RAND EPRM SPECIAL SERIES

System Design for Complex Problems

April 27th and 28th, 2017
Part two of a special three-part seminar series on systems analysis and design
Hosted by the Center for Applied Network Analysis and System Science

Walter McClure, PhD

Chairman, Center for Policy Design
guest speaker

•1. Large System Architecture: *Toward a more systematic discipline for policy design and analysis of large social systems*

Friday, April 27, 2017, 12–1pm (PT) / 3-4pm (ET)
Santa Monica – m1474 (Pardee Rice Classroom) [HOST location] | m1250 (overflow)
Washington – w7401 | Pittsburgh – p4202 | Boston- b9037
Conference Line: (800) 747-5150, Access Code: 6904767#
Adobe Connect: http://webmeeting.rand.org/networkanalysis

2. Does the American Economy Need Redesign: *An example of LSA analysis*

Saturday, April 28, 2017, 12–1pm (PT**)**
Santa Monica – m1474 (Pardee Rice Classroom) | m1250 (overflow)

Large System Architecture:

Toward a more systematic discipline for policy design and analysis of large social systems

Walter McClure, chair, Center for Policy Design
presented at RAND Corp. System Analysis Methods Seminar Series, 27 Apr. 2017

Summary: Dr. McClure will outline a general theory and systematic methodology, Large System Architecture (LSA), for analyzing, designing and politically implementing policy to improve the performance of large social systems such as e.g. education, health care, the economy, etc. The product of LSA methods are "system redesign" policy strategies to align the structure and incentives of a large system with society's goals for that system. He applies LSA methods to two example systems, the health care system and the economic system, to demonstrate LSA's power to generate novel promising policy strategies largely missed by our current amalgam of policy analytic tools. Dr. McClure will pose LSA as possibly foundational to forming a discipline of policy analysis and action adequate to address increasingly complex large-scale challenges and opportunities.

Speaker: Walter McClure received a BA in philosophy and physics from Yale in 1959 and a PhD in theoretical physics from Florida State in 1967. In 1969 he switched from physics to health care reform policy. He worked at InterStudy under Paul Ellwood's leadership from 1969 to 1981, at which time he left to start the Center for Policy Studies (now the Center for Policy Design). At InterStudy he worked with colleagues on the HMO strategy for health care reform, among other tasks drafting much of the Federal legislation. At the Center he developed Large System Architecture, which is a general theory of why organizations do what they do, and a set of methods to strategically redirect their behavior toward the goals society desires of them. With these methods he and his colleagues at the Center developed a health care system reform strategy to get better care for less, and developed a National Health Insurance proposal consonant with this strategy. The Center's education leadership also developed leading public school system redesign strategies including a set of reforms known as public school choice, and most notably the process for creating chartered public schools.

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Hello to all of you here in San Diego and to our phone audience in Washington, Boston, Pittsburgh ... from coast to coast and all the ships at sea. I'm very delighted and honored to be with all of you. I have admired RAND seemingly forever, starting with Herman Kahn on thermonuclear war. And I've worked with and learned from some of your distinguished alumni like Alain Enthoven and Joe Newhouse. And so it's just very nice to be here and share ideas with you.

I hope to learn as much as I share. But full disclosure, I am here on a mission. I am a few months shy of 80 years old, and I have a half a lifetime of work, most of it unpublished for reasons I'll explain shortly, which I would like to share with you. Because what possibly better audience could I have for this stuff, the smartest folks in the field, powerful and connected. If you buy this stuff it might see the light of day and be put to work. So I was pretty excited last night thinking of today. Your media folks might title this video “Sleepless in Santa Monica”.

So I come to your door like a raggedy itinerant peddler with my carpet bag full of shiny wares to show you, and hope that you will see the promise in this stuff. I know none of you have read the handouts because you are very busy people, and what I hope is to show you so much promise and possibility that you will be too busy not to read them when I'm finished.

Okay, so let's see what is the first thing I've got in my carpet bag? Ladies and gentlemen step right up, I have this handy dandy universal health care and coverage proposal. It's called *Informed Consumer Choice*. What with the hot debate over replacing Obamacare, what could be more timely? Except it dates from 1985 and was called “Buy Right” back then. From the moment I backed out of theoretical physics to do something I thought might be more useful for the country – we had enough natural science and we needed a lot more social engineering – and found myself unexpectedly in health care, all I wanted to do is figure out how can we have national health insurance with high quality care and coverage that won’t eat us out of house and home.

I think I have an answer, and it's different than anything out there in the conventional health policy conversation. And so I hope you'll take a look at it. And if you like it, it needs some detail engineering, and most of all it needs a bill. And my outfit, the Center for Policy Design, doesn't presently have the budget or manpower to do that. So if you like what you see, please pile on. We’ll need all the help we can get.

Second in my bag of tricks, I have a public education reform strategy. It's called *Public School Choice*. You may have heard of it, it was developed by my brilliant colleague Ted Kolderie, and it introduced to the nation the concept of chartered public schools – public schools chartered by the State to compete with district public schools, so that by parents exercising choice, good public schools, chartered or district, could draw students away from poor public schools, chartered or district, which could then be closed. This strategy too needs some refining, and particularly needs marketing. You probably have heard of charter schools...that's all off our boiler plate from the Center. That's where it came from.

I'll speak a little bit more about it in a moment, but the point I make now is that every special interest that can claw its way into a statehouse has twisted this strategy into its own hobby-horse, and in many states it has very little to do with what we recommended. Charter schools are public schools – not private, not profit, not religious, not for breaking teacher unions, not for resegregating schools – they are public schools chartered by the state Instead of districts. And after we have talked about the theory of policy design we use at the Center, I'll tell you why we came up with this particular education reform strategy.

Third, I have for you a start on a strategy to redesign the economy, which, given the stakes, is the most important thing I'm doing. One of the pleasures of nominal retirement is I don’t have to confine my work to health care anymore, and can apply the Center’s theory and methods to other large systems. But if my analysis of the economy is correct, if we do not redesign this flawed economy, we're going to lose the Republic. I'm very serious. Read the handout, and we will spend tomorrow's lecture on it ... I mean it's too important to rely on just my own analysis. I desperately need peer review on this, so check me out. Also this is the first time I've public circulated anything or spoken on economic redesign, so this is an exclusive for you here.

I do not expect to even complete the design before I sink gracefully into senescence, and certainly not the implementation. But maybe I can get the diagnosis delineated clearly enough that we can see our way through to a new design and its implementation. So, graduate students, beyond the diagnosis that's your homework assignment for the next ten to fifty years. People say, "what, you think you can redesign the economy?" Why not? Adam Smith did. I'm just sitting at the feet of the master. As you can see, we make no small plans at the Center for Policy Design.

Finally, fourth, and the most important thing we'll talk about today is I want to share with you a very general formal theory and set of methods for analyzing, designing and implementing policy strategies to improve the performance of large systems – large systems like health care, like education¸ like the criminal justice system, like the finance industry¸ like the economy, and on and on. I call it Large System Architecture (LSA for short). It's a very general theory; I'm quite delighted with it. I understand that RAND is very aggressively looking for the next generation of policy analysis tools to deal with complex issues. And I'm thinking that this might be part of what you're looking for.

Everything I have pulled from my carpet bag today, and what makes each of them different than everything else you find in the conventional policy conversation on these issues, springs from this theory and methods. It is the best way we have found to think about policy strategy for large systems; we use it constantly at the Center and hope others may find it equally fruitful and improve on it.

Spoiler alert: I know there are a lot of card-carrying economists in the audience. And so I need to warn you that every non-economist I have shared this theory and methods with has found it a kind of revelation, an epiphany that makes them see the world differently and more clearly. But every economist I've shown it to finds it a big yawn ... nothing new here, we already know all this, we're already doing this. So one of the more important things in our discussion while I'm here is that you can persuade me that LSA is merely old wine in new bottles, and maybe not very new bottles at that, or I can persuade you that maybe LSA *is* new wine, not only new wine but very good wine. And you can help me make it better.

The only place I have written up this theory is the unpublished paper I've given you in the handouts. Unless you've been there, the paper has much more content than a casual reading may suggest. The subject really demands a book. But I don't think I'll live long enough to write that book, I got a lot of other stuff on my plate too.

I think people only grasp the full power of LSA by seeing how it's developed and applied in real cases. I'll try to touch on a bit of that today, but I can only do enough to whet your appetite. Let me give you a quick example of how LSA jumps the track of conventional thinking. Two weeks ago the Opinion Section in the New York Sunday Times had an article by a very nice education professor lambasting Education Secretary Betsy De Vos for dismissing public schools as being too slow and difficult to reform and recommending more nimble schools like charters and vouchers and so on.

The professor's rebuttal consisted of describing this extraordinary school district in Tulsa, Union School District, which is doing everything you want a school district to do. It's in a high minority, low income neighborhood, and its schools and students are performing well above the national average on any metric you care to measure with, and on a per-student budget well below. It was a very informative article. Union sounds like the Finns: they put the kid first and the curriculum second. They've turned their schools into community centers, all-day hangouts essentially, they're even helping the parents get jobs. And every kid is known to somebody on the staff...their personal home situation, their progress in school, and so on. What more could you want from a public school district?

The good professor cites a few other exemplars in a few other states around the country. But he doesn't think to ask if I walk next door why aren't they doing the same thing in the next district? Why isn't all of Tulsa doing at least as good or better than this district which has been doing this for 20 years? The professor titled his article “What An Ordinary Public School Can Do”. Perhaps a more apt title might be “What An Ordinary Public School Can Do, But Most Don't.”

The same thing is true of Secretary De Vos. She says, well we've got to get these better, more nimble schools like charters, religious schools, and so on. Well maybe they can be more nimble. But there's no guarantee they will be. You have to hunt just as far to find one of these fantastic charters and religious schools as you do for one of these fantastic district schools. Both the professor and the Secretary see the problem as poor schools and the solution as better schools.

And that's where LSA thinking is so different. When you use the lens of LSA and see a large system like public education, or health care or whatever, where most of the organizations seem to be sub-performing on important goals, you don't ask what's the matter with the organizations. You ask what's the matter with the system.

Okay, because usually in large systems with problem performance, people don't ask this, they ask what's wrong with the organizations. What isn't obvious to most people is that organizations operate in a larger system, which I call a *macrosystem*, a large system that serves a definable purpose for society and consists of all the strongly interacting organizations and people necessary to accomplish that purpose.

When most people say health system or education system or criminal justice system, they aren't thinking like systems engineers. It's just the plural word they use for all doctors or all criminal justice institutions or all educators. They don't see the system in the technical sense, “system” is just a vernacular plural term they use for all organizations and people in the system. But when you start thinking about these large systems as formal systems in the systems engineering sense, you suddenly realize what a large formidable system they are.

Every large system has all these very formal and informal rules of strong interaction that the organizations must obey. And most importantly, these systems place incentives on the organizations within them: if they follow the incentives they prosper, if they don't they suffer or even go out of business.

And that's the heart of Large System Architecture. It's a very obvious idea in retrospect. It's apparently a rather unobvious idea in prospect: it certainly took me some years to get there, and not many other policy designers seem to think this way yet.

My poster boy for ideas obvious in retrospect but not in prospect, is the arch. How many years did people build in stone before the arch was discovered? Maybe 3000? Once you see one its obvious. But until you see one, it’s not obvious at all. The Egyptians built in stone for thousands of years and never found it. The Greeks never found it. The Mesoamericans and Incans never found it. The Romans finally saw it, and if you aren't an inheritor of the Romans, you still don't have the arch. This whole idea of macro-systems likewise seems to be unobvious to people. And somehow I fell into it by the way I got educated realizing the HMO strategy for health care system reform, of which I was one of the assistant architects, had failed. I now realize I was using LSA intuitively for several years to come up with a new strategy for health care reform ... the Informed Consumer Choice strategy I mentioned earlier. But once I finally saw how to formalize it explicitly, oh joy, it had nothing to do with health care per se, it applies generally to a broad class of macrosystems.

So the LSA idea is this: when you see some macrosystem where most of the organizations are not performing well on important objectives, don't start trying to treat the organizations or their bad performance directly. Look underneath at the structure of the macrosystem itself and the incentives it places on the organizations. It is this structure and its incentives that reward and drive the observed performance of the organizations. And almost always when most organizations are thriving by performing badly, the bad performance is due a deeper underlying cause: a flawed macrosystem structure and incentives enabling and rewarding the undesired performance. Think of the bad performance as symptoms and the unsound system structure and incentives as the diagnosis. And if you wish to cure the symptoms, you’ve got to address the diagnosis. Unless you cure the diagnosis, the symptoms will keep coming back no matter what you do. So policy must aim at correcting the unsound structure and incentives in those systems where most organizations are chronically performing poorly.

When you have a good system where most organizations are performing as society wishes, you will find that the underlying macrosystem structure and incentives are sound: they enable and reward the organizations for the desired performance. I mean we have some wonderful macrosystems. Look at the car industry, look at the computer industry. You can't make better cars and computers *that consumers want* for the money than they're doing today. It's extraordinary. (Of course many complain that cars should among other things use less fossil fuel. But with current technology such cars cost more and perform less well, and without incentives Americans don't want them and they don't sell. In Europe high gas taxes give strong incentive for people to buy such cars and drive less, and these taxes can be used to maintain infrastructure.) Of course economists say we know all about that. Markets and all that. Adam Smith and his unseen hand, blah blah blah. Now look at macrosystems that aren't doing so good. Do people say Adam Smith and the "invisible hand". Not so much.

Take the health care system, for 50 years steadily eating up more and more extraordinary amounts of GNP and nothing stops it. And every time there's a statistical fluctuation where it doesn't go up quite as much as last year, there is much self-congratulation that some tinkering policy has contained cost. For example, there was a brief claim that the Affordable Health Care Act was containing cost. No it hasn't. And before that DRGs, a hospital payment reform was claimed to be containing cost. No it hasn't. The incentives haven't been changed. Cost will just keep marching up until we change those incentives. But do people blame the incentives? No, they say greedy doctors, for-profit insurers, unhealthy consumer lifestyles.

Okay, how about the finance industry? It crashes the economy, twice now and getting worse. How about education? It seems like our schools cannot educate a substantial number of our children adequately let alone well. And it's been happening for 50 years. So what's wrong? The finance industry is the result of 30 years of bad decisions eroding sound structure and incentives, very bad policy design ignoring unsound incentives. And education and health care we've been working on for 50 years and not curing the problems. Why? Because policies are aimed at symptom curing, not going after the diagnosis. They've consistently ignored correcting the unsound structure and incentives of these systems.

When I say the diagnosis is unsound structure and incentives, by unsound I mean they're not aligned with the goals that society wants for that system. And until we change that, nothing will change. It's just like medical care: when you symptom-cure, the symptoms keep coming back. Until you can figure out the diagnosis and address that, that's when you finally cure the illness.

Now the cure for an unsound system is system redesign: designing and implementing a new, sound structure with sound incentives for the system which enable and reward the performance society desires. Tinkering policies trying improve symptoms are easy but usually have little lasting effect. System redesign policy is very hard. But the logic says that's the cure. And so if you're politically unwilling to undertake it, prepare for another 50 years of seeing your GNP eaten up by medical care, and more collapses in your economy as this finance industry goes off on its next tear. So it's very obvious in retrospect now, what policy has to do to correct these malperforming macrosystems. LSA theory tells us that. We need to convey that to policymakers.

Just a couple other insight points. Notice what people ascribe the bad behavior of poorly performing systems to. It's not the system. On the left, they blame the people or organizations in the system. They say the health care system's problems are due the greedy doctors and the for-profit insurance companies. In education it's, oh, those teachers are incompetent or lazy and we need to select and train them better, or oh, it's those teacher unions and so on. And left-oriented policies aim at government commanding the people and organizations to perform properly...make them straighten up and fly right. On the other side, you have the right saying, oh it's all that government interference that's making the problems. Right-oriented policies aim to get government out. They assume the system is fine, and it will work fine if they can just get the left to stop all this government meddling. They fail to recognize the system is unsound, and that only proper policy can make it sound. For example, they assume private markets are self-correcting, even though Adam Smith taught us they were not. Markets behave well only if government assures they have sound structure and incentives. The moment government doesn't do its job of keeping the structure and incentives of markets sound, they quickly become unsound, as Smith observed, and serve the interests of producers instead of the public.

So the right kind of government interference, maintain sound structure and incentives, is indispensable. The wrong kind of government interference is what the left wants to do: which is the moment that they see an industry performing poorly, they want the government to step in and use strong regulation to order the industry to perform as society desires. This is termed 'command and control' regulation. Well, we've known ever since Charles Schulz that that such command regulation never works nearly as well as its advocates hope or assume. And look at the reason: in a badly performing system the incentives reward the bad behavior and punish the desired behavior. So command regulation is trying to order organizations to behave in ways that the system punishes. And if organizations fight or evade the regulation successfully they prosper, and if they don't. they lose money or even go out of business. So they fight and evade, and there starts an endless cycle where government tries to strengthen its controls and micromanage, and organizations up their resistance and evasion, and you just add increasing red-tape, rigidity and expense without curing the problem behavior.

For example, government wants providers to be efficient, that means get good health results but earn less on each patient. Well, if every provider did that, 20-30% of them would be out of business, and the most efficient would be the first to go. They don't get any more patients; indeed patients don't know who they are, nor have any way to find out, nor have any incentive to switch to them if they did. So providers simply resist, tokenize and evade command regulation ordering them to be efficient. So such command regulation is trying to spit into the wind and it doesn't work. And so they lay on more command rules and more red tape. And now you're into exactly the kind of interference that conservatives rightly worry about, you stultify the system with red tape.

The current euphemism for government command and control in health care is 'single payer'. Well we've had a single payer system for 50 years. It's called Medicare, and it's the most inflationary program in the system (not that the unsound private market has done much better if at all). It's got an absolute lock on the senior market, which is 50 percent of medical care cost . What have they been doing with all this authority? ... trying to order a system against its incentives instead of trying to change those incentives.

And here's the conservatives and their policy is: get the government out. Read their proposals. Now health care is a terribly unsound market and violates all the structural conditions that economists have set up for sound markets. And you would hope we have learned from Adam Smith that unsound markets don't self-correct; the government has to correct them. That's why we have an FTC. Except it's made up of too many lawyers and they think they can sue their way to a sound market; markets have other structural problems than monopoly, and you can’t fix them by suing, you have to legislate and enforce the necessary structural conditions. So by getting government out instead of legislating and enforcing the required market conditions, you leave the health care system in the same unsound cost-escalating mess it’s been for 50 years. Now that's a poster-boy example of what happens when policy designers and policymakers don't realize that the diagnosis is the unsound system not the individual organizations and people.

I mean does anybody think that the car industry works, that the computer industry works, because of the virtue of auto executives? There's just as many greedy and profit-seeking people in those industries as any other. Okay? And yet those industries work well. So the point is, that in any large system of people you have just as many saints and sinners, just as many dunces and geniuses, just as many in health care as in the computer industry or the car industry or education, and in one system it all works well. And in another it doesn’t. Why?

Because of the incentives. If the structure and incentives are aligned with the society's goals, then the right people do the right things for the right reasons and they prosper, and the wrong people do the right things for the wrong reason – it's the only way to prosper. But no matter their motives, right or wrong, they all do the right things or they're out of business. And that's why system redesign is the cure for chronically malperforming large systems.

The alternative to system redesign in these malperforming macrosystems is what we've been doing in policy for 50 years: symptom-curing, which the estimable Louis Butler satirically labeled ‘omnibus tinkering’. So LSA tells us policy design for large systems comes down to omnibus tinkering versus system redesign.

Okay, so if all this is so wonderful – and I'll lay out the postulates and the methods of LSA in a moment – if it’s all so wonderful, why isn't it published? And the answer is that in 1986 I ran into a little problem called major depression, and my wife, whose father had it, recognized it and wouldn't leave me and saved my life. And after some soap opera I was carried off against my will in a squad car to a psych ward, where three weeks of electroshock brought me back to sanity for a while.

Unfortunately it didn't hold very long. But for the six months to a year that it did, this theory got done. I mean I was brimming with optimism and energy and creativity. Maybe the electroshock is responsible but I don't recommend it. Ask me about it sometime.

At any rate so my life was saved by our medical profession, and not just from depression. I have had two major heart attacks, and in the second, my heart stopped on the table and I was brought back from death's door by very skilled dedicated people. Further, my oldest son was brought back from death's door in Hawaii. He had been wading in a stream, cut his toe and by next morning was virtually unconscious with this raging lethal tropical infection. We rushed him to the Kaiser Hospital in Hilo who saved his life. And my youngest son was born with an open palate, and with the help of some extraordinary surgery and speech therapy is now good as new; you'd never know. So I owe our health care system a lot. And so by addressing its problems, I'm trying to repay the favor, though the patient...that is, our health care system...isn't necessarily happy about it.

Well, how did I get going again? I started coming out of this 15-20 years later, in 2004 when they finally found an antidepressant that would work. It was many months before I realized it was working, because remission is just as insidious as onset. I mean I had nothing to be depressed about except that I had it ... just the wrong genes and a lot of stress, which is well-known to provoke it.

To underline the point about stress, I can tell you, trying to run a little nonprofit think tank with the incentives in health care and in the grantmaking community stacked against you is stressful. You've got to have ideas, you've got to sell the ideas to people who can act on them, you've got to manage a little organization, you've got to kiss a lot of well-meaning butts for money from people who don't understand what you are doing and want immediate results. I believe we need some system redesign in the nation's voluntary grantmaking system, but I won't take that out of my carpet bag today, maybe in tomorrow's seminar, because I'm sure RAND has the same problems.

I stayed away from any professional work for five years. Particularly my wife was on me, no pressure she said or you'll go right back into the pit again. So I became a champion fritterer for five years. In retrospect I realize I've been a moderate depressive all my life, and suddenly I found myself waking up happy. This must be the way normal people feel; I was amazed.

So how did I get back (maybe say relapse back) into professional work. Well, Tim McDonald, your fellow graduate student, showed up. He was an intern in the Center working on education for my colleague Ted Kolderie, and had started staffing our board meetings. I scarcely knew him from Adam. I didn't do any work then, I just chaired board meetings and signed checks, and hired a marvelous guy, Dan Loritz, a retired senior vice president of Hamline University to be our CEO, just trying to make it easier for the people doing the actual work. I told Dan the privilege of being the Center's CEO is now you get to raise your own money if you want any. Neither of us has stopped working really, because we love what we do, we just don't bother getting paid. If you love it, that's part of the stress: you can never do enough. And now I no longer try.

So Tim comes up to me after one of these board meetings and says, what is this theory you keep talking about in board meetings, where can I read up on it? And I said, well I never wrote it down. He says, well how I can learn it. I say, let's have lunch. So after a couple of lunches Dan tells me he is reassigning Tim to me. He needs some broad-ening, Dan says; he knows education very well, and has written a book on it. Now you teach him large system architecture and health care so he learns about more than one system.

So Tim and I had lunch every week for two years. And I immediately put him to work because 80 percent of your job as a large system architect is implementation – design is only 20 percent -- and you learn implementation by doing it with a mentor. And if you're not teaching implementation here at Pardee, you better. Because very few academic policy schools are teaching policy analysis students how to implement. You don't learn implementation skills doing research, you learn them doing implementation.

I certainly didn't find the key idea of large system architecture myself, which is incen-tives. The importance of incentives I learned from my previous boss, Paul Ellwood. I found myself working, quite by happenstance, in health care policy research for Paul after I backed out of physics. It seemed to me the dullest of subjects. I can assure you nobody wants a used physicist, and Paul was the first guy who took a chance on me. So that's how I wound up in health care in 1969, not by aiming for it but because nobody else would take me. As it turns out, it has been far more fascinating than I ever expected, the perfect field for a hard-nosed theory guy, and LSA has been the climax.

Paul was the head of a a very distinguished rehab hospital, the Sister Kennedy hospital in Minneapolis, and he had this high paid, well-respected job, but had started this health care policy research office on the side. The reason, he said, was the faster we get a kid through rehab the less money we make; that's a terrible incentive to be inefficient that we've got to somehow turn around. And what did he do: working with his little research group, he ginned up something we called the HMO strategy. The research literature showed that in prepaid group practice, the faster and cheaper you get patients back to health, the more the prepaid group practice earns. So Paul asks how can we stimulate these prepaid comprehensive care organization throughout the nation. So we started working on that. Now, I didn't learn a thing from Ellwood about research. He doesn't think like a researcher and has no training in research, he's a brilliant intuitive. What I really learned, and what's hard to get in academia, is how to find ideas, how to have ideas, and how to boldly put ideas into action.

There would be no Center for Policy Design if I had not seen Paul Ellwood walk away from his high-level job as hospital CEO, walk right off the plank, to turn our small policy research group into an independent little think tank called InterStudy. That is real risk-taking. And real dedication, to the larger and insecure mission of health care reform rather than the security, remuneration and prestige of running a conventional health care institution. And that's the kind of thing I'm watching and learning from Paul. Are you graduate students in policy getting that training here at RAND? It’s invaluable.

The HMO strategy attracted some extraordinary talent, like Alain Enthoven and Clark Havighurst. And so there we were, a doctor, a lawyer, an economist, and a theoretical physicist. We didn't have an Indian chief but that might have helped too. And the strategy caught the attention of Lewis Butler who was then Assistant Secretary for Planning and Evaluation of HEW, charged with policy development in general and coming up with a remedy for soaring Medicare costs in particular. Any of you who know Lew know what a sensational guy he is...a great mind and bulldog determination for the public interest. You don't hear about him because he doesn’t demand credit for the many things he has made happen. And suddenly our little group is working for Lew, and I found myself in 1970 designing and drafting the HMO amendments for Medicare and later the HMO Assistance Act.

I thought I had thrown away, you know, five years of graduate education when I got out of physics. But in fact what I learned to do that most people don't, is: when you have a problem you've got to find a theory or you don't know what to fix. So I was riding on Paul Ellwood’s theory that if you could stimulate HMOs to compete with fee-for-service, it would reverse the cost-raising incentives in the health care system. But by 1980 it was clear to me HMOs were going nowhere and having no impact: health care costs were marching right up. The HMO strategy was failing.

That's okay. I’m a theoretical physicist by training. I did a two-year stint in rocket science (really not as a real rocket scientist myself but as an assistant to them), and rocket scientists know that the first rocket on the pad blows up. (For comparison, if you're a large system architect working on designing a government, think Articles of Confederation.) And while the press goes into hysteria that American science is failing, the rocket scientists go back to work. The engineers expect it to blow up... you can’t make a million parts work perfectly together the first time... so they go all over it, find out what failed, blow up a few more rockets along the way, and then we go to the moon. Same way in LSA. You can hope but not expect your first system redesign strategy to work. Then you go back to the drawing board and try again.

Okay, so now I've come up with this new handy dandy strategy, *Informed Consumer Choice*, that I think might take us to the moon ... a health care system redesign that might work, get everybody high-quality care and coverage at a cost the individual and the nation can afford. And I have a way of staging it so we don't load the whole United States on the rocketship and fire it off untried, okay. It's always a good thing in implementation to try to stage your implementation, and make your course corrections before you scale up, so you aren't experimenting with the whole country. Like every other strategy I’ve mentioned in my carpet bag today, it is a product of LSA theory and methods.

So, like Tim asked, what is this theory I keep mentioning. Before I get to the formal postulates and theorems, let me do some more insight building and talk a moment about the fact that we know sound markets work not because of private or for-profit competitors, nor because of unseen fairies with invisible hands. Neither do other sound large systems that aren't markets. They all work, market and non-market alike, because there's a formal structure, a set of structural rules that create the right incentives.

Adam Smith's invisible hand isn't invisible at all; you can make it quite visible just by analyzing the structure and incentives of your system. And if they're aligned with the goals society desires of that system, we call it a sound system and you're in good shape. You can tell policymakers to protect that structure, you don't want that structure changed accidentally or intentionally. Every special interest will be trying to twist it to serve their own ends rather than the public good. Conversely, if the incentives are not aligned with goals, we call it an unsound system, and you've got to redesign its structure to produce the desired, properly aligned incentives.

But economists say what we know all about sound and unsound markets. But we are way beyond just markets, we are talking about a discipline for political economy that I believe larger than economics: Adam Smith's "science of the statesman" to design large systems that perform in the public interest as society desires. Let me give you some examples.

The federal government is not a market. Yet it is one of the most extraordinary large system architectural designs in history, with ingenious structure and incentives to prevent government from tyrannizing the majority, and the majority from tyrannizing the minority, and to produce laws responsive to the will of the governed. And you can credit the architects: our founding fathers.

Or take market economies. A market economy is not a market, it is an economic system. Only half of it is markets, the private sector. The other half is the public sector. And what most people don't seem to grasp is that at least half, and from the standpoint of the public wellbeing the most important half, of the wealth produced in a market economy (including the American economy) is produced by that public sector. In America you might not know that, due the perpetual deafening false propaganda that the public sector is a parasite. But if you have any doubts, read the handout piece on Adam Smith. The market economy is one of the finest examples of large system architecture in history. You can credit the architect, the extraordinary Mr. Smith, for that.

And so I am not the first large system architect in history, my stumbling efforts are dwarfed by these giants. I'm just the first one to think of himself that way, because I stumbled into a way to think about macrosystems generally. Like me working on health care, these guys were working on a specific system, on a design for a government or for an economy, and didn't think about the generality of it. Nor did I until much later, when I finally was able to formalize LSA theory. So I'm not the first or the best large system architect, I'm just the first to realize, hey there's a theory here that can help us all when we're engaged in trying to do this kind of large system redesign.

My last example is the basic research system. It's a particularly telling example because it's a fine piece of large system architecture and it doesn't use financial incentives much at all. It uses cultural incentives. Scientists aren't working to get rich, even though many certainly deserve it from the standpoint of the wealth they create. It sometimes happens...think Craig Venter as one example. But most of us are in there for serving the public interest and our curiosity and all that, but very much also for stature ... show we're smarter than that other guy over there, make the bigger contribution. We're all trying to outsmart each other and we advance the field doing that. And in many ways the grantmaking process is working well: research money generally if hardly perfectly flows to the people who contribute most (as I mentioned earlier, we'll talk about the imperfectly part tomorrow), and dries up for people who don't contribute enough and they leave the field and do something else.

America leads the world in science and technology because we publically invested more in basic research than anybody else. But when we turned things like Bell Labs, and RAND, over to client money, that's the end of long term thinking and research. Clients don't want long term thinking. They want a solution; this little immediate problem of theirs right now. You can't do long-term analysis and research on client money. How are you going to do a long term thinking and research whose results and success you can't predict often for years, unless you have long-term core support?

Alright, enough about LSA as a discipline for political economy. Let's get to the actual formal theory. This theory is the mountain top of my career. Remember I'd been using this theory intuitively for years but specific to health care. And being a well-schooled hard science theoretician I've been trying to formalize it all this time. And the dog just wouldn't sit down. And then here I am six months out of electroshock. The first month I didn't even know what I did for a living or where. They had to lead me to our offices and give me my papers to read. I didn't remember or recognize it was my writing for a month (I must confess during that time I was very impressed by the author, say I humbly). Gradually it came back to me and I gained more energy and understanding. And suddenly the dog sits down. I see the basic postulates and am amazed: it has nothing specific to do with health care, it covers many macrosystems.

I'm ecstatic, you realize. I'm a theoretician, a real theoretician ... I have discovered a theory. So my cup ran over.

Here's the postulates and, like the sublime Charles Darwin and very much in debt to his example, they are qualitative, not quantitative. I'll take lust a moment to chide those economists who keep chasing the siren song of physics with its quantitative predictions, and have been narrowing their field out of applicability to the real world. I am the last guy to disparage trying to be quantitative, but you mustn't sacrifice reality to do it. Realize that the greatest book in science history, *On The Origin Of Species*, didn't have a single formula. And the greatest policy analyst of the last century, Jean Monnet, father of the Common Market, never produced a formula. We could hardly do better than if we could teach our policy students to think as deeply as Monnet.

The formal theory comes in three easy postulates:

Postulate 1. All organizations operate in a larger system, called the macrosystem, whose structure and incentives they cannot alter by their own efforts alone.

Postulate 2. The structure of a macrosystem places various enabling and restrictive constraints as well as creates various incentives of varying strength on the organizations within it, some sufficient to cripple or kill the organizations that try to oppose them, and others that will lead them to prosper the more they adapt to follow those incentives.

Postulate 3. (and the one that gives us hope): While no organization by its own efforts can change a macrosystem, organizations or society can do that by collective action.

And if society isn't doing it by intelligent policy, remember every trade association is a large group of organizations using collective action to try to change their macrosystem in their favor. That's what they are all doing. So okay, Congress, forewarned is fore-armed. Except sometimes it seems this Congress is trying to help them.

So that's it, that's the theory. See what I mean: dog just sat down, and not a word about health care. Applies far more broadly. Very obvious in retrospect, took a while to see it in prospect. And you can derive a lot of theorems from it useful for analysis and redesign of a problem system; you can find examples and applications in the handout piece on LSA.

The theory is not universal. The postulates are true by inspection, and for any large system that violates the postulates to some degree, to that degree the theory will not be valid; it will produce incorrect predictions for such systems. For example, any macrosystem with an organization that can alter that macrosystem by its own actions alone violates the first postulate, and LSA does not apply. However, it appears that quite a broad class of macrosystems do satisfy the LSA postulates rather well, and for all these LSA will be valid. And even when a problem macrosystem violates the postulates, you can sometimes come up with a redesign for the system that satisfies them and installs sound incentives.

Now I said at the outset that LSA is not only a theory but a set of methods for applying them to analysis, design and implementation of system redesign policy strategies. So here come the methods. They divide into two kinds, those for analysis and design, and those for implementation. I'll start with the analysis and design methods, and touch on implementation methods if I have time. But you can read an outline of them all in the handout on LSA.

The analysis and design methods are based on a very profound idea. It's not mine, I read it in a book in 1970 and it's stuck with me ever since. It was a wonderful book on the methods that were used by NASA for the moonshot. I wish I could remember the title, but it seems to have permanently left me, but I've been using many of those methods ever since. NASA did not invent new engineering technology, indeed the genius administrator, James Webb, ordered a freeze and declared they would go with existing scientific and engineering technology. Webb saw their biggest problem as to bring it all together, the most massive domestic project in human history. To accomplish that, what NASA really invented, pioneered, was a whole new management technology: PERT charts, Delta estimation, etc. – which I have found very useful. And one of the most useful things I learned was the definition of a problem.

Think about the following crisp definition and compare it with the usual muddling way we usually think about what constitutes a problem. A problem is crisply defined in systems engineering as a discrepancy between performance and goals. And what makes that so profound for macrosystems is: until you've properly identified your goals, you don't know what your problems are! You see all these people talking about policy problems, and the list soon grows voluminous and incomprehensible. They haven't thought about what the goals are, nor agreed on goals, and usually there are folks in various parts of the system who have their own idea of the goals, very different than the public interest.

So you as a large system architect, it's your job to figure out proper goals for the system, indeed it's the first task on the list. If you don't know the goals, you don't know the problems. You can't proceed sensibly. You can't assess whether the system's performance is discrepant or not, nor can you diagnose why any discrepant performance arises if you don't know what it is. So the first task is to arrive at proper goals.

Let me list the three steps of how LSA analyzes a large system, then make a few comment on each:

1. Identify a complete set of goals for the system.
2. Assess the actual performance of the system on each of the goals.
3. Analyze the underlying system structure and incentives which drive the observed performance.

Once this analysis is complete, you know the actual problems of the system, all performance unacceptably discrepant from goals. You also know the faulty structure and incentives that drive this unacceptable performance. That is what will have to be altered and corrected by any proposed redesign for the system. Conversely, if the system is performing well on all goals, it also tells you the structure and incentives are sound, i.e., aligned with goals, and policy should protect this sound structure to assure the good performance is maintained, and not allow it to erode either by intention or inattention. Policy must maintain constant proper oversight of all large systems to protect and maintain structure and incentives that are sound, and redesign and correct them when unsound.

It may appear that these analytical tasks should be carried out in logical sequence, but I assure you in practice this is not so. They are constantly iterated, going back and forth, and slowly gaining insight and refining the results of each step. And it may take months to years, especially when you add in the fourth step: coming up with a sound redesign. The analysis does not tell you how to redesign the system to produce good performance; like all design, that is a matter of talent and experience. The analysis does tell you what the desired performance goals are, and what underlying unsound structure and incentives must be altered, but you will have to invent the new sound structure with sound incentives yourself that will reward the desired performance.

I could talk a ton on each of those steps, but given our limited time let me make a couple key comments on each. The first step is goal setting. You must ask yourself:

What are a reasonably complete and proper set of goals for this system?

a. what performance goals does the public want for this system, but also
b. what goals should the public want if they are not to unknowingly undermine their general welfare.

I will begin with a very crucial point about goals. Then I'll give you a couple examples how bad it is when you don't get them complete or right. But bottom line, your first task as an architect is to help the public clarify what the goals of the system should be to improve the system's performance in the public interest and wellbeing.

Perhaps the most crucial point on goal setting is this: you as LSA architect have no power to decide the goals, you only have the power to propose. It's just like a house architect. He doesn't decide, the client decides. Similarly, if you're a large system architect, then those with the legitimate authority to decide ... your "clients" so to speak ... are the relevant elected and appointed officials. They are the ones who should and do decide. Now, you can help them by clarifying goals and clarifying what the problems are and clarifying what the structure and incentives are that need to be changed. You can then recommend what you think the goals should be, and tell them, that if they agree, you also have this handy dandy redesign strategy for them which you think will achieve these goals. And they can accept or reject your proposed goals and, independently, accept or reject your proposed redesign strategy, and/or send you back to the drawing board on any part of either. And that's why marketing is so important. You have to persuade them.

Now special interests in any large system hire marketing and propaganda geniuses often to misinform the public and distort proposals to their own advantage rather than the public interest, so LSA architects must develop the same skill if they wish to counter them successfully. I call this the rhetoric battle. Al Franken, our Democratic Senator from Minnesota made a crack about the Democrats poor skill at marketing: the Republican bumper sticker just says "no", our bumper sticker says "blah blah blah, to be continued on next bumper sticker". So LSA architects, like Democrats, have to become much better at marketing if we want to see our proposals accepted and implemented intact by both Republicans and Democrats.

All right let's talk about some examples of poor goal specification. The first is an example of the damage done by an incomplete set of goals. Medicare and Obamacare considered only the goals of (1.) high quality coverage and (2.) affordability to the individual. Neglected were the goals of (3.) quality of care and (4.) affordability to the nation. There was no mechanism to assess quality of care, nor was there a single incentive on either patient or provider for economy. In fact the incentives were the opposite, rewarding cost independent of quality ... i.e., rewarding provision of ever more, and more expensive, medical services even if they had little or negative impact on health. As a consequence, “medical error” is now the third leading cause of death, and a bloated health care system is eating the nation out of house and home, depriving of funding all other social programs that would have substantially greater impact on improving the nation’s wellbeing, including its health, than more superfluous medical services.

Now because goals interact in any complicated system, it is usually difficult to tack on a major new goal after the fact. The entire system must usually be redesigned to accommodate any such new goals. For example, if you wish to double the payload of a rocket, you can’t just double the size of the rocket, it has to be redesigned; the same is true of macrosystems. Thus in 50 years Medicare has not been able to tack on either quality or cost control in any more than token fashion. The beneficiaries are happy with these programs because they get medical services freely and affordably, a veritable free lunch, and do not see their ever-ballooning true cost: namely, the damage it is doing the federal budget, lagging health levels, and other needed social programs much more valuable to health and wellbeing. It will likely prove politically difficult to redesign these programs because the free lunch must be replaced with an affordable but properly incented lunch, and voters do not like losing a free lunch. But it must be done if we are to end this disaster. It is this kind of damage that prompts LSA to start with a complete set of all the important goals for any given system.

My second example of bad goal specification concerns the consequences of misidentifying the proper goals. I’ll use the economy as my example macrosystem, so we’ll get a jump on tomorrow where I have promised to do an illustrative LSA analysis using the economy as my example. Okay, what are the goals for the economy? Now if you talk to the economists and the bankers who are managing our economy, they have a bunch of goals, and a bunch of tools ... fiscal and monetary policy ... to manipulate the economy to achieve those goals.

The goals include such performance objectives as: is GNP growing adequately; is inflation suitably low and under control; is unemployment suitably low and under control; are markets, particularly financial markets, suitably sound?

Okay, so if you ignore the era before the great crash of 2008, where it is clear the economy, particularly our financial markets, was grossly mismanaged, and you look at the era since the crash, then measuring against those goals our economic managers appear to be doing a slow but creditable job. That's a notable achievement, good if not great. So everything would seem hunky-dory except for one thing: I contend those aren't the real goals... maybe for some other country, but not the proper goals for the economy of the United States of America.

Here's this complicated macrosystem to create and distribute wealth. What does society want, or what should society ...American society... want, of the economy. Well, the United States has a very clear statement of goals, and these goals are what fundamentally make us a great nation. I believe it the noblest, tersest, and most moral expression of national goals in history. It's called the Preamble to the Constitution of the United States (although we must not overlook the goals at the beginning of the Declaration of Independence, too). And the two goals in the Preamble of relevance here are (1) to promote the general welfare and (2) to secure the blessings of liberty to ourselves and our posterity.

So now how are we doing on these, the real goals? When we measure our economic performance against those goals it is a totally different story. When you measure against the general welfare, we're not doing well at all. By virtually any measure used, it has been almost flat for several decades. And when you measure general liberty, by any number of qualitative measures it appears to be actually gradually declining. And if you then do your LSA analysis of the structure and incentives in our present economy, you find the structure and incentives are perverse, highly destructive of the general welfare and liberty without any natural or built-in check. If this flawed economy is not redesigned, the Republic is headed for disaster. I will elaborate on all this tomorrow, and you can also read about it in the handout tonight if you are as concerned as me and can't stand the suspense.

Okay, remember I have no power to decide, only to propose. So who besides me thinks these are the goals. Apparently very few managers of the economy. Apparently few think that the general welfare is a goal. They pay some attention to it, but apparently they don't think it a major priority, let alone *the* priority: one of the two Constitutionally-obligate priorities for the economy (and all other aspects of American life) to which all other non-Constitutional economic goals are subordinate. Had our economic managers treated raising the general welfare as the overriding Constitutionally-obligate economic priority that it is, we wouldn't have the current president.

How about the general liberty? I don't know a single manager of our economy concerned about managing the economy for liberty, do you? They all appear to think ...not my job. Well if we don't think about liberty and redesign this economy, we're going to lose it.

Now notice, you don't have to agree with me on these goals. I am a LSA architect, all we architects can do is propose, not decide. I have to persuade you these are the proper goals that we should worry about with our economy. And if they are, we desperately need to redesign it. If you disagree, if our elected officials disagree, I lose. Except unless you can show me where my analysis in tomorrow's seminar, or more fully in the hand-out, is wrong, I think America loses...disastrously. Which means I've got a marketing job on my hand. And I never give up.

Thanks. Oh and thanks for the Pardee ball cap. I did wear a coat and tie just as proof of age. But now to show you how hip I am [...puts on gift Pardee ball cap with brim backwards.] ■

RAND EPRM SPECIAL SERIES

System Design for Complex Problems

April 27th and 28th, 2017

Part two of a special three-part seminar series on systems analysis and design

Hosted by the Center for Applied Network Analysis and System Science

Walter McClure, PhD

Chairman, Center for Policy Design

guest speaker

1. Large System Architecture: ***Toward a more systematic discipline for policy design and analysis of large social systems***

Friday, April 27, 2017, 12–1pm (PT) / 3-4pm (ET)

Santa Monica – m1474 (Pardee Rice Classroom) [HOST location] | m1250 (overflow)

Washington – w7401 | Pittsburgh – p4202 | Boston- b9037

Conference Line: (800) 747-5150, Access Code: 6904767#

Adobe Connect: http://webmeeting.rand.org/networkanalysis

● **2. Does the American Economy Need Redesign:** ***An example of LSA analysis***

Saturday, April 28, 2017, 12–1pm (PT)

Santa Monica – m1474 (Pardee Rice Classroom) | m1250 (overflow)

Does The American Economic System Need Redesign?

an example of standard LSA analysis applied to the economy

Walter McClure, chair, Center for Policy Design
presented at Rand Corp., System Analysis Methods Seminar Series, 28 Apr. 2017

Summary: Dr. McClure will present an analysis of the economy using standard Large System Architecture theory and methods. He will (1) identify the goals of the economy, (2) assess its performance against these goals, and (3) explore the structure and incentives of the economy driving the observed performance. He finds the structure and incentives of the present system severely flawed, enabling and highly rewarding runaway concentration of ever more of the nation's income-producing assets in ever fewer hands, unappointed and unelected, with neither built-in nor natural constraint. He explores redesign considerations for such constraint. Is this analysis correct? We can debate any particular level of inequality; but steady unlimited runaway inequality, if true and if left unchecked, is not debatable. It will finally destroy liberty and reduce the Republic to a small self-perpetuating de facto aristocracy and despotism.

Speaker: Walter McClure received a BA in philosophy and physics from Yale in 1959 and a PhD in theoretical physics from Florida State in 1967. In 1969 he switched from physics to health care reform policy. He worked at InterStudy under Paul Ellwood's leadership from 1969 to 1981, at which time he left to start the Center for Policy Studies (now the Center for Policy Design). At InterStudy he worked with colleagues on the HMO strategy for health care reform, among other tasks drafting much of the Federal legislation. At the Center he developed Large System Architecture, which is a general theory of why organizations do what they do, and a set of methods to strategically redirect their behavior toward the goals society desires of them. With these methods he and his colleagues at the Center developed a health care system reform strategy to get better care for less, and developed a National Health Insurance proposal consonant with this strategy. The Center's education leadership also developed leading public school system redesign strategies including a set of reforms known as public school choice, and most notably the process for creating chartered public schools.

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I think of my two talks here as a kind of one-two punch...yesterday about a general theory and methods which I call Large System Architecture (LSA for short) for how to think about designing policy for a broad class of large systems; and today an example application of that theory and methods to one particular system, namely the economy, the economic system.

For those who weren't present yesterday, most of the work of society is done by "macrosystems" – large systems of organizations and people, like health care and public education and the economy and so on, that interact strongly to accomplish a definable purpose for society. So they are intensive objects of policy. People don't think of them as systems technically; it's just a popular plural term for everybody in the system. We will design much better policy to improve their performance if we start looking at and treating them as systems technically.

When they perform poorly on one or more important goals, policy habitually tries to improve the bad performance by improving the organizations ... cajoling, or assisting, or ordering the organizations to perform better. I call this omnibus tinkering. Our policy success using tinkering on large systems that have been chronically performing poorly on important goals for decades – systems like health care with its runaway cost, or public education with its inability to educate a substantial proportion of our children adequately let alone well – has been modest at best.

With LSA when you see a large system where most of the organizations are performing poorly, you don't ask what's wrong with the organizations, you ask what's wrong with the system. You regard the bad performance of the organizations as symptoms. The diagnosis, the underlying cause of the malperformance, lies in the structure and incentives of the larger macrosystem in which they operate. So ask does the structure of that macrosystem and the incentives it places on the organizations within it enable and reward them for the desired performance, or does it impede and punish the desired performance while enabling and rewarding them for the malperformance that is observed? Invariably in chronically poorly performing systems it is the latter. The organizations are malperforming exactly as the unsound structure and incentives of the larger system reward them, and if they do not, if they try to perform in ways opposed to those incentives, the incentives punish and ultimately kill them if they persist.

The only cure is system redesign. You must "re-architect" the faulty system: intentionally think up a new design for its structure and incentives that aligns them with the performance society desires, and then come up with a policy strategy to implement the redesign. Policy can do omnibus tinkering on the bad performance forever, but until you address the diagnosis ... the faulty structure and incentives of the system that drive the malperformance ... the symptoms will only continue and likely worsen.

In any large system there are very powerful incentives. If they are aligned with the goals that society wants, then everybody in the system is striving to accomplish what society wants. Look at the car industry. You can't make better cars for the money than the world does today. Policy doesn't have to order carmakers to do that. In that system, if you can't make a better car for the money, you're out of business.

But look at the education system. Despite shining exceptions, all too many schools and school districts are persistently doing an inadequate job educating the kids for whom they are responsible. Thinking the LSA way, don't ask what's the matter with the schools, ask what's the matter with the school system. What are the incentives on schools and districts. If kids aren't learning, who loses their job, who goes out of business? Nobody. Good schools don't grow and poor schools don't fail. Look at the health care system. The more inefficient you are – the more costly you treat each patient independent of the quality of the result – the more you prosper. The more efficient you are - getting great health outcomes at less and less cost per patient – the less you earn. Indeed if all providers were as efficient as we know how to be today, inventing nothing new – got top quality at the least cost for each patient – 20% or more of them would be out of business, the system is that bloated. And the most efficient would be the first to go.

So that's been going on for 50 years, and will continue for another 50 if policy doesn't wake up and learn to address faulty system structure and incentives. But policy doesn't think that way yet. The left tries to cajole, assist or order the badly performing organizations into submission, blithely overlooking the underlying incentives that will kill the organizations if they comply. So of course they evade and tokenize compliance. The right says get the government out, let the market work, blithely overlooking that the market is unsound and rewarding exactly the observed malperformance that neither they nor anybody else wants, failing to realize that, as Adam Smith taught us, unsound markets don't self-correct, and it is precisely up to government to correct and keep them sound if we want the desired good performance.

System redesign is a lot more formidable than omnibus tinkering ... longer and harder to come up with a promising redesign model, longer and harder to implement ... but look at the logic. It's the only way out, the only way to finally cure the bad performance. Look for example at all the decades and time-consuming policy effort and expense we have wasted on health care reform and education reform -- two of our most important and expensive systems that we know have extremely faulty structure and incentives -- with such meager results because we tinkered rather than redesigned for sound structure and incentives. We can waste another fifty years to equal effect – see health care eat up another hefty chunk of GNP with no improvement in health, see education leave another couple of generations of kids inadequately prepared, or we can re-architect these systems properly.

So how do we go about redesigning a macrosystem so that it's structure and incentives align with the performance goals society desires. LSA provides a set of systematic methods for that. And our topic for today is to offer an example demonstrating how to apply those methods.

We have two different sets of methods. One set is design and analysis methods which help us design a proposed model for the future system with structure and incentives properly aligned with goals. The second set is implementation methods. How can you implement the proposed redesign, how do you get from here to there, from the present system to the redesigned system. Assisting policymakers with implementation is an equally important part of being a large system architect (that's what I call policy analysts who apply LSA to large systems). Indeed it is the largest part of the work: only 20% of the work is analysis and design, at least 80% of LSA work is implementation...how do you make it happen.

Because we have but an hour I shall limit my example application solely to analysis and design methods. But first a word from our sponsors ... really a word of thanks to our enablers. One was Alex who arranged all the video of yesterday's talk, which I'm titling "Sleepless in Santa Monica". Another was "Tess" Cooper, who took care of me like she was my mother. And of course Tim McDonald who organized this series of talks. So I would just like to acknowledge that if you enjoyed these presentations, it took all these folks too and more to make it happen.

Also I had a nice dinner with a few of the graduate students last night, and we talked about one of the items I didn't pull out of my itinerant peddler's pack yesterday... that our nation is relapsing into a legislated state religion. States are legislating doctrines of a minority group of very good and sincere conservative Christians, with which the majority of Americans – including the majority of our Christians, equally devout – disagree. Our forefathers, many of whom fled here for freedom from state-imposed faiths, set up our courts and legislatures to protect us from any such state-imposed religious doctrines, and our courts and legislators are doing a poor job and need to step up. These are good people on all sides of these religious issues, all trying to do their best for God and country. Our Constitution says you have an absolute right to advocate and proselytize for your religious beliefs, which I absolutely respect and support, *but* you are equally absolutely banned from legislating them, and I absolutely support that too. Discussing this issue with the students gave me useful ideas that I didn't have before our dinner. So I thank the students for our enlightening discussion.

Now before turning to the economy, I want to begin with an illustrative digression. I'd like to talk about redesign of the grant-making system in this nation, another item I left in my peddler's carpet bag yesterday. (My bag is quite full of system redesign things.) This will provide a brief example of LSA implementation methods discussed in the Architecting Large Systems paper in your handouts. Let's talk about implementing a reformed grant-making system. Step 1 of our implementation methodology is to have your proposed redesign model in hand. You have to know where you are trying to get to. Not all roads lead to Rome, but if you don't know you're trying to get to Rome, any road will do.

Okay what's the matter with grantmaking. RAND knows this quite as well as we at my organization, the Center for Policy Design. There is something terribly wrong with a system where the nation's most competent researchers and thinkers spend 40% of their time writing proposals, usually to far less expert people, instead of engaged in research and thought. This is especially true for those in long-term basic research and thought of uncertain outcome, but on which ultimately, as experience has amply and steadily proven, the wellbeing of all our society, public and private, depends. The performance problem is that this is precisely the area where funding support is unwisely shrinking. Short-changing basic research and policy analysis is like smoking, it takes awhile before you realize it is killing you. And our policymakers and grantmakers seem to be suffering that myopia.

Grantmaking is a way of supporting the production of certain kinds of public goods. By public goods I mean those we must buy collectively as opposed to private goods which we buy individually. Over half the wealth of this country is created by producers of public goods, mainly government, which is supported by taxes. But we also have a voluntary sector of largely non-profit public goods producers, and these are supported by gifts, grants and contracts. Consider there are three kinds of public goods. There are (1) public consumption goods, outright charity where we take money contributed by haves and give it to needy or suffering have-nots. But there is also public investment goods, where we gift money from haves to causes that we expect that, along with promoting the general welfare, will eventually return far more to the economy than the original gift. Much of this is (2) specifically targeted investment giving, such as rehab programs for addicts and training programs for the structural poor...human capital development...that will bring them into the work force and paying taxes and reduce welfare and criminal justice costs well beyond the cost of these programs. But the third type is (3) broadly targeted investment gifting for long-term basic research and policy analysis in some specified field, whose outcome we cannot predict, but which, competently directed to competent performers, has proven over and over again the greatest source of public wealth creation in history. And this terribly critical area is where funding is short-sightedly declining.

To illustrate the consequences of this performance problem in the grantmaking system, consider the demise of one of the most prolific and extraordinary of these basic research programs, Bell Labs. Almost the entire private sector still runs on the public goods created by Bell Labs during its decades of productivity. When AT&T went for-profit, it spun off Bell Labs and set it adrift to survive on for-profit client revenue, whereupon it promptly went bankrupt. Instead of government or some foundation collaborative picking up this extraordinary national asset, and putting it on a firm basis of long-term core grant support, we stupidly, shortsightedly, profoundly unwisely for American technical leadership in the world -- so much of it owed Bell Labs -- let it disintegrate. Can we, government and foundations, not see this loss and learn from it.

You cannot do productive long-term basic research and thinking on client money. Clients are not interested in the long-term public interest, they are interested in short-term solutions to their immediate problems. Large System Architecture would never have come about on client contract money. Who would have asked for it? How could we even know we would come up with such a general theory and methodology? I believe if it achieves widespread use it will produce enormous wealth ...for society, not the Center. If our health care proposal, *Informed Consumer Choice*, is ever implemented and saves the nation the billions of dollars I believe it will, not one dime will come back to the Center. That is the nature of voluntary public goods. It requires core support.

The Center cannot do its mission of system redesign on client money. Nor can we use a one-year grant of $1 million dollars. What we can use is a ten-year grant of $100,000 a year. That's what I mean by core support. On that we can hire and train staff and not worry that we will lose them, and our substantial investment in them, at the end of the year when the money runs out. On that we can accept just those project contracts related to implementing our mission and proposals, and spin up our core grants by double. We can refuse any contracts not related to our mission and proposed strategies, contracts we would be forced to accept to cover staff had we no core grants and had to figure out who to charge when we go to the john. On client money solely, you are off-mission immediately.

So we need a grantmaking system that recognizes the need: that long-term basic research and thought needs long-term core support grants to productive individuals and organizations, that this deserves a high priority among all the other worthy things they are supporting. The redesign model I propose is they need to stop betting on proposals and start betting on people and organizations with a productive track record. They should not wait for a proposal, but go to these organizations and say what are your plans and how can we help. They should then have them do progress reports, not proposals when they need to alter direction, and as long as progress seems productive, maintain core support.

Now the first step of LSA implementation methods is to have in hand the redesign you are proposing for the given macrosystem. And that is why I just outlined it. And now you have to make it happen. So the second step in LSA implementation is to identify the front log, the action that would start the system moving in the right direction, meaning in the direction of the proposed redesign. If you work on back logs, the log jam doesn't move, but if you identify the front log, the jam will move and shift. I think the front log is core-support grantmaking. I think Michael Rich's idea, to try to use the Pardee school for long-term policy thinking amazingly brilliant. But it's a stop-gap, a brilliant stopgap, and it's limited to organizations with a graduate school. It doesn't change the grant-making system.

Step three of LSA implementation is to identify who has the power and the motive to move that front log. Well, both government and foundations have that power, but at the moment government is led by those who, ignorant of Edmund Burke's wisdom, confuse economy with parsimony, and present a poor target. The big voluntary foundations on the other hand have the power, and have the motive if they can be wakened to it. So step four, the architect wanting to implement the redesign must go market the idea to them, devising persuasive arguments about the benefits of moving the log and the detriments of not doing so, using every forum and vehicle to reach them.

Now I cannot think of a person with greater stature for such a mission than your admirable CEO, Michael Rich. And with Rand's ability to round up further individuals of similar stature (probably could do it just with your distinguished board and alumni, but I'm sure many others of equal eminence would join you), you could go to foundations to make this case: long-term core support for organizations with a track record, betting on the track record not the proposal, and assessing results by progress reports.

So have any of you talked to Michael about this idea? Everyone in the field of long-term research and policy design would be grateful, and the nation would be the beneficiary, though they would not know it anymore than about Bell Labs. I have not met Mr. Rich but I suspect many of you know him. Or you can at least get the word to him, or you can send this tape to him. I shall leave that as an assignment to the audience.

OK. Now I want to turn to the economy. It's a very big macrosystem and I want to show how we apply standard LSA methods of analysis by using it as an example. Yesterday we got a start on it. I gather many of you weren't there, so let's reprise a bit.

LSA analyzes macrosystems in three highly iterative steps: (1) identify the goals that society desires of the system; (2) identify the system's problems by assessing the discrepancy between performance and goals, and finally (3) identify the underlying macrosystem structure and incentives driving the system's performance and determine whether they are aligned or anti-aligned with the goals. LSA theory predicts that when most organizations in a system are chronically malperforming on important goals, it is because the system structure and incentives are anti-aligned with the desired goals, and are perversely enabling and rewarding the organizations for the observed malperformance. It predicts that until policies redesign the faulty structure and incentives to align them with goals, the malperformance will persist despite superficial, ameliorative policies.

LSA adamantly starts with goals, because we define a macrosystem problem as a discrepancy between performance and goals. So you do not know what your problems are until you have properly identified the goals society wants for the system.

So let us start with step one, what are the goals of the economy. The function of the economy is to create and distribute wealth, but that is the function, not the goals for that function. If you listen to the economists and bankers who manage the economy, they list standard disciplinary goals from macroeconomics. Oh, we've got to have GDP growing adequately. We've got to have inflation down and under control. We've got to have unemployment down and under control, we've got to have sound markets, we've got to have adequate balance of trade, and so on.

On that score, comparing performance against goals since the Great Crash of 2008, we look rather good if not great. The Great Crash was a total performance failure of our economic managers, who failed to keep the finance markets sound. They've done a notable job since then, at least on those stated goals, managing the economy's recovery.

But I argue those aren't the real goals that society wants at all, or should want. As a large system architect your job is to figure out what society wants or what it should want.

I also remind you a large system architect has no power to decide the goals, only to propose. Decisions are made by policymakers with the legitimate authority of the electorate, not system architects. Just as with a house architect, it is the client who decides, the architect can only propose. But it is an important function of architects, both house architects and large system architects, to help clients clarify their goals and show them what is possible and its advantages.

And we in this country have the advantage of having explicitly written goals that we're supposed to achieve as a nation. The goals are written down – I still marvel every time I think of them – in the opening words of our Declaration of Independence and the Preamble of our Constitution. All men are endowed by their Creator with certain inalienable rights. All. And we have steadily broadened that to include all mankind regardless of gender, race, ethnicity, religion and economic circumstance. It took a civil war and great political strife to accomplish that broadening in the law in principle, and in practice it notably remains a work in progress. I do not fault the noble gentlemen, our founding fathers, for failing to recognize the more than half the population who were women and slaves; they were so far ahead of their time with just the phrase all men. It remains for every generation to finish that task: all mankind.

The two goals that specifically apply to the economy are those last mentioned in the Preamble: (1) To promote the General Welfare and (2) secure the Blessings of Liberty. Not just for ourselves but also for our posterity. These are, I contend, the principal goals for the economy – indeed for all aspects of American life – that our society would and should desire if it were well informed.

Because LSA defines a performance problem as a discrepancy between performance and proper goals, you actually do not know your real problems until you have first specified those goals properly. And if you mis-specify the goals, you will then mis-specify your performance problems, and mis-direct your policy strategies.

The macroeconomics goals that our economic managers are using, I contend, are the wrong goals. They are instrumental goals subservient to the correct principal goals above, and may only be used to the extent that they advance the principal goals, and must yield otherwise.

Measured against the first of these principal goals, promoting the general welfare, the economy is doing poorly. By most measures the general welfare has been stagnant for some decades and took a disastrous hit during the Great Crash.

On the other measure, securing the general liberty, if my analysis of the flawed structure and incentives of the economy, which I shall shortly present, is correct – and this is far too important an analysis to be left to my judgment alone, I need all the peer review help I can get – the nation is on a disastrous course, which if not corrected by redesign, and soon, will lead to the destruction of liberty and descent into despotism by a de facto hereditary privileged few. I am deadly serious, so I will want your attention and critique of this analysis.

I know very few managers of the economy who think promoting the general welfare is a priority, let alone *the* priority. Most unthinkingly assume that by promoting their macro-economic goals they are promoting the general welfare, but the moment they seriously measure, it is clear they are mistaken. Had promoting the general welfare been the true priority, the current President would not be President.

I know no economic managers who think protecting and promoting the general liberty is part of their job. And that is why I believe us headed for disaster of the magnitude I shall try to spell out.

By any number of measures, a lot of hardworking Americans, those below the median income, are working harder than ever, yet still falling behind, losing homes and adequately paying jobs ... this whole class of people that the Democrats forgot and the Republicans never really cared about except to convince them it was the Democrats fault. Where is the American dream they were promised, that if you worked hard, you would get ahead. These people wanted answers. And here came a maverick, brilliant con man who could spot a huge crowd of victims that both parties were too blind to see, who told them he had the answer: it's those immigrants, those Mexicans and Muslims sneaking into our country bringing drugs, crime and terrorism and taking our jobs, and we'll build a wall and bar the new ones and throw the illegal ones out and torture the terrorists and that will make America great. Well, we've seen that talk before in history; all demagogues use the same formulas.

And how is the nation performing on promoting the general liberty? And here is an important warning about assessing performance. On many goals, including liberty, performance is hard to measure quantitatively. One must use performance measures that actually reflect the performance you are trying to assess. I quote the sociologist Cameron's warning: not everything that counts can be counted, and not everything that can be counted counts. So use quantitative measures wherever you can, but only if they meaningfully reflect the performance you are trying to assess; if they don't, don't use them just because you can measure them. Rather, use qualitative measures when you must if they meaningfully reflect the performance you are trying to assess. The *Incumbency* paper in the handouts spends considerable time on performance measures for the general welfare and liberty.

One illustrative little quantitative proxy for liberty is social mobility. It used to be America was the land of opportunity. Europe was a caste system where you could seldom climb above the status and income of your parents, America was the land of Horatio Alger where the poor lad could rise to success and the log cabin child could become President. But now, if you measure, many European countries have greater social mobility than the United States. In America the less talented children of the rich are more likely to go to prestigious universities and land high paying jobs than the talented children of the poor. Neither Europeans nor Americans are very aware of this reversal of affairs, but it means shrinkage of the general liberty in America. We are not the land of opportunity we once were. This is only one little proxy and of course adequate assessment demands many more, but they all paint the same picture, decline in the general liberty of the many, particularly the poor, and increase in the individual liberty of the privileged.

After identifying goals, and comparing performance against goals, we now turn to the third step, a structure and incentive analysis of the American economy. We investigate, does our economy structurally enable and reward economic activity that promotes the identified goals: the general welfare and liberty for ourselves and our posterity? And I'm going to start by telling you my conclusion, which is so appalling I fear I have a credibility problem.

I find the structure and incentives incredibly stacked against the general welfare and liberty. They reward just the opposite. Indeed, our problem is not inequality. We can constructively argue about the proper level of inequality to maximize the general welfare and liberty. Indeed, I have developed a theorem to prove that you need a certain amount of inequality in order to maximize the general welfare and liberty. Too little is bad. Too much is bad. There's a sweet spot. And that's where you want to keep your economy. So *our problem is not inequality*. We can rationally discuss what that level of inequality is and what it ought to be. *Our problem is runaway inequality*.

If my analysis is correct, our problem is a seriously flawed economy that is driving inequality slowly and relentlessly upward with neither natural nor built-in constraint. It is promoting without limit the ever increasing concentration of more and more and more of the nation's income-producing assets in ever fewer hands, neither elected nor appointed – not answerable to the public in any serious way.

Inequality we can debate; runaway inequality, if true, is not debatable. Long before any natural limit sets in, the United States will have fallen into the hands of a small de facto hereditary financial aristocracy, and government of the people by the people and for the people will have long since perished from this nation.

And more than that, we may be reaching a tipping point. There are strong signs that this process is accelerating, and if we do not redesign the economy to be consonant with the Constitution soon, runaway inequality may grow beyond the power of the Constitution to contain. At that point we will not be able to accomplish and implement redesign without bloodshed. That is why I say this is the most important thing I'm working on.

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I fear this conclusion appears so drastic that people will not take it seriously: Come on, Chicken Little, the sky is not going to fall. That can't happen here in the United States of America.

To address this credibility problem, I wish to point out that this would not be the first epic disaster to liberty, it would be the second. Exactly what I am predicting has already happened to mankind once, and the results were catastrophic. And the forces that drove this first catastrophe appear to me so similar to those I find presently driving us toward a repeat of this disaster that I make the prediction with, unfortunately, considerable confidence. So let me take you back to that first epic disaster and show you what we can learn that night help avert a repeat.

I am going to take you back to pre-history, to our hunter-gatherer ancestors. Adam Smith meet Margaret Mead ... or more accurately Marshall Sahlins and other anthropologists who study modern hunter-gathering groups – the few that remain – and Mark Cohen and other paleoanthropologists and archaeologists who study the prehistoric evidence on ancient hunter-gathering groups.

And contrary to Thomas Hobbes, the research finds their lives are not solitary, poor, nasty, brutish and short...a war of all against all. It turns out these people were bigger and stronger and healthier and longer lived and less hard-working than their agrarian descendants. I was amazed, this was all news to me. We can look at the fossils and see they were bigger and better built and less disease-ridden than later agrarian populations. Even today they do not face the infectious diseases and famines that killed and continues to kill millions of agrarians, unless they make close contact with them. If you survive childhood – their childhood mortality is the same as agrarians: high – and aren't killed by violence: about 25% of men and 5% of women (their biggest enemy is other groups) – you live longer than your agrarian descendants.

Most hunter-gathering groups work fewer hours and less hard than agrarian people, indeed than most modern people, to meet all their needs, and spend the rest of their time in socializing and pastimes. One anthropologist wag termed them 'the original affluent society' because they have so much leisure compared to us. And their work, hunting and gathering and making necessities, is sociable and pleasurable compared to the grinding toil of farming. The men form hunting parties, and the women go out and gather and chatter away. Kids don't work, old people don't work, even some adult men never hunt. Yet all food is shared, everyone gets fed and it is unthinkable that anybody go hungry. There's no formal education. Kids learn by watching and doing, and don't begin hunting or gathering until they choose to.

I find it fascinating that the culture of hunter-gatherers appear to follow the structure and incentives set by their natural environment. There's two kinds of hunter-gatherers; and presumably at the beginning most of them were of the first kind, but as the world begins to fill up with people we get more and more of the second. The first kind are called immediate-return hunter-gatherers. These go out and get what they need as they need it, every day or every week. The second kind are delayed-return hunter-gatherers. These people manage, nurture and harvest certain wild crops and game and preserve them for year-round use: you harvest mongongo nuts when ripe and store them, and harvest the smelt run and smoke them, that sort of thing. Watch how the structure and incentives of their natural environment shape and differentiate the behavior and attitudes of these two kinds of cultures.

The most striking feature of immediate-return people is their egalitarianism, the most egalitarian societies ever found. It is not, oh let's be tolerant and nice to each other. They are fiercely and aggressively egalitarian. If you try to act superior or compel others, you are brought quickly back into line by the entire group, by shaming, shunning or as a last resort execution. As one psychologist said, the most frustrated people in immediate-return societies are megalomaniacs. There is no coercive hierarchy, nobody can order another person what to do. Leaders lead only by persuasion and earned respect. And in many of these societies, this equality extends to women, no man tells a woman what to do...not all, many develop some degree of gender bias, but many do not.

As population pressure forces groups toward delayed-return hunter-gathering ... to more fully exploit their territory by husbanding and preserving resources ... there comes the necessity to guard and ration those resources, not only from insect and animal pests and members of your own band, but especially from other marauding hunter-gatherer groups. And groups begin to fight over richer territories which provide more resources. If you have a good territory, and unfriendly neighbors show up because they need more resources, you've got to defend your territory. And we know that a great deal of many hunter-gather groups' time was spent on war. For example, a convict, William Buckley, back in the days when England was first moving into Australia escaped and lived with an Aboriginal group for 30 years. The was no agriculture because Australia held no domesticable crops, so for 60,000 years virtually all Aboriginals lived as hunter-gatherers. It is fascinating to read Buckley's account. He loved the people but reports these hunter-gathering groups constantly finding grievances against neighboring groups and either defending or planning attacks avenging themselves on the neighbors. Mortality in any one of these battles was usually quite low, one or two casualties often sufficed to end the battle, but sustained cumulatively over a lifetime, these constant skirmishes made mortality from violence high. Note, there appear many examples, modern and ancient, where groups found ways to keep rather sustained peace with their neighbors, but also many where they did not.

Thus because these delayed-return circumstances require more organization, leader-ship and direction for groups to survive, egalitarianism declines and hierarchy in power rises, ranging from mild to moderate, in these societies, the more and the longer they depend on delayed-return resources. But such hierarchical inequality in power, often accompanied by hierarchy in personal possessions, even among highly delayed-return groups appears trivial compared to later agrarian societies. There are no massive subject populations and slavery was virtually unknown. (The only exception to my knowledge were the Northwest Pacific Indians of North America whose territory was so rich, they lived in permanent settlements which developed very stratified classes of power and wealth, including slaves.)

Even when population pressure first made deliberate agriculture necessary, the homes in the earliest known settled agricultural towns, such as Jericho and Catul Hayuk, show some differences in material possessions but no indications of different classes – estates and palaces are not found – nor is there evidence yet of social distinctions between men and women. Planting and guarding and defense require leadership and cooperation, but apparently leaders while heeded and respected were not accorded notable differences in material status and wealth.

It does not appear that hunter-gatherers were, or are, looking for agriculture, nor grateful if compelled to it by exigency. It is far more time-consuming and demanding, and given a choice most happily retreat to their foraging life. One poster-boy example were the Tierra del Fuegians. Thomas Malthus along with Charles Darwin and *Beagle* captain Robert Fitzroy thought them the sorriest people on Earth. So Fitzroy took three volunteer Fuegians back to England, had them taught Christianity and farming to enlighten them about "progress" as conceived by Europeans, then transported them back to Tierra del Fuego on a subsequent voyage and set them up with huts, garden plots and farming tools. Almost before the ships were out of sight, the Fuegians abandoned them for their former life. Later asked why and if he would like to go back to England, one replied he "had not the least wish to go back", he was "happy and contented"; "plenty fruit, plenty fish, plenty birdies," said he.

So why did we go to agriculture? Because with hunter-gathering only about 1 percent of the wild plants and animals in a given territory are edible or useful resources, whereas in agriculture, by replacing them with domesticated plants and animals up to 90 percent become useful. You can support 10 to 100 times more people on a given piece of land by agriculture compared to hunter-gathering. So as populations expand and the neighbors press in, and/or the climate becomes less favorable, you have to exploit your territory harder and you're forced into agriculture. And it's a one-way deal, because settled women are much more fertile than foraging women, the birth rate explodes and you can't go back.

While it is impossible to go back to hunter-gathering, this way of life explodes a lot of the assumptions we entertain, particularly in the West, about human nature. It certainly opens the mind to the distinction between wellbeing and wealth. For example, the rational economic man we talk about, his wants are many and resources few: hunter-gathering peoples have limited wants and seemingly ample resources to satisfy them; they lived, and continue to live, in high wellbeing with little wealth. And many accomplished amazing feats without much coercive, privileged hierarchy. For example, the earliest, most monumental megalithic structure we know, Gobekli Tepe in southeast Turkey, predates Stonehenge by 6000 years and makes it look like kindergarten. It was active from the 10th to the 8th millennium BCE and involved hunter-gathering-groups, some increasingly dabbling in or adopting agriculture, which was beginning to develop here and there, sometimes abandoned but reverted to again. It appears from artifacts to have involved hunter-gatherer societies from Egypt to Mesopotamia continually and peacefully cooperating to regularly elaborate the structure. It dwarfs all other later megalith sites known. There obviously had to be strong leadership and peaceable arrangements between these various groups. Yet there are few indications of rank or class or material exploitation; they still retained much of the values of their hunter-gathering past.

So now let's strike to the bottom line: <u>Pre-agriculture</u>: The great majority of people lived in relatively high well-being and liberty and low material wealth. <u>Post-agriculture</u>: Within a few centuries the mass of mankind lived in grinding poverty and servitude, and high material wealth in the hands of a very privileged few. Within just a few centuries after agriculture developed, extreme inequality of power, wealth and status between these privileged few and the exploited many.

This was a tragedy to human wellbeing and liberty of catastrophic proportions! And almost nobody seems to realize it. But almost nobody seems to know that it happened or why! And as these are the very two goals promised in our Preamble that we hold for our economy, it very much behooves us to learn why.

First grasp the scope – the magnitude, the recentness and the longevity – of this tragedy. Think about it. This disaster is less than 10,000 years old, yet still persists in much of the world. Realize, mankind lived as hunter-gatherers for millennia: homo sapiens is perhaps a million years old, modern homo sapiens 300,000 years old. Civilization and written history...it's less than 10,000 years old. So over 95 percent of our history, mankind lives as hunter-gatherers with uneven but relative equality, liberty and wellbeing, then suddenly less than 10,000 years ago appear monarchies, aristocracies, mass subservient peasant populations, mass slavery. Extravagant inequality of power, wealth and status of the very few over the many. One small set of people elevated superior to the rest of mankind. I mean, amazing.

Contrary to conventional notions, these are all new, novel institutions... things like monarchy, aristocracy, peasantry, slaves that seen through the bias of written history seem to have always been with us. And these tyrannical institutions are still with us in much of the world, they have endured for millennia. They're not eternal, not ineluctable, not divinely ordained. They were not at all in any way an inheritance from our hunter-gathering ancestors. And yet they happened. And the question is why. How could so great a tragedy have befallen us?

It’s also important to realize this particular form of tyranny has finally been overturned in parts of the world starting less than 300 years ago. Starting with our own nation, the first to find a way to harness the ideals of the Enlightenment, and those who have copied us, this tyranny of organized force has been overthrown ...further proof that it is not ineluctable or naturally ordained, that mankind can end tyranny if we have the courage and, even more crucially (mankind has never lacked for courage), the wisdom and understanding of how it arose and how it was stopped, so that we can prevent a repeat that endures another several millennia.

Because I contend from my analysis, a repeat is brewing and rapidly. It's the same thing that I contend is going to happen due our economy. And so there's a lot of parallels and lessons. And the most important concept I'm going to introduce, common to the first tragedy and today, is what I call *incumbency*. I believe incumbency a root cause of the first tragic destruction of liberty, and now at work in our economy driving us, unless stopped, straight toward a second.

Incumbency is a property of sources of power. Most sources of power don't have it. But when they do, everything changes. Incumbency is the “increasing ability of people who hold such power – the incumbents – to gain more of that power, the more of that power they gain. It's a runaway positive feedback loop.

So what happened when agriculture arrived was that it conferred incumbency power on organized force. Organized force did not have incumbency power among hunter-gathers (indeed in their skirmishes and battles against neighboring groups, their use of force could hardly be called organized). But under agriculture it only took about 50 or 70 percent of a group to feed the rest which means the rest could specialize in various occupations like the crafts, religion, administration and the military.

This is a very important phenomenon, this ability of a group where formerly every member did everything for themselves, but now learns to specialize members at various tasks in which they become much more expert, and to suppress free riders, i.e. members who loaf and parasite on the work of others. If the group can organize and specialize its members cleverly and suppress free riders adequately, it will take over from groups that don't. This is a rare evolutionary phenomenon that has occurred a few times in nature, first in organisms and then in social species like ants and humans. Every time biological or social evolution has stumbled on this, the new organized group takes over from non-specialized rivals.

Consider the first instance, multicellular organisms. Unlike protozoa or sponges where the cells have no specialized roles, multicellular organisms like you and me develop specialized organs and take over ecological niches from non-specialized organisms. Sometimes these organisms, like you and me, are unable to suppress free riders, cells that parasite off the others without contributing to the reproductive success of the organism: they are called cancers. Similarly, the social ants are insects that evolved the ability to specialize and suppress free riders. And since then, they have taken over from non-social ants and many other species, and now constitute 15% of the world's total terrestrial biomass, 25% in the tropics. With the advent of agriculture, humans socially evolved into organized societies with people specialized at various occupations, and various social devices to suppress free riders. And these organized societies have simply taken over from hunter-gatherers, who have less or no specialization and pushed them to the brink of extinction, and indeed are now taking over the Earth and pushing many species to extinction, including perhaps ourselves.

The last and most recently evolved example, which will very much feature in the developments of our flawed economy, is the big corporation. It's what I call "the new size". Businesses have recently learned how to aggregate ever larger numbers of employees in ever more specialized tasks needed by the corporation and largely rid themselves of free riders. Some of these mega-firms straddle continents and dwarf national economies. And as we would predict from every time this phenomenon has evolved in the history of the world, they are rapidly expanding their share of, and influence on, the economy at the expense of all rivals, smaller businesses and the general public. I shall come back to this.

So one of the first tasks of an agrarian society is protecting its crops from marauders, such as non-farming hunter-gathering groups outgrowing the resources of their territory. And a second task is your population is expanding and soon too big (estimated beyond roughly 150 persons) for inter-personal social pressure to maintain order. For the first time in human history groups become so big that there are people in the same group who are strangers to each other, and now comes the necessity for laws and courts to maintain order. The earliest societies, attempting to maintain some degree of egalitarianism appointed judges to make rules, adjudicate disputes, and organize and lead defense. But the larger and more successful the society, the less adequate the system of judges proved to decide and enforce the rules and defense.

Then came the invention of physically coercive leadership – authoritarian chiefs and organized force, professional armed men. Either the group appointed a leader for the purpose or some skillful individual gathered a gang and strong-armed himself into a warlord position. The longer such authoritarian leaders and their personal retainers persisted, and passed power to their own descendants, the more they became de facto and then de jure hereditary aristocracies. These societies with an authoritarian leader and an army of professionals were overwhelmingly superior to their less organized neighbors, essentially at their mercy. Such strong organization was particularly valuable where irrigation was required, and agrarian societies spread down the Tigris and Euphrates and soon became little feuding city-states, each with their own monarchs, aristocracy and army.

You can see this transition in the Bible. The Israelites were latecomers, pastoralists led by judges, compared to their neighbors. In the book of Samuel you see the Israelites insist that their judge Samuel appoint a king, despite all his admonitions against it. It is clear that Samuel had observed how kings in the neighboring societies operated. This king will take your sons for his army, Samuel warned, and your daughters for his household, and 10 or 15 percent of your crops and income for his upkeep. Why would the Israelites want that and be so insistent on a king. Well, the Bible has its own take on it, but if you look back in the Book of Judges you find that a neighboring king came in with his army and drove the Israelites into the hills starving for almost a decade before leaving, and they did not want a repeat ever again and saw how helpless they had been. So they decided to join the arms race.

Agriculture developed independently in several areas of the world and in each one you see this invention, this evolution, of kings, aristocracies and armies independently soon after. Agriculture permits specialization, requires defense of stored resources and maintaining order. People start inventing organized force, professionally trained with professional leadership by aristocrats. It's overwhelmingly superior to societies where every guy puts down his hoe and picks up his spear or bow and goes off to fight under some judge who has only rudimentary knowledge of tactics and little more than respect to enforce directives. Which is the way that hunter-gatherers and the earliest agrarians fought with their neighbors when peace mechanisms failed. Unorganized force cannot compete with trained, disciplined organized force.

But that's not where it stops. Once you have organized force, the megalomaniac and egocentric kings begin to try to take over their neighbors. They start to eat each other up. The successful ones can now mount a bigger army and take over smaller ones. In other words, organized force suddenly has acquired incumbent power: the increasing ability of people who hold organized force – the incumbents – to gain more organized force, the more organized force they gain.

It's not that every king or tribe wants to, but some do and it's a another one-way process. All over the world, following the development of agriculture come little city-states and kingdoms that get taken over and annexed into burgeoning empires. Some greedy brilliant guy figures out how to run the army better and eat the others up. A Pharaoh takes over all the little city states along the Nile. Philip invents the phalanx and takes over Greece, and son Alexander takes over his known world. The Chinese take over theirs. A thousand years later the Khmers, the Incas, the Aztecs take over theirs.

And where does it stop. It doesn't. Until there's some natural or technical limit. The empires grew as large as they could grow with the communication technology in hand. And we, mankind, lived in servitude to these few fortunate privileged. For thousands of years. And because incumbency is on the loose again in our flawed economy, conferred upon a different source of power, if we don't redesign it, we will again.

The first great tragedy to liberty is a dramatic lesson to mankind that new technology and social arrangements can quite covertly confer incumbency on some unsuspected source of power and destroy liberty for millennia if not caught early. It is an ever-lurking danger of progress that wise lovers of liberty should be constantly on the alert for.

How was this incumbency of organized force ended? If we are to prevent incumbency it is crucial to know. It was tamed by a group of large system architects...called our founding fathers. They took institutions which everybody at the time, indeed everybody for millennia, thought were natural, ineluctable, divinely ordained. Theologians declared them so. The privileged assumed their natural superiority without a second thought. The non-privileged resented bad treatment but did not question the idea of hierarchy. Everybody said well you can't have a society without a king, how are you going to keep order.

But then along came avant garde Enlightenment philosophers who came up with the idea of human rights. And a group of Americans decided to intentionally redesign their government based on these principles. They did not re-establish these millennia-old institutions after the Revolution here on American soil, they daringly overturned them. People who today with 200 years experience take the founding fathers' redesign for granted fail to grasp how radical it was. Skeptics thought them dreamers. All Europe expected the "impractical" new nation to self-destruct. And the fathers did not make it on the first try – first rocket on the pad blows up, an engineering adage I mentioned in yesterday's talk – not until the second.

Their goal was a government where no minority could tyrannize the majority, nor the majority tyrannize any minority. And they set about redesigning government and other institutions with new structure and incentives to achieve this goal. They abolished aristocracy, the idea of a class of naturally superior people entitled to hereditary privileges. They abolished monarchy, the idea of an authoritarian leader not answerable to the citizenry. They replaced them with representative democracy and a tri-partite government with checks and balances. They professionalized the Army: officers were no longer the monopoly privilege of the aristocracy, but trained from ordinary citizens and placed under civilian control. And they separated religion, which along with government had been the second great source of tyranny, from the state. So presumably now neither church nor state could tyrannize the majority or minority.

As large system architects redesigning a government and other relevant institutions, they did a remarkably good job. It has worked rather well, with glaring exceptions, for over 200 years. And everywhere our Constitution has been copied or improved on, there has been an end to tyranny. Why? Because they broke the power of incumbency that agriculture once conferred on organized force. We still have agriculture, it has saved the world from starvation, but it no longer confers incumbency power on organized force. We still have organized force, it is necessary for our national defense and internal order. But those who control it can no longer tyrannize the citizenry. The incumbency power of organized force was broken by very deliberate, very deliberated, redesign of a large system that no one thought could be redesigned nor, many thought, should be.

We should not overlook our luck in being a small unimportant country far from Europe, nor the fortunate confluence of so many extraordinary leaders, not only able but thoughtful. When France tried the same revolution, the leadership was not equally wise, and more interested in vengeance than constructing a capable government; the chaos was ended by a self-appointed authoritarian conqueror, and he was ended by the monarchies of Europe uniting to end this threat to the established order whose institutions protected hereditary privilege and tyranny. Fortunately they were not on our doorstep, as they were on France's. But it was not luck that produced our redesign, it was intelligence. But it required both intelligence and considerable luck that it got implemented and has been maintained.

I have now summarized the first tragedy to human liberty, a product of incumbency resulting in millennia of tyranny to the great majority of mankind by a privileged few, and ended only by redesign of government to remove the power of incumbency from organized force.

And I now fear we are about to lose it again. A flawed market economy is now conferring incumbency power on a new source of power: capital. Capital held little incumbency power in the agrarian world; it was subject to organized force. It is the invention of the market economy now that organized force has been tamed that has suddenly conferred incumbency power on capital: the increasing power of the holders of capital – the incumbents – to acquire more capital, the more capital they acquire. The incumbency power of capital is not the only performance problem with our flawed economy, but it is by far the most serious because, unchecked, it will be fatal to liberty.

So let us now inquire into the structure and incentives of our economic system. Remember the goals are (1) promoting the general welfare and (2) securing the general liberty for ourselves and our posterity. This means in a perfectly designed economy, economic activity that raised the general welfare and general liberty would be enabled and rewarded by the structure and incentives, *and conversely*, economic activity that lowered the general welfare or general liberty, or benefitted the welfare and liberty of any few at the expense of the many, would be impeded and penalized.

What does the present economy reward? It enables and rewards exactly what you observe: economic activity that promotes the welfare and liberty of the holders of capital, irrespective of whether it promotes the general welfare and general liberty of the public. The incentives are predominantly misaligned with goals. It is not that economic activity benefitting the general welfare and liberty doesn't occur, a lot of it does, but the data show it far from the predominant economic activity in our economy. There is also substantial evidence of great wealth being accumulated by harming the general welfare and liberty.

Here's a poster-boy example of a fortune made by harming the public. You all know there is an opioid epidemic in this country, ruining lives and killing people. Do you know where it came from? You can thank the three top executives of the pharmaceutical firm. Purdue Pharma. (You can google up this story). The nation has a drug system which amazingly allows pharmaceutical companies to market and pretty much say anything about their product they want to, including suppressing unfavorable studies and side-effects. And around 1995 Purdue Pharma was selling opioid pain-killers like Oxycontin used for terminal cancer patients, and decided to run a marketing campaign to expand use and sales of the drug. And they mounted a diabolical marketing campaign worthy of a military invasion. They lied to the FDA and trained an army of reps, who knew only what they were told, to repeat these lies to doctors. They lied that Oxycontin was less than 1% addictive (it is over 30% addictive) and that it lasted for 12 hours (it lasted 4 hours). To add to this drumbeat, they set up and financed phony non-profit fronts touting the mantra that good care should be pain-free. No tolerance for pain they cried, and it became like you weren't doing good medicine if your patients had pain. They gathered big data statistics on every doctor's prescribing habits of pain-killers and targeted the biggest prescribers with their reps. It was a disciplined, brilliant, marketing strategy: lie, lie big, lie often.

So what happened? Purdue Pharma went from a minor firm with revenues of perhaps $500M a year to a major firm earning $3B a year. And what happened to patients? They woke in pain at 4 hours and took more Oxycontin and became addicted. Purdue made bigger pills to last 12 hours, and they became more addicted. As you see regularly in the news, lives are still being ruined and lost to overdose, the most celebrated death being the rock star Prince. Even conservative radio jock Rush Limbaugh ... he of the three strikes and you're out for drug addicts ... became severely addicted.

Fortunately if belatedly, NIH runs this system where doctors who suspect side effects of a drug can report in. And after a couple years sufficient reports of the addictive nature of these opioids were accumulated that the FDA held clinical trials and found Purdue Pharma had lied. The evidence was turned over to the legal department, which went after Purdue Pharma. But Purdue Pharma has a nice big legal department of it own (remember what was said about big corporations and specialization) that dragged things on for several years. Purdue Pharma was finally convicted of deceit around 2007. And what was the penalty? The company was fined 600 million, the largest ever levied against a pharmaceutical firm. $600M on continuing annual revenues of $3B (and still even now $2B a year)!? Pocket change! The top three officers pleaded guilty and were individually fined a total of $34M. Again, pocket change. Poor babies won't be able to buy their new Bugatti this year. These are crimes against humanity, these guys should be sent to Nuremberg. Our economy has rewarded them richly.

Now an opposite poster-boy anecdote of under-rewarded economic activity greatly promoting the public welfare. Who has saved more lives than anyone else on Earth? A good case could be made for Norm Borlaug, distinguished professor of agriculture at Texas A&M university, the "father of the Green Revolution". His reward was a Nobel Prize. He has not accumulated any degree of wealth from his staggering accomplishments. Isn't there something wrong with an economy which enriches the authors of an orchestrated fraud harming more than 2,000,000 people, including killing upwards of 30,000 in the last 15 years, and only smacks their fingers when caught, while on the other hand merely conferring a Swedish gold star – not riches, a medal – on the savior of up to a billion people around the world.

These are simply anecdotal examples illustrating perverse incentives in our economy anti-aligned with goals. But we can make some more systematic generalities from the data: First of all, public goods, goods and services made or arranged by the public sector, constitute at least half the wealth produced by this nation, but they are highly under-rewarded relative to private goods. Secondly, within the private sector, labor is under-rewarded relative to capital. Were the rewards more fairly distributed relative to contribution to the nation's wealth, or more desirably, contribution to wellbeing, the general welfare would not be so stagnant and the general liberty in such decline and jeopardy.

Let us look more carefully at the issue of labor and capital, because here is where the devastating problem of incumbency starts. Adam Smith noted 200 years ago "...the rise of wages operates as simple interest does, the rise of profit operates like compound interest." That is an astute qualitative observation by Smith which has not been controverted since. And now it has been quantitatively confirmed recently by Piketty.

Now think about what that observation means. It means that our capitalists, working no harder, will capture an ever greater share of the nation's wealth. And labor, working no less hard – and American labor works longer and harder than any other advanced country – will be rewarded by an ever declining share of the nation's wealth. So in our flawed market economy more and more of the wealth produced is going to the holders of capital, and less and less to labor. You can make any economic arguments you want to justify this or not, but the Constitution is not interested in economic arguments, only the general welfare and liberty. The general welfare is not being rewarded, and without redesign will continue not to be, and the economy will fail on its Constitutional obligation.

But it doesn't stop there. Now we add on top of Adam's observation, the second step: incumbency. The holders of capital do not sit content with their disproportionate return relative to labor, they become discontent with their return relative to other holders of capital and start to eat each other up. It is exactly parallel to the holders of organized force in the days of agrarian empire-building, when holders of more organized force ate up holders of less. Just so, holders of more capital are now eating up holders of less. It is all around you, everywhere you turn, mergers and growth into ever more huge corporate and financial entities. It is “the new size”. Remember the early observations about big corporations and their ability to specialize and suppress free riders, and how this confers ever more disproportionate power to take over or drive extinct smaller rivals. So now because of the incumbency power conferred on capital in our present market economy, more and more of the nation’s income-producing assets are being concentrated in ever fewer hands, the people at the top who control these business and financial mega-firms, unelected, unappointed, none answerable to the public.

And it is very clear that they are using their extreme wealth to influence government, the media and public opinion to further increase their power and wealth at the expense of the public welfare. It’s the “new propaganda”. For example, the public is being systematically misinformed on scientific and political issues by a propaganda machine of deliberate disinformation funded by wealthy special interests hiding behind deceptive fronts they set up and finance. And by owners at the top ordering major news media what to say. Whenever scientific results or the public interest threaten the leaders of these mega special interests, their propaganda disinformation machine goes into action. The distinguished theologian, Michael Novak, at the American Enterprise Institute once observed, you can judge the morality of a society by the number of people paid to lie. On that standard, we are not doing so well morally in our country.

Regarding government, because of the influence of big money in elections, it is increasingly taking steps favorable to big business and finance at the expense of the public welfare. It’s “the new bribery”. And unlike the old bribery, it’s not illegal. In the old illegal bribery you gave officeholders money for favors; in the new legal bribery, you make elections so expensive, office seekers can’t get elected without campaign contributions from big money; then if the favors aren’t forthcoming, you dry up your campaign contributions.

As just one anecdote, the Great Crash of 2008 was directly the result of special interest financial influence to weaken vital regulation of the finance industry (which continues even against the pathetic new Dodd-Frank reform regulation today). And it was clear that criminal as well as under-handed legal foreclosure of homes was going on. Yet Congress could not fall over itself fast enough to exempt the industry from prosecution for its crimes, and bail out the failing banks and insurers without penalty. Yet it provided no financial relief to the homeowners to save their homes, whether lost by legal or illegal swindle. Would government free of undue special interest financing have behaved this way? I think not.

In other words, an extraordinary threat to the general liberty is rising rapidly due our flawed economy conferring incumbency power on capital, with neither natural nor any designed built-in limit....at least no effective restraint that I can ascertain; I ask you to check me and point out any adequate restraints that I have missed. Indeed in the last three decades we seem bent on removing any of the impediments that might have been present earlier. We appear to be suffering not inequality but runaway inequality. And that will be the end of liberty. The managers of our economy appear oblivious. They seem oblivious that the general liberty is even a goal that is part of their job, let alone that it is under dire threat. The public appears totally unaware. What will happen? What else but what happened in the first great incumbency: the slow inexorable death of liberty for millennia.

What can we do about this? The same thing as did the founding fathers: redesign. Adam Smith redesigned the economy, so can we. And like the founding fathers, we must add in any other institutions necessary (for their problem, they redesigned the army and religious power as well as government) to break the present incumbent power of capital. Capital, like organized force, is indispensable. But we need it stripped of incumbency power, as we did organized force 200 years ago. And we need to do it before the power of the incumbents of capital to resist grows beyond the power of the Constitution to contain.

Well, there's two parts to any redesign solution: the technical problem and the political problem. Technically how do you design an economy that tames incumbency of capital, yet still maintains adequate access to capital and sufficient inequality to provide fair incentives (as Adam Smith taught us) for contribution, effort and risk-taking. And politically, how do you implement your redesigned model for the economy. The technical problem is tough but likely adequately soluble. The political problem will be much tougher.

And what you see in my handout is a starting draft of my thinking in the middle of this redesign process, trying to think through these two problems. I remind you how iterative it all is. You see me wandering from goals, to measuring performance, to structure/ incentive analysis, to design considerations and back again. Because it doesn't happen sequentially. You just go back and forth, make a little progress here, a little there. But it's all the same kind of thinking: Large System Architecture theory and methods. I stumbled into this way of thinking after ten years working on health care reform and found it much more general, applying to a very broad class of macrosystems, and I'm trying to get policymakers and analysts to adopt this way of thinking every time we have policy problems with a macrosystem.

I'll just give you a quick summary of a few of the thoughts from the handout that seem important. The first is to get rid of the idea of the divine right of markets. The divine right of kings has been replaced by some mystical divine right of markets and worse by the divine right of free markets. OK, that's Frederick Hayek, who made the correct observation that a little panel of central planners cannot out-think all the creative expert people in an entire industry, and then drew all the wrong conclusions from it. I am for free enterprise. It's one of the great inventions; thank you, Adam Smith. But I'm against free markets, i.e. unregulated, government hands-off, markets; again thank you, Adam Smith. Adam was aghast at the idea of unregulated markets. He was aghast at the idea that greed is what serves markets; he called it rust in the machine that would destroy it.

So call them ‘sound markets’ when they have all the right structural rules that Adam and his successors have recommended. They're a great invention. But it's the rules, and only if they are enforced, that makes markets sound, i.e. have incentives to perform well the way the public wants. And unsound markets don’t self-correct. The only reason we have any sound markets is because government maintains them.

In other words, the job of government is not to micromanage the firms in a market ...that’s the central planning model that Hayek properly decries. But Hayek forgets, unregulated firms left to their own devices, as Adam Smith observed, will rapidly make their market unsound so that it rewards malperformance in the firms’ interest at the expense of public’s. The duty of government is therefore to design and enforce rules setting up the structure and incentives of each market (and any other macrosystem), so that it rewards firms for the performance society desires of that market. Then the firms will perform that way in their own interest far better than any planners could coercively micromanage them. Markets are means, contrivances, not ends, and if they are not serving the ends society seeks, they should be redesigned so that they do.

The second idea is that some inequality is necessary to maximize the general welfare and liberty. I show empirically and prove theoretically in the handout that too little inequality is just as dangerous to the general welfare and liberty as too much. Empirically we find countries that try to excessively level inequality both fail economically and politically; they become tyrannies. Likewise those with too extreme inequality become tyrannies run by and for the benefit of the few who control the lion’s share of the wealth. And these empirical observations are supported by good theory. You can read it in the handout.

And so in between there's a sweet spot, a range of inequality that maximizes the general welfare and liberty. Well, how do we determine that sweet spot? And here is a third important idea. Since we don’t have a theory to predict a safe range of inequality that best maximizes the general welfare and liberty, we can do it empirically. We can look at inequality around the world and examine the level of inequality in thriving economies that appear to have high wellbeing and liberty. Since inequality is a political decision, not a divine revelation of economies (which are contrived macrosystems), we know we can design and operate a thriving economy with high wellbeing and liberty in the range we observe in these countries.

Let us use the GINI index to measure inequality in countries. (You can google up the definition if unfamiliar.) It’s 100 if one guy has all the wealth and zero if everybody has equal wealth. So a higher GINI means greater inequality, a lower GINI means less inequality. I am using GINI figures compiled by the CIA. The highest GINI in the world is Lesotho at 63. The lowest is Sweden at 23. Notice how far the lowest is from zero.

Our own country, the United States, has the highest inequality of the developed nations. Our GINI presently stands at 45, and it has been steadily rising from a low of 35 in the ‘70s for the past three decades. LSA theory says this is not a one-time fluctuation; the incentives in our economy predict this rise and predict in the absence of redesign it will continue unabated without limit at at least its present pace. Our inequality is marginally higher or equal to Russia, a kleptocracy of the worst order, whose GINI is reported as 44. (We should assume an error bar of 10% due inaccuracies in national statistical systems.)

The average GINI for the European Union is 30. The Germans are 27. The Czechs and Danes are around 25, and the Swedes, as mentioned, are at 23. These are reasonably thriving economies with high wellbeing and liberty. So if we decided to set inequality in the United States at our previous 35, or closer to Europe at 30, we know we can run a very successful economy promoting the general welfare and securing the blessings of liberty. We would have to design redistributive mechanisms that promote and do not compromise fair incentives for enterprise, effort and contribution to the general welfare. And these mechanisms could be tuned to hold inequality where we desire as a society: strengthened if inequality rises above the specified target goal, moderated if it sinks below.

Regarding implementation of a redesigned economy, I will simply say we will need the help of the privileged as well as the grass roots, just as in our Revolution over 200 years ago. We will need their leadership, political and financial support if redesign is ever to be implemented. If not enough answer the call, it is my opinion from this LSA analysis that the Republic is doomed. I invite your peer review.

I am going to end this talk on applying LSA theory and methods to the economy with a quote from an unlikely source, Niccolo Machiavelli, almost 500 years ago. Though it applies equally to the redesign of any important macrosystem, it will especially hold true for the economy.

> “There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things. For the reformer has enemies in all those who profit by the old order, and only lukewarm defenders in all those who would profit by the new order, this lukewarmness arising partly from fear of their adversaries, who have the laws in their favour; and partly from the incredulity of mankind, who do not truly believe in anything new until they have had actual experience of it. – Niccolo Machiavelli, *The Prince*, 1532

This is the task of the Large System Architect and I hope you will make it yours. ■