

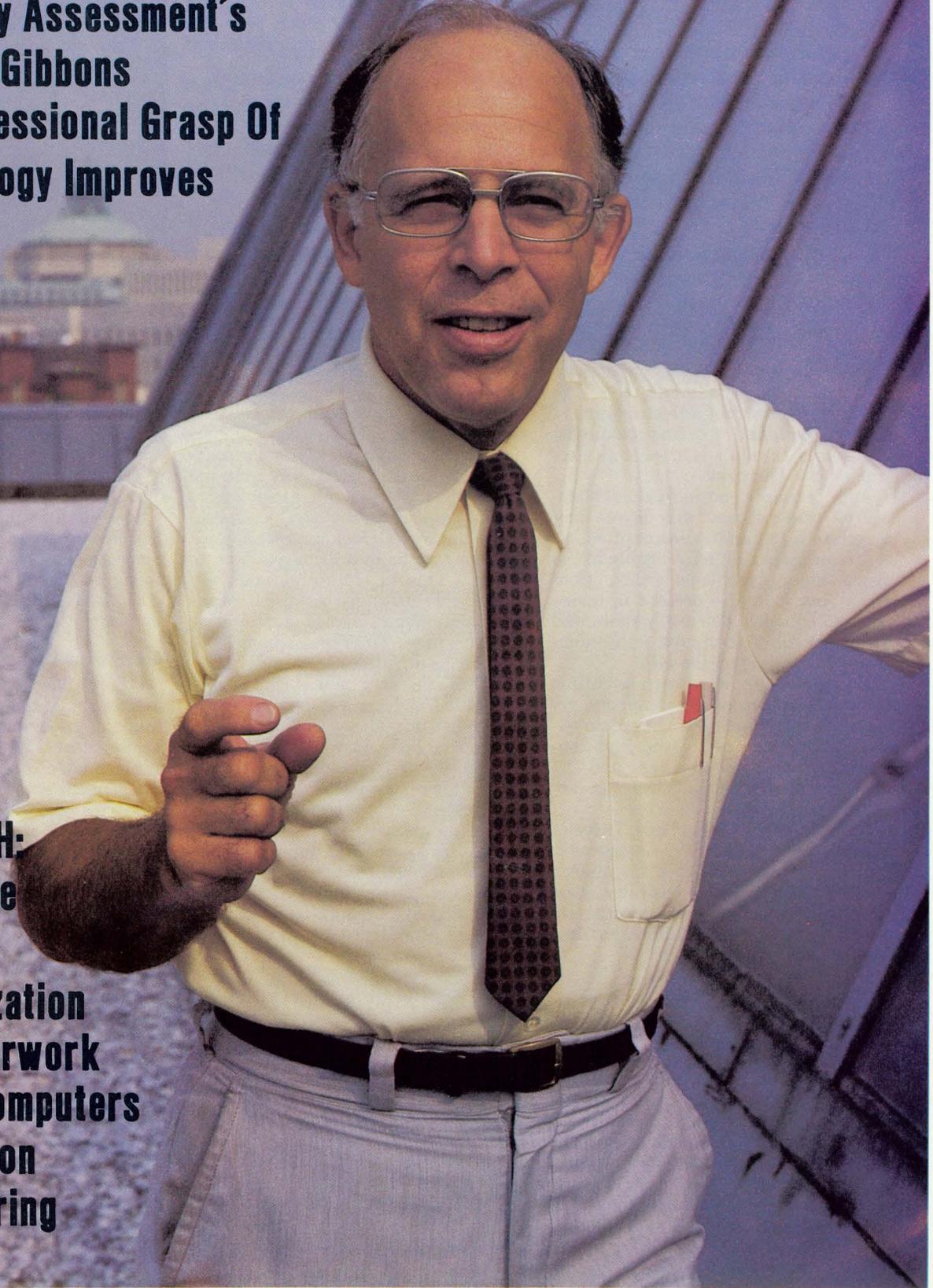
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# Facing Up to the Realities of Finiteness

### HIGHLIGHTS

- Faced with a situation growing rapidly beyond its control, Congress, in 1972, established the Office of Technology Assessment.
- OTA is designed to make in-depth assessments of technological issues and include the relationships with issues of social and economic impact. It leaves the policy decisions to Congress.
- And in developing any major study requested by the Congress, OTA sees to it that everybody whose ox is being gored or fed is involved.
- Having swung to both extremes in its short life, OTA, under Director John H. Gibbons, is becoming extremely effective.
- Will OTA finally make technology the servant of Congress?

It will not appear in the plethora of political rhetoric swamping the U.S. There will not be but a fleeting hint of it in the political reporting assaulting the senses through printed and electronic news barrages.

And, certainly, no individual Member of either House will devote any speech to it for public consumption.

It manifests itself most visibly in the great energy problems facing Congress—but it is also present in transportation, health, defense, welfare and in almost all of the major issue identifiers abounding on the Hill.

Energy is a big word with scientific, technological, social, economic and political connotations. But the whole energy question is really the first confrontation between Congress and the "realities of finiteness." It is an absolute confrontation.

And Dr. John H. Gibbons, Director of the Office of Technology Assessment, U.S. Congress, finds this fascinating because those realities basically question the ability of our physical resources and our institutions to deal with a national problem.

#### Out of the Cowboy Age

"It is imperative to take this lesson seriously," says Gibbons, "not because the solutions are so critical in energy, but that the processes involved are changing the whole way we think about problem-solving in our society. It is not just a shortage of fuel but a confrontation of the anachronism of the underlying tradition of western thought that is involved."

The point Gibbons is making is that we have always used our natural or industrial resources to solve problems.

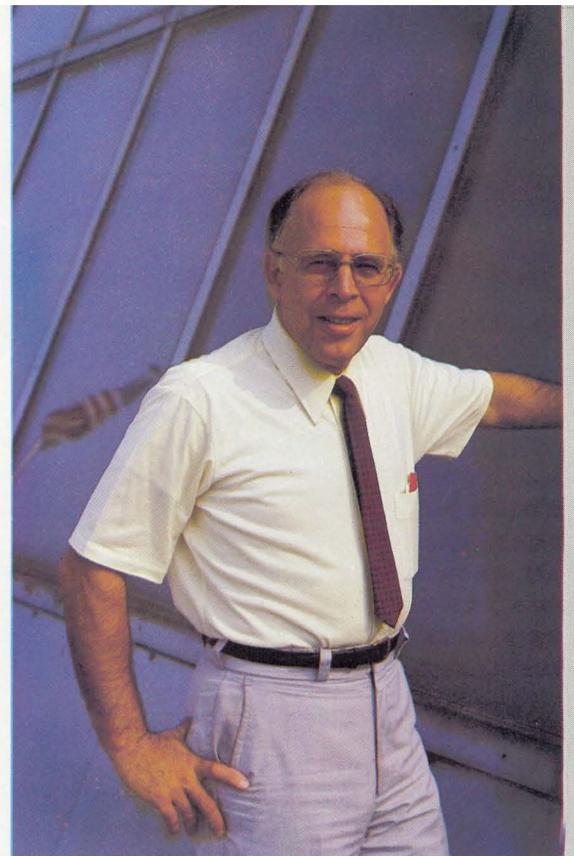
Now we are beginning to have to use our brains.

And Congress, in spite of polls and heavy criticism to the contrary on particulars, is moving, slowly and sporadically as an institution, away from the cornucopia concept. "We are far from running out of technology," says Gibbons, "but we still look back for a quick technological fix every time we get into a jam." This is a natural and very comfortable attitude—because it means we do not have to change our thinking or, even more terrifying, change the way we, as a Nation, do things.

There are very few technologists elected to Congress, yet, because of the very great mix of levels of sophistication in that body, many Members have a far better understanding of the complex inter-relationships among technologies and other societal elements than the Public. And almost all of the legislature knows that policy is a process, not a fixed point in time. (Those who do not, simply do not count.)

It could have been anticipated when Congress established its own Office of Technology Assessment back in 1972 (See Box), that the entity would eventually serve as a window into Congress itself. All of Government's creations eventually do this. But the OTA window is small and often slightly opaque.

In its initial years, OTA could be best described as a joint committee and it was pretty much treated as such. But the original idea was to create a body capable providing non-partisan, objective and fair advice to the Committees and Members of Congress who are inherently deeply involved in political choices. Which are, of course, the op-



**Gibbons: "An experiment that is working and working better as we learn."**

posite of non-partisan, objective and fair.

So in its first phases, OTA wound up too close to the day-to-day action of Congress. In its next phase, the obvious swing to the other end started and OTA, in the minds of many Members, was getting to be almost irrelevant.

#### Constant Change

OTA is now in the third, and by no means final, phase. Gibbons realizes that Congress wants a degree of independence in OTA but that the organization must also work for Congress. "So the attempt is to move close to the imperatives of Congress while doing the least amount of violence to these studies—which do take both money and time.

"OTA is an experiment, that is now working and working better because we have learned a lot."

So has Congress.

Yet Congress must also appreciate that the advice it wants from OTA immediately must have already been in the works at OTA for many months, if not years.

"Our hope is that Congress understands we have an undercurrent of projects that take a year or two to complete and at the same time we must develop the ability to pull, out of those studies and others already completed, information that is germane to current issues before Congress. It is a balancing act."

## Origin of OTA

Throughout the 1960's the inability of the Congress to adequately absorb technology into those broad policy decisions it was generating led to results that were inappropriate, ineffective or worse. Indeed, Congress had never, in the history of the U.S., been able to appreciate the substantial effects of technology—which had a way of progressing in directions not usually envisioned by lawmakers.

The National Legislature's answer was to throw committees at the problem—but again, the nature of technology is such that it refused to be isolated and it just would not remain fixed with respect to time.

Recognizing that the problem was not one of direction, Congress, in 1972, (and after a long series of hearings and studies) created the Office of Technology Assessment. In effect, Congress would have its own capability for assessing such issues.

Most of the issues facing Congress—energy, environment, natu-

ral resources, national security, health, agriculture, telecommunications, transportation, world trade, nuclear wastes, clean water and air—have three distinguishing characteristics.

- Their most important aspects are often not the immediate and the isolated, but the longer range and the more inclusive.
- They are complex, and analysis requires the integrating of a broad range of information and expertise that cut across many fields of knowledge.
- They have a significant technological content, and efforts to resolve them adequately must employ the best scientific information and analysis available.

Thus OTA's function is to explore complex issues involving science and technology in ways that clarify for Congress both the range of policy options and the potential impacts of adopting each of those identified options. OTA does *not* normally recommend or advocate particular policies or actions.

OTA is governed by a 12-member, bipartisan Congressional Board on which the OTA Director serves as a non-voting member. The Board con-

sists of six Senators and six Representatives, evenly divided by party and appointed by the President pro tempore of the Senate and the Speaker of the House. The Board, in turn, elects a Chairman and Vice-Chairman. These posts alternate between the Senate and the House in succeeding Congresses. The Vice Chairman is a member of the Minority.

The current Chairman is Rep. Morris K. Udall (D-Ariz) and the Vice Chairman is Sen. Ted Stevens, (R-Alaska). The Senate Members are Kennedy, Hollings, Stevenson, Hatch and Mathias. The House Members are Brown (Cal), Dingell, Winn, Miller (Ohio) and Wydler.

OTA's Advisory Council consists of 10 public members eminent in science, technology and education, and are appointed by the Board. The Comptroller General and the Director of the Congressional Research Service of the Library of Congress are ex-officio members. The OTA Director is appointed by the Board and the Deputy Director is appointed by the Director with the approval of the Board. The Director is Dr. John H. Gibbons and the Deputy Director is Daniel DeSimone.

OTA's role is not to tell Congress what to do, but to supply intelligent options. "It is a little like the difference between *projecting* into the future where you are going based on energy supplies and *forecasting* where energy is going to go. A lot of people do not realize the difference between the two. We in OTA *project*, we do not *forecast*," says Gibbons.

A university, or a major corporation, tackles an interdisciplinary study by gathering electrical, mechanical, civil, and other engineers together and turning them loose on a problem.

"Congress," says Gibbons, "is at a unique extreme, and has to bring together an inordinate number of considerations."

On the other hand, the National Academy of Sciences is now integrating over the life and physical sciences—but when they get into economic or social elements they tend to bog down. "It gets too complicated."

"You can consider OTA as being at the next level. We integrate over the life and physical sciences but also over the social, economic and political sciences as well. We are just beginning to synthesize information—but still at a level far below what Congress must take into account."

"We are starting to become a significant part of the Congressional process."

Gibbons thinks that OTA is also the catalytic point between what the

Congressional committees want and where the relevant information exists. "This information is literally all over the U.S. So we form advisory panels on issues approved or requested by the Board, and include all interested parties. Everybody whose ox is going to get gored or fed is on these panels."

OTA actually has a very small professional staff—less than a hundred. The major work of information synthesis is through panels, short-term employment, consultants and subcontracting. This gives the small staff a tremendous outreach. Every major study OTA instigates involves panels and "these panels are carefully pulled together to make sure that all interests are represented." They may not have equal representation but the target is to be fair.

"And then we always put out these documents that are too much for anybody to read," says Gibbons, so he has expanded on an idea of one of his predecessors—the one page summary. "We print separate summary packages designed to meet the needs of Congress." He is also working on graphics and other information packaging techniques to improve the communication of OTA's basic works.

### Instant Response?

"We are not in the business of filling shelves with information. We must fill the voids of information in the current policy generating functions of the Con-

gress. We have to be responsive and have damned good stuff. If you feed Congress junk they just turn you off."

OTA's ability to respond to short term queries is improving. This is a function of the number of studies underway and the backlog of completed projects. It is also an imposed attitude. "We should be far less reactive and much more anticipatory in our working for Congress," says Gibbons.

Oddly enough, Gibbons has found the best way to reach his hundreds of "Bosses" is through magazines and newspapers, as well as T.V. "It is often a far more effective route than sending reports and the media, is, in fact, turning out to be one of our most important delivery systems."

OTA is fairly open. It is impossible to keep much of what it does under wraps because of the many inputs and the controversial nature of much of the subject matter. OTA does suffer from leaks in the sense that draft information is often made public to bolster a particular point of view while ignoring all of the rest of the options, projections and other aspects appearing in the final report.

"Frankly, I think we just have to take our chances here. The benefits of open information exchange in the development of assessments far outweighs any short term negative publicity," says Gibbons. He might have added that no Member of Congress is anything less than expert in promul-

gating partisan information through the news media. So there is an understanding here.

### Grasping Intangibles

There is one area causing Gibbons some concern. This is in the perception of duplication of effort. A Member sees a report from the GAO on, say gasahol, and then a study from OTA on the same subject and forms the superficial conclusion that one or the other was a waste of effort. "Not true," says Gibbons, "what you have is the same subject analysed from two entirely different aspects. In fact, OTA and GSA would probably have been aware of each other's project and cross-correlated along the way."

In a recent hearing on the synthetic fuel issue, Gibbons, acting for OTA, and the Congressional Budget Office spokesman hit the same subject and, in fact, came up with the same bottom line in their separate analyses. "I did not know about the Congressional Budget study until the hearing itself. The point is that the Budget Office analysis worked its way through macroeconomics and we worked our route through engineering and technology. The fact that the bottom lines were the same is a clear advantage to Congress. Far from being a duplication of effort, it was actually a demonstration of the intrinsic worth of complementary analysis."

The charge that OTA duplicates the work of other Congressional support organizations is one of the most serious levied against the organization—not because it is true but because it shows a fundamental misunderstanding about the purpose and value of OTA to the legislative process.

In a very real sense, the most formidable problem facing Gibbons is the abstract nature of many of the deficiencies he has to resolve.

"We have been called the 'Office of Technology Harassment'" says Gibbons, as if OTA had the power at all.

There are differences of opinion among the more powerful Members of the House and Senate as to exactly how OTA should proceed. Gibbons is very much aware of the impasse that can easily develop between an organization that generates multi-year assessments at the whim of a body that stands for re-election every two years and every six years.

In Washington, there is an impression that Congress is a fast moving legislative arena and OTA, by its nature and the complexities of assessing technology against the intangibles driving Congress, therefore moves slower.

Yet that so called fast moving legislation is normally in response to social and political problems perceived by Congress long after it surfaces some-

where in the U.S. and the legislative "solutions" arrive on the spot after the problem has changed or died of old age. Or misses the problem entirely because all Congress can do is enact, it cannot enforce or even administrate its creations. Or causes other problems which, in turn, generate more legislation.

The point is that Congress had better be more right than wrong the first time—and that is really why it created OTA in the first place.

An example of the product of OTA is the recent assessment of oil shale technologies. The study took all six elements—technology, economics and finance, resource acquisition, environment, water resources and socioeconomics and developed four production targets for 1990 with strategies for reaching each. In doing this, the study identified no less than thirty issues and thirty-nine policy options.

That, in only one aspect of energy, is a considerable range—especially since the study was done for Congress and treats only what Congress alone can do. And the study concerned itself with the oil shale formations in portions of only three states—Colorado, Wyoming and Utah. Obviously those three states are represented by a part of the House and Senate—so the considerations facing Congress as a whole with respect to exploiting oil shale can get interesting real fast.

It is an example of what Gibbons means when he says that "anything that has big potential positive consequences is sure to have big potential negative potential as well."

Reading any of the concise summaries of OTA's studies, much less the full reports themselves, strongly indicates that the era of the quick technological fix is over. And since all of these studies were requested by Congress, the aggregate is also a good indication that Congress, itself, has an institutional awareness that the cowboy days are also over and that, as Gibbons notes, there is a new dependence on the brain.

The oil shale study is also a case-in-point of the brutally dispassionate delivery of indigestible effects of technology. Take, for example, the following excerpt:

"An illustration of the needs for tradeoffs among objectives can be seen at the 1-million-barrel-per-day production level, which attains the positioning and energy production objectives (i.e., it would displace about 16% of imported oil and significantly reduce the U.S. balance of payments) but only at the cost of extensive Federal involvement, increased pollution and social disruption."

The only thing that is known about the effect of the million barrel level is that it would exceed the capacity of all of the communities in the affected

areas.

This is the projection of only one of the four strategies in the report—all of the others involve less than a million barrel daily production. But it shows one of the unintended impacts of an effective OTA—it provides Congress with a technological conscience. That is what you can expect to get from a non-partisan, objective and fair analysis.

"There is an impression that Congress does not worry about the long term," says Gibbons, "but if you look at the legislation going on now, you find an awful lot of it is concerned with where we are going to be in the year 2000. Much of what Congress is trying to do in energy will really only start to take effect as we cross the year 2000."  
**Bath Water and Babies**

It could well be that OTA was created with only a dim perception of its full role in the Congressional process. But, less than 10 years after its formation, it would seem that the parent is starting to get comfortable with the child—and neither have even scratched the potential involved.

As one congressional expert notes—OTA is, at the top, short on staff with extensive Congressional experience and, to some extent, a dash of old fashioned legislative relations would help OTA. Gibbons is trying the close the communications link through more effective reporting, interim responses supporting the "quick question" and developing better substantive relationships between OTA and the various caucuses on the Hill.

But Gibbons knows that there is no way to speed up the basic OTA process without compromising the quality of the results—his "getting close to the imperatives while doing least violence" shows his awareness of the problem.

And Gibbons also knows, as do the more thoughtful Members of Congress, that many technological crises will seemingly develop overnight having evaded OTA's early warning system.

There must be a very necessary element of trust on the part of Congress towards OTA for the latter to perform effectively. OTA now seems to have the confidence of the Congressional leaders—but this is an intangible that takes careful and constant nurturing on both sides.

There is evidence available on this. OTA will soon be taking a look at the whole area of non-nuclear toxic industrial waste. But the assessment will involve what is going on now and in the future rather than what happened twenty and thirty years ago. The future look is to detail what can be done through process design and other technological avenues now to prevent history repeating itself. The toxic waste problem of the future must be cut at

the source rather than at the end of the pipe. Since almost anything in industrial processing has the potential of harm—and all that such processes really do is concentrate such problems rather than disperse them—then engineering and chemical design should be brought to bear up front.

OTA is also studying the availability of Soviet energy and the influence of U.S. trade on Soviet energy production. A short study, drawing heavily on past work, will involve the combination of U.S. electronic, automotive and steel elements in foreign trade.

These go beyond the obvious. The problem is the development of federal policies involving innovation—especially in the international arenas.

It is Gibbons who will determine, to a large extent, the future of OTA. He is the third director, Former Congressman Emilio Daddario, after pushing the enabling legislation through Congress, became OTA's first director. He was then criticized for running OTA like a Congressional Office and for all of the trappings of a joint committee staff.

Former Governor of Delaware, Russell Peterson was the second Director and he got charged with allowing OTA to drift too far away from the legislative pattern of doing things.

But Gibbons thinks that Daddario and Peterson made the necessary rough cuts in establishing OTA and also bore the blame for the many problems that always accompany the creation of such a highly specialized operation.

For countless reasons, good and bad, with many being completely beyond its control, OTA could sink to such a level of routine that it should be abolished, or worse, grafted into the GAO or the Congressional Research Service—two entirely different functions.

But it is far more likely, given the Congress' belated, and private, recognition of technological complexities and the extent to which these now penetrate the purely political realm of old, that Gibbons will turn OTA into an effective tool aiding Congress in making technology the servant of U.S. policy, domestic, military and foreign.

Right now, technology runs both Congress and the Administration.

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