LIBERTY, TECHNOLOGY AND HOPE*

Dr. Ursula Franklin**

In reflecting on ideas of Liberty, Technology and Hope, I want to offer some thoughts to help us engage in an interesting civic conversation about our community. I am not certain that the title Liberty, Technology and Hope was a wise choice on my part, as it is much too broad a subject. What I want to look at, in even the most elementary way, is the notion of liberty and of the law as social instruction. I understand the term 'social instructions' to mean a set of concepts and practices that express people's wishes as to how they want and need to live together. Social instructions, as expressed in notions of Liberty and in legal provisions, intersect with other kinds of social instruction, such as technology - or the way we do things in the course of living together. I thought that it would be interesting to engage in this civic discussion as we attempt to look after the common good[1] of our community.

It is well to remember that none of us are free to do whatever we want or wish. This is not only due to our lack of liberty, but also because the very activity of doing things links us together in work and delineates what we can and cannot do in a certain place and at a given time. In adopting this viewpoint, I thought it would be useful to look at the two sets of social instructions and at the notion of hope. Not in the sense in which a strict Methodist, such as R. B. Bennett, would have said "Salvation is our hope," but rather the way in which Karl Polanyi in "The Great

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* This paper is based on the keynote address given by Dr. Ursula Franklin at the 22nd Memorial Viscount Bennett Lecture on February 17, 2000. This lecture series hosted by the Faculty of Law of the University of New Brunswick was established under the terms of the will of the late Rt. Hon. Viscount Bennett. Born in New Brunswick in 1870, Richard B. Bennett had a long and distinguished career as a lawyer, politician and statesman, and served as Prime Minister of Canada from 1930-35. He was created a Viscount in 1941 and died in England in 1947. In recognition of the life and career of Viscount Bennett the annual lecture series is designed to promote a greater appreciation of the role of law in modern society.

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[1] In her book *The Real World of Technology* Dr. Franklin defines the "common good" as indivisible benefits – justice and peace, clean air, sanitation, drinkable water, safe roads, and equal access to education - as opposed to divisible benefits – private and corporate profit. U. Franklin, *The Real World of Technology*, revised ed. (Toronto: Anansi, 1999) at 66, 117.

Transformation"[2] stated: "Hope is defined as the vision of perfectibility." Hope is the dream that one can work towards betterment, that things can get better and that they will get better for everyone.

Such hopes and dreams of perfectibility are a pretty tall order and difficult to visualize or actualize, but it is nonetheless important for us to try to envision ways of advancing our dreams of perfectability together. Before considering how these sets of instructions overlap, let me begin with some definitions. For instance, what does one mean by liberty and how do we picture the social impact of technologies?

If one had asked Bennett about what is meant by liberty, he could have spoken in a Methodist, British lawyerly way about what liberty meant to him. Similarly, he might have stated, in an equally Methodist and British way, what he meant by hope. But I think he would have been puzzled if one had asked him about technology. This, in spite of being a man who, in the words of F.R. Scott,[3] "hitched his wagon to the CPR" and derived wealth and power from the opening of the West that the railways brought about.[4] He would probably have replied, "Technology, you know, that's the sort of thing workers do for a living; they get dirty in doing it and they get rather nasty when they become unemployed."

In spite of his imaginably cavalier attitude towards technology, new technologies were the source of his personal wealth and power, while technological change was the cause of his New Brunswick upbringing. The formative imprint on Bennett's childhood was the change in transportation technology. His father was a sea captain and a wealthy builder of sailing ships, who was pushed out of his business by the steam engine. When the large seagoing steamers became common, boat builders and captains like Henry Bennett lost their livelihoods and their status.

Bennett Sr. started a fairly modest and unrewarding farming business in New Brunswick.[5] His son probably did not envision the family's fate as the human consequence of technological change. Yet such reflections could have altered the

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[2] K. Polyani, *The Great Transformation* (Boston: Beacon Press, 1957) at 84.

[3] F.R. Scott "Ode to a Politician" in *The Selected Poems of F.R. Scott* (Toronto: McClelland and Stewart, 1981) at 68.

[4] Bennett was a lawyer for the Canadian Pacific Railway. He made millions of dollars defending the CPR and other big corporations and investing his fees: G. Donaldson, *The Prime Ministers of Canada* (Doubleday: Toronto, 1997) at 132 and 135.

[5] *Ibid.* at 134.

path of his political career, including his defeat in the Depression. Bennett's fall from power was rooted in his inability to grasp the structuring effect of technology on the economic life in the world.

This reflection is not intended to diminish Bennett's record as an important Canadian statesman. However, Bennett was quite helpless in the face of the Depression. His problem was not unlike the helplessness vis-a-vis globalization that we find amongst today's political leaders, who may also not consider the social impacts of technological change as thoroughly as they should.

Turning to definitions of liberty, Ann Denin reminded us that, using John Stuart Mill's own words, the modern spirit of liberty is a love of individual independence.[6] A century after Mill, Sir Isaiah Berlin in his *Four Essays on Liberty*[7] introduced a negative liberty and a positive liberty. A negative liberty indicated the fact that one needs freedom "from" something. In fact, Berlin said freedom was the absence of oppression. He also turned the coin and spoke about positive liberty - the freedom "to."[8] He insisted that the freedom of an individual was located in his ability to be his own master. Berlin wrote in 1952, "I wish my life and my decisions to depend on myself and not on external forces of whatever kind.... I wish to be a subject, not an object."[9] Of course, for a worker in one of the call centres in this province or for a woman who is unwillingly pregnant with her fifth child, Sir Isaiah's views will appear hopelessly idealistic.

C. B. Macpherson, Canada's preeminent political theorist, picked up where Berlin left off, recasting that freedom "from" oppression. Macpherson, being much more attuned to the power of economic structures, viewed freedom in terms of immunity from the extractive powers of others, including those of the state. He rephrased Berlin's freedom "from" into a counter-extractive liberty.[10] He took Berlin's positive liberty, the freedom "to," as a developmental liberty - the freedom

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[6] E. Alexander, ed., *On Liberty: John Stuart Mill* (Broadview Press: New York, 1999) at 117. It is interesting to note the following comment by Mill on human nature and machinery which is prescient to Franklin's *The Real World of Technology*: Human nature is not a machine to be built after a model, and set to do exactly the work prescribed for it, but a tree, which requires to grow and develop itself on all sides, according to the tendency of the inward forces which make it a living thing (at 114).

[7] I. Berlin, *Four Essays on Liberty* (Oxford: London, 1969).

[8] *Ibid.* at 122-23.

[9] *Ibid.* at 131.

[10] C. B. Macpherson, *Democratic Theory: Essays in Retrieval* (Oxford: Clarendon Press, 1973).

to develop and use the person's full human capacities.[11] Yet he was equally aware of and eloquent about the impediments that stood in the way of realizing liberty for all, and the impediments that inhibited the use of a person's full human capacity. He classified the impediments into three groups.[12]

The first is rooted in the lack of adequate means of life. Life needs energy, both physical and psychological. Lack of food, shelter and community can be a primary and very serious impediment to the development and use of human potential. The second group pertains to the lack of access to the means of labour. If there is such a lack of access, with no way for an individual to obtain the means of life even if they are generally available, then the situation constitutes, in terms of society, a genuine impediment to liberty. The third group consists of items that relate to an individual's lack of protection against an invasion by others. Such invasions need not be territorial. They can be ideological or economic, social or police-directed. Whatever their form, the lack of protection from invasion is an impediment to the pursuit of liberty.

The foregoing essentially maps out the territory of liberty and constitutes what people consider when they worry about its pursuit. Interestingly, when one thinks about liberty it is assumed that there is a constituency or society. In the most simple terms, there have to be others. The concept of liberty only makes sense vis-à-vis others. It is pointless to sit on a desert island and pontificate about freedom of speech when there is no one to hear you.

The whole notion of liberty, of being free from oppression or being free to think and act according to one's own convictions, assumes the existence of society as a reference system. While laws and law enforcement may address the protection or promotion of liberty, their means are most likely based on regulating the conduct of citizens and institutions, in other words regulating society. There is little point talking about liberty when there is no viable society.

If one looks at law as a body of social instruction, one can make the case that its goal is the advancement of liberty. But again, the assumption is the existence of a society. The composition of the society may change, its politics may change but, in terms of a fixed reference point with respect to liberty, there has to be a society. Yet, in the modern technological world, the existence of society as a reference system

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[11] *Ibid.* at 53.

[12] *Ibid.* at 59-60.

should not be taken for granted.

It is well to remember that the law is not our only codex of social instruction. The other great source of social instruction is work. Not so much the outcome of work or the products of labour, but the process, the way we do things together. It is the complex set of activities and arrangements that we often consider under the rubric of 'technology'. It is helpful to define technology simply as practice, as the way of organizing work and people.[13]

There has always been technology. The problems of civilizations throughout the ages have often been very similar. How they were dealt with is what has been so different through time and culture. Whether you write on clay tablets or send somebody an e-mail, what is said is probably quite similar. It is how you say it, the way both the work and the task are structured, that has changed. Perhaps it wouldn't be a bad idea to go back to clay tablets for a while. People would become a lot more succinct, particularly if they had to write, bake and carry their communications. It would be amazing to find out how many things could be left unwritten.

It is important to reenforce that technology is practice. It is the way we do things. Certain technologies may involve devices, machinery or computers; nevertheless the focus should be practice. What matters is how we do and share the work and who instructs and who obeys. Such arrangements and the practices they imply are profound social instructions.[14]

In *The Real World of Technology*, I distinguish between two different forms of technological development, *holistic technologies* and *prescriptive technologies.*[15] The categories of holistic and prescriptive technologies involve distinctly different specializations and divisions of labour, and consequently they have very different social and political implications. Holistic technologies are normally associated with crafts. Artisans, be they potters, weavers, metal-makers, or cooks, control the

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[13] *Supra* note 1 at 2, 6.

[14] In discussing technology as a catalyst for the spread of control and management, Franklin states:

> The fact that citizens are more and more stringently controlled and managed is often considered as normal and fundamentally beyond questioning, as a necessary feature of technological societies. Technology has been the catalyst for dramatic changes in the locus of power.

Ibid. at 49.

[15] *Ibid.* at 10-12.

process of their work and make decisions from beginning to end. They draw on their own experience, each time applying it to a unique situation.

Holistic technology involves specialization by product. Prescriptive technologies, on the other hand, involve specialization by process. Here, the making or doing of something is broken down into clearly identifiable steps. Each step is carried out by a separate worker or group of workers, who need to be familiar only with the skills of performing that one step. In Europe, this type of division of labour took hold during the Industrial Revolution and underlies most modern technologies.

Take as an illustration the modern manufacture of a car. Its seats can be made in a certain plant, the body may be made somewhere else as would be the brakes, while all parts may be assembled elsewhere again. What happens in this example is significant on two levels; one is the tight prescriptiveness of the process, as all the separately manufactured parts have to fit together to make a functioning car. Training in such work nurtures what I call the "culture of compliance": an acceptance of the obligation to conform to detailed instructions because "things have to fit."[16]

Second, there is the fact that nobody sees the total project any more; thus there is the need for coordination and management. Managers emerge who can instruct the workers, whether or not they themselves have the technical skills to carry out the tasks. The Industrial Revolution gave rise to a massive body of new social instructions, which were quickly transferred from the factory to other workplaces. Prescriptive technologies transformed manufacturing, but also administration and governance, instruction and inquiry.

Many of these technologies utilized the new scientific insights of the time. It is well to remember that the first applications of new knowledge to the workplace were more often than not in what I have called "work-related technology." That is, technical changes that actually made it easier for workers to accomplish the task such as the digging shovel or the tractor.[17]

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[16] For a fuller discussion of the culture of compliance, see Franklin, *Ibid.* at 16, 17 and 19.

[17] Franklin states

> When work is organized as a sequence of separately executable steps, the control over the work moves to the organizer, the boss or manager. The process itself has to be prescribed with sufficient precision to make each step fit into the preceding and following steps. Only in that manner can the final product be satisfactory.

On the other hand, many of the later technologies are "control-related."[18] Their aim is not so much to make the work easier for the worker but to facilitate the control of the labour process itself. Most people know from their own experience the extent to which modern electronic technologies are control-related. One does not have to think only of monitors at work, or smart cards. The very replacement of workers by devices can be an essentially control-motivated development. It is not that the bank teller cannot hand you money as efficiently as the bank machine. However, the bank machine does not unionize, it does not need to go to the washroom and it does not need to sleep. While the machine is likely more expensive than employing a teller at a reasonably decent wage, the determining factor is control.

Control through technology is not a new consideration. Looking back at the writers of the Industrial Revolution, such as Charles Babbage,[19] it is clear that quite a few of them dreamt of a workerless factory, where nobody had to deal with unruly workers who might drink, or want a raise or better housing.[20]

Another important facet of the real world of technology is the role of planning. Planning as an activity involving "planners" and "plannees" originated within prescriptive technologies. As prescriptive technologies have taken over most of the activities in the real world of technology, planning has become society's major tool for structuring and restructuring, or stating what is do-able and what is not. A common denominator of technological planning has been the wish to adjust parameters so as to maximize efficiency and effectiveness. Underlying such plans

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Ibid. at 16.

[18] Franklin defines control-related technologies as those developments that do not primarily address the process of work with the aim of making it easier, but try to increase control over the operation.

> Now workers can be timed, assignments can be broken up, and the interaction between the operators can be monitored. Most modern technological changes involve control and thus new control-related applications have increased much faster than work-related ones.

Ibid. at 9-10.

[19] C. Babbage, *On the Economy of Machinery and Manufactures* (London: C. Knight, 1832). See Franklin, *ibid.* at 55.

[20] For a more detailed discussion of how the emergence of new social patterns in the seventeenth and eighteenth century led to the massive changes of the Industrial Revolution, see Franklin, *supra* note 1 at 55-58. At 59-60, Franklin further discusses commonalities between the present time and the period of the Industrial Revolution including both ages having irrationally high expectations of the beneficial effects of science and technology voiced by their respective proponents.

is a production model, with production typically planned to maximize gain. Holistic planning strategies, on the other hand, are usually designed to minimize disaster, rather than to maximize gain.[21]

Let me now move to a discussion of global structures. Not just individual manifestations of the culture of compliance, which everyone who lives in a technological society recognizes. As the question of liberty is before us, I would like to inquire into what happens when new technologies move into broader spheres.

To facilitate the discussion, consider a very simple model. Imagine the whole world as a plain, cylindrical cake, its wedge-shaped slices representing states, countries or regional entities.[22] There will be a slice called "Canada," and many of our institutions and social images can be visualized within such a model. You may think of yourself as raisin in the cake, or as one of the crumbs at the bottom or maybe as part of the icing on top.

Much of what is perceived as identity has been anchored in a slice, in a definable locality, including one's language. The notion of "foreign" languages is an interesting variation on the theme of identity as locality. Consider the phrase used often in Atlantic Canada, noting that somebody is "from away." In the cake model, the slice locates "us." It defines our representation - the Members from Kicking Horse Path or Bonavista-Twillingate are identified in terms of their location within the slice, as are our law courts and school boards.

Notions of social mobility, the image of a trickle-down effect, fit well into the cake model. It seems obvious that "our" slice is closer to its adjacent slices than to those on the opposite side of the cake. Such proximity matters when it comes to questions of contact and exchange. While many of our social activities, social instructions, customs and laws relate to actions and movements of people within the slice, there is, and has always been, a certain amount of overlap of activities and ideas with adjacent slices.

Going beyond local interaction, individuals have always traversed great distances, from the Apostles to Marco Polo. Some have come back to their own community bearing new ideas and stories. In terms of the cake model, such travel and exchange amounts to a horizontal slicing within the cake. Throughout history

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[21] *Ibid.* at 79-80.

[22] Franklin discusses the "cake model of the world," *Ibid.* at 158-164.

small horizontal cuts were made by individuals or small groups of people, often followed by more organized trade. Think, for instance, of the Silk Road, the important trade route along one of those limited horizontal cuts, started before Roman times.

Modern science has improved the ease of horizontal movements within the global cake, from aids to navigation and communication to land and air transport.[23] New technologies have pushed the boundaries of space and - using the cake model again - horizontal cutting becomes easier as time passes. Along such horizontal cuts, an increasingly rapid exchange of people, ideas, goods, and habits has taken place.

For a long time the national entities, states and empires, or the vertical slices, were defined and governed by boundaries, passports and tariffs. This was the model within which R. B. Bennett functioned. His solution to Canada's problems during the world-wide Depression was to increase Canada's ties to Britain. He wanted to strengthen the Imperial Slice and to protect it by instituting high tariff walls.[24] For him, it was the vertical slice that had to be protected by regulating and restricting the horizontal movement of people, ideas, goods and money.[25]

It is well to remember that in the past it was easier for people to move, notwithstanding the practical problems of getting from here to there. The movement of goods was strictly limited by physical constraints, and money was almost impossible to transfer because of the reluctance to accept someone else's coinage.

Today the situation is basically reversed. It has become almost impossible for individuals to move from slice to slice, except when their speedy return is assured, while it is easy and almost trivial for goods and money to move along the horizontal cuts.[26]

The protection of the vertical slice, pre-eminent for Bennett and his successors, began to crumble as the ease of horizontal movement increased, mainly through the increase in air traffic. Yet it was the electronic technologies, beginning with the telegraph, radio and telephone that produced a quantum leap in the importance of

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[23] *Ibid.* at 159.

[24] *Supra* note 4 at 136, 138.

[25] As expressed by Franklin in *The Real World of Technology*, *supra* note 1.

[26] For a discussion of the speed of monetary transactions and the resulting increase in global financial trading and profit making, see Franklin, *ibid.* at 162.

horizontal versus vertical activities. Electronic technologies have made it possible to send instructions without sending people.[27] You can trade at the stock exchange in Tokyo by telephone or computer link, without ever being there. The ease of conveying instructions has made possible transactions across horizontal slices that were previously unthinkable.

However, the same technological changes have substantially increased the problems of maintaining the integrity and cohesion of the vertical slices. National entities have become unable or unwilling to regulate the intrusion of horizontal activities into the patterns of life within the vertical slice. Yet it is in the vertical slice that law and governance, the bearers of social instruction, are embedded.[28] The increased ease of horizontal slicing occurs in parallel with a vastly increased fragmentation of work and production and is directly related to it, if not caused by it. Technological innovations that make it easier to achieve horizontal movements combined with modern production technologies and their prescriptive fragmentation lend themselves well to global capital mobility and the subcontracting of work.

Here is a brief and graphic example. Recently a friend of mine in Toronto went to buy a pair of winter boots. Checking where they were made, she found that the left boot came from Indonesia and the right one from South Korea. Though the shoes fitted well, she went to the sales person, only to find out that there was no mix-up of orders, but this was an intentional design. This incident illustrates the ultimate in prescriptive technology and its impact. My friend commented later that it was probably quite a clever way of subcontracting, since it undercuts the black market. You just cannot swamp a country with left boots. The problem is that while the horizontal pull weakens the vertical slices, as there is no shoe industry in Canada, it is the vertical slice where authority and all legitimate tools of intervention are located. Law and Liberty are embedded in the vertical, but the most crucial social and political activities are taking place along horizontal segments.

Where does this leave the members from Kicking Horse Path or Bonavista-Twillingate? What should they do, if they value the cohesion of their communities and feel that there is a precious identity in the vertical slice? The representatives of the vertical cannot give up on the constitutional obligation to authorize or legitimize activities that impact on their locale, on their constituency. Yet, the power to forge

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[27] *Ibid.* at 159.

[28] For a further discussion of how technological innovations have made it easier to achieve horizontal movements see Franklin, *ibid.* at 159.

new social instructions and new demands of compliance, has gone increasingly to horizontal activities. It is this change in authority and constituency that is at the core of present world problems.

In every country, the ruling apparatus has divided itself into "horizontalists" who are often from the upper part of the slice, and "verticalists" who may identify more with the crumbs at the bottom, and resent the "horizontalists" who divide their country in the name of commerce.

The ease of horizontal activities has developed in part because those who have the power to maintain the cohesion of the vertical slice have divested themselves of the very powers that could regulate the new activities. Here is the central problem of developing a contemporary approach to Liberty, Technology and Hope. On the one hand, there is a new body of social instruction – new technologies - which could address the pursuit of liberty in light of the impediments that Macpherson pointed out.[29] Clearly, liberty makes no sense for those who do not have enough to eat, thus lacking the means of life. While there is now a large body of new knowledge and with it fresh hope for human betterment, global developments have not removed the basic impediments to liberty for many people.

Furthermore, progress towards the pursuit of liberty depends on the presence of a viable society. Yet the same technologies that may give the tools to assure sustainable means of life may also disempower society, at times quite intentionally. None of these observations should be interpreted as technological determinism or a belief in the autonomy of technology *per se*.[30] I am not implying Margaret Thatcher's *TINA*, "There Is No Alternative."[31] There are alternatives, but such options must be discussed thoughtfully and knowledgeably.

Thus, the situation in which we find ourselves presents on the one hand, a clear desire among people to pursue liberty for themselves and others. Many make the case that horizontal cutting of the global cake can improve the chances of adequate

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[29] *Supra* note 10.

[30] *Supra* note 1 at 51.

[31] This refers to Margaret Thatcher's famous retort to critics of her free market economic strategy. When pressed about economic injustice, Thatcher was dismissive, arguing, "There is no alternative." This defense of the *status quo* was soon translated into the phrase "TINA," meaning "There Is No Alternative" to capitalism and that a globalized economy is inevitable; online: The Media Channel <http://www.mediachannel.org> (date accessed: 20 May 2002).

means of life, bringing food and shelter to all. Yet, it is becoming quite clear that the very reference system for liberty, or a viable society vigorously guarding against the erosion of liberties, has itself become endangered.

With fewer and fewer activities embedded in vertical slices, those who work horizontally must question the location of their society or community, as well as whom they are ultimately responsible to.

Discussing a more expanded version of the cake model during a talk in which I was quite critical of the use of electronic systems in the classroom,[32] someone asked me: "Don't you think there could be a community of like-minded people on the net?" Because I was just moving house, I responded by saying, "I can certainly see that one can make friends on the internet and collaborate with them, but they won't help me pack my books next week."It is easy to forget that there is a physical reality in community and society, but it is dangerous to do so. We all depend on the physical reality of our community for our well-being, much more than we often realize or admit.

The social instructions of technology intersect with law and tradition in the reality of our communities. To find a way in which these often contradictory instructions can be sorted and cobbled together so that liberty can advance is the hard task before us. Those who wrestle with issues of intellectual property, or with the effect of research being transmitted across institutional boundaries, will understand the enormity of this challenge. Hope, as the expectation of perfectibility of people and institutions, will help with this task, and so will clarity. It is important that we become clear as to what is going on around us, at least in a structural sense.

There are ways to resolve the current contradictions between the demands of liberty and the demands of modern technology. In fact, we should be discussing them with a great sense of urgency. Personally, I do not want to believe that vertical slices are acquirable, particularly not in Canada. All people have the right to be governed, and governed well, rather than to be administered for the benefit of somebody else. It would appear that at the moment Canadians are not governed but

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[32] For a discussion of Franklin's concerns with computer-based education, see Franklin, *supra* note 1 at 23, 169-70. She comments at 23, "If there ever was a growth process, if there ever was a holistic process, a process that cannot be divided into rigid predetermined steps, it is education."

administered.[33]

In terms of liberty, I firmly believe that there is no substitute for "good government" in the sense of peace, order and good government. There can be new options to make good government work well in a technological society. For instance, in response to C. B. Macpherson's first and second impediments, there may be a place now for a basic incomes policy[34] as a way out of the dilemma of vanishing employment in an efficiency-driven system.

There is significant practical and intellectual scope in striving for clarity in the face of assessing which endeavours should be entrusted to horizontal arrangements, as well as how to activate and strengthen the vertical sinews. If there is any real hope that modern standards of liberty, such as human rights for all, can co-exist with modern technology, then there has to be the option to assert the authority of community. In other words, it must be possible to reject social instructions that come at us horizontally by saying, "No thank you, we don't want it."

Now is a time to look at technology not as an instrument to maximize gain, but as an opportunity to minimize disaster. The disasters that I fear most are the threats to the sustainability of society. Minimizing such threats is hopefully one of the true aims of liberty.[35]

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[33] As expressed by Franklin in *The Real World of Technology*:

> ...(T)he major decisions that affect our lives, here and now in Canada, are not made by the House of Commons or as (sic) result of public deliberations by elected officials. I hold that, in fact, we have lost the *institution* of government in terms of responsibility and accountability to the people. We now have nothing but a bunch of managers, who run the country to make it safe for technology.

Ibid. at 121.

[34] See S. Leaner, *Basic Income: A Primer* (Toronto: Between the Lines, 1999); Franklin, *supra* note 1 at 177.

[35] In *The Real World of Technology*, Franklin states that there are few practical difficulties to planning to minimize disaster and that such approaches are possible in today's real world of technology. She cites as two examples the inquiry led by Thomas Berger into the building of the Mackenzie Valley pipeline and the 1977 study of the Science Council of Canada, entitled *Canada as a Conserver Society*; *supra* note 1 at 80-81.