, the self-driving car might have to make that decision. And I don't think we've kind of quite come to a solution where we're comfortable that, well, all things being equal, I don't know, the elderly is less valuable than the child, or the child is less valuable than the elderly and so on. We don't quite and I think there is. Big issues coming up, similar issues in the domestic sphere, especially with care, because if law is not playing well as it is, but that's about it, then the baby drops. That is that is much more concerns. And I think that those people are thinking about it and worrying about it because at the moment a lot of the innovation, the world of the most exciting things is happens largely in the company sphere this and they're ultimately their motivation is profit making. And I believe that as there is more and more pressure on the state level, especially in richer countries, you know, as societies are graying and Japan is a great example, but many others are following in that trajectory. Our care needs of societies are going to go very much up. And we I mean, as we've seen in some of the white papers, I think European Commission published one recently saying that digital technologies in the future should play a bigger role in this space. It's really important to start thinking about the guardrails. And I mean, liability is who is going to be called responsible is one thing. I mean, some of these technologies we could imagine like voice assistant sort of communication devices or something like a activity that was given as an example a moment ago. They may become firm in the same way. I mean, they might give wrong advice, but generally, hopefully no one's going to be seriously harmed by that. But there is other risks. They're going to learn a lot about households. They're going to hold all that information. Are we comfortable from are we comfortable thinking about the for profit making in companies, getting such detailed insights into our family life? You know, who is where, at which point, what are the consumption patterns? You know, I just can see that there's such detailed level of information can be used to, you know, marketing at the very at the very least. And of course, when we think about households, they often involve people who can't by themselves make this decision and give consent. Think about children or maybe or maybe there's family where there is one household member which, you know, decides and the others haven't thought it through, don't have the capacity to understand all the implications, and yet everyone's going to be affected. The evidence that will be collected.

SANJAY PATNAIK: Now, I think to raise really something very important, which is I think in the dash to kind of like put this systems in place, we have to be really careful to make sure we regulate it in a in a proper way. And we have a regulatory framework. So that's right. Because of good data and privacy, the US has a very bad record. Even now, if we look at social media about cybersecurity and data safeguards in a lot of the data currently is not being safeguarded in the interests of consumers, and Congress has not been able to pass comprehensive privacy legislation. And so this will just be exacerbated on a much more massive scale with AI and with all the systems that are coming down the line. And I think especially when you talk about unintended consequences, even with cheap beauty, right? Like what if if suddenly these systems can tell people, Yeah, like how do I build a bomb or something like that, Right. How do you kind of like prevent these kinds of things even with some guardrails? So sort of move over to Liz and Beth a little bit. How do you think about that from policymaking perspective? Kind of like very brief since we are running up to the end of the event. But what is the role of regulators here and how do you think about their kind of like their we have of safeguarding the technology and making sure it works for the benefit for the majority of people?

ELIZABETH J. ALTMAN: So as I'll start and just say, you know, we are learning every day, right? As our regulators on this. But I think the safety and privacy issues absolutely are front and center. And we didn't really talk that much about bias in these systems. But these models, especially in a judge, Judy Beatty, is an example of generative A.I.. There are a number of systems out there that are the primary elem systems, and then other systems build on them. So, for example, Microsoft is using open openness system and then connecting it to that to the web, you know, but they're trained systems. So it depends a lot on what they're trained on. Right. And you can see and especially these image systems, I saw a demo yesterday where someone said, you know, if you ask one of, you know, one of the systems for a beautiful woman and you ask it ten times, you'll get eight, you know, white in young women. Right. And so that's a that's a an artifact of how the system was built and how the system was trained. Right. And so I think it's an interesting question with the role of policymakers, since these systems are going to have huge impact, they're already starting to have huge impact. It's you know, they're the fastest adopted technology ever since November 2022, right? So something like over 100 million people have have tried the systems at least. Right. And so faster than smartphones, faster than any other technology they've been adopted. So when you have a technology that's going to be that pervasive, right, that influential, that impactful, how it's developed, right, and so how it's trained and then how it's deployed. You know, it is a very interesting question. What? What the regulatory implications of that are. And I would say it also is both going to vary by geography. And then the question is how should it or not vary by geography? Right. Like with most of this one other area I would just mention, I don't think we've touched upon yet is with autonomous vehicles. Again, there's conversations about the vehicles themselves, but there's highway technology, you know, infrastructure, network technology that for some of the systems has a huge impact. And so how that's in the realm of the public policy regulation. So so I think. Thinking about those systems, interoperability, how they're deployed, etc. makes a big deal. There are all kinds of discussions about ride hailing laws, for example. Right. And and contractors and labor laws that affect the the workforce and, you know, the work sphere. But that has direct impact on some of the conversations we're having around household labor in terms of who is performing this labor and how they're being treated and what benefits they're getting or not getting. And so all of the questions that I address and think about around workforce ecosystems have some level of implication also for all these conversations we're having about household labor. So those are just a few, and I'll pass it back to back for last. Any additions or anything I left off there?

BETH K. HUMBERD: Now I'll just make a very quick plug. We know I know that we only have a minute left, but I think we're going to see Liz and I are organizational scholars. We study companies, businesses, corporations. We all know that when we download an app on our phone and we agree and install, we've agreed to all these things that maybe we don't realize. Right? So I think the regulatory unfortunately and fortunately continuing to work directly with the corporations to understand what exactly these tools are capable of, what they're gathering and what the safeguards are is going to be important. And I say, unfortunately, Senator, that we've done a great job of that so far.

SANJAY PATNAIK: No, that that's that's very true I think. Alright, so this was really fantastic. I really enjoyed very much your thoughts, your insights, and I'm glad that you are working on these really important topics of Thank you, Ekaterina. Thank you Beth. Thank you Liz. Any anyone in the audience? We will have to we will have to video up afterwards so you can go back and view it again. And thank you very much again.