

## Careers for Leadership

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### Abstract

Leadership in society comes through involvement in society. Engineers through their engineering careers build skills that enhance their competence in their profession, and many of these are also valuable in civil society and in businesses. An involvement in civil society is not career limiting for engineers but brings benefits both to the individual and to the profession. Leadership emerges as much from being involved and the opportunities that emerge as much as from any grand career plan.

Our society has difficulty over decisions on major investments – on their timing, size, technology and the acceptability of their impacts. These are matters engineers are uniquely qualified to assist with. One first role is one of professional advice but there is a more central one of the decision maker, that would benefit from having more engineers involved.

### Introduction

IPENZ President Ian Parton has made leadership a theme for his presidential year.

Ian has characterised four stages of a potential career path for engineers:

- Stage 1 qualification
- Stage 2 competence
- Stage 3 leadership and management
- Stage 4 governance and expertise

Ian noted too many of us became diverted after stage 2 into being back-room experts.

His concern was not just for engineers as a group, but for the economy as a whole. He noted we had low levels of engineers in our work force, in relation to the size of our economy and we had particularly low levels of engineers in governance roles compared to other developed nations. He linked this to our generally low level of economic performance.

Economic performance comes not through working harder – we already do that. It comes from smart investment particularly for productivity and capturing the gains of that investment – matters at which we have done poorly.

It is also a matter of making an adequate level of investment in research and development and directing that well to sectors where there is opportunity. This was a second of Ian's themes.

Having been given a structure to think in it is hard to break out of it. I will try to illuminate aspects of this theme rather than give any radically different insights.

### **Why do engineers become engineers – and does this give us some handicap as leaders?**

I can only speak for myself. I was good at maths and physics at school – thanks to some great teachers - middling at English, awful at languages and encouraged at home to consider arts, history or geography as something to be interested in rather than being career options, despite being interested in them. Some library books on the construction of the Panama Canal, on Brunel's and Robeling building the Brooklyn Bridge caught my imagination. It was not without competition – in my first professional year at Canterbury the engineering librarian had raided the town library and produced a display of books on archaeology. That was a family interest and I had already had some participation in field work. I don't think I read much else the first term. The temptation to switch to an arts degree was strong and almost won.

Engineering didn't present itself to me as a career where there were broad social skills as a requirement, where communication and non-technical leadership as important parts of what one was going to be doing. I think people with a bent in those directions in their late teenage years were going to other careers. Engineering students were turned on by technical and palpable things, rather than the less predictable and esoteric.

Engineers grow from what they start as – relatively undemonstrative, mostly mildly conservative, solid citizens, who don't make a lot of noise about themselves. Indeed IPENZ could be characterised the same way. They are character matters that do not change through life.

These characteristics are not always the ones that give prominence and openings in Ian's Stage 4 – governance and expertise. Another characteristic needs to be mentioned - the potential stage 4 engineers of today are dominantly white and male - two groups already well represented in governing structures so someone looking for some gender and cultural balance in a Board does not seek yet more of the same.

Hence I think there is a handicap, one from our initial conceptions of our career, one that needs to be consciously addressed if it is not to become a boundary. However let's not dwell on that overly, for we are not short of positive advantages.

### **Worldly of not?**

Engineers are sometimes seen as a little unworldly and overly focused on technical things. One sees engineers operate from time to time in ways which reinforce the views of others. Engineers operating in committees often seize on a technical issue and start debating it themselves to the exclusion of the non-engineers in the room. If the issue is important we are not often good at explaining why it is in terms the other people can understand. Or is it a defence mechanism? – something we can talk comfortably about without all the social,

economic and political judgments that often come into governance decisions, areas in which we feel less competent?

We need not be modest about our skills, but to advance in Parton's level 4 an engineer needs to develop skills which are more than the strictly technical or managerial.

### **Skills of engineers**

Engineers have a long list of skills:

- Technical analysis
- Integration of diverse sorts of information
- Interaction with non-engineers on technical matters
- Acquisition strategy / contracts
- Project management
- Operations management
- Maintenance management
- Consultation with communities
- Political interface management (policy advice / representation to)
- Marketing
- Human resources
- Knowledgeable about the community infrastructure and its capabilities.

Of course not all engineers can tick off all of these or even in some cases would say they would seek to be doing a lot more of some of them. However most engineers I think with careers in years with two numbers in could tick off most on the list.

It is not an insubstantial skill list, however a lot of them are skills that undertakings consider they can readily buy in the market and indeed most of them are sought this way. They are needed at a governance level though but in a strategic way, not as a source of management capacity or detailed advice. To apply these skills and knowledge at Ian's level 4 needs a broader approach than considering oneself experienced at managing them.

### **Engineers as leaders**

I undertook a modicum of research here. A PA I had in the past had worked for four different engineers in her career. I asked her what we had in common.

Her answer: We were pragmatic, we lead by example, we were all good team players, we did not give too much weight to the popular strategic leadership tools which were flavour of the month, say like vision statement / mission statements and strategic direction, but did enough of it. What we did not do much of in our leadership was inspiring or exaltation – communicating vision or enthusiasm.

We were on the soft side on people management - not tough enough with those who were not performing or exploiting employment situations for personal gain to the disbenefit of the organisation. We were not always good delegators, doing ourselves what we knew how to do, rather than passing it to others.

Let me confess to recognising some of myself in this. Perhaps the sample members are not typical but in the absence of other evidence..... In any event it is about what one would expect from people who had elected a technical bent off their tertiary studies, who came to management by running things.

There are some real strengths here – team work is a skill that runs much of the world, pragmatism helps keep it sensible and leadership by example shows a basic honesty and personal application. The teamwork one is almost a given: anyone who has a successful early career in engineering will have been working in situations where teamwork was central to achieving anything. There are few solo consultancies for young engineers and no projects of any weight that one engineer can deliver alone.

But there are other leadership styles and they have application in particular circumstances. Inspirational and directional leadership is what is needed in some circumstances. It may not be engineers style of choice but engineers as leaders they need to be aware of the alternative and know when and how to push these buttons.

Doing oneself what one knows one can do is not good time management for a leader. It is doing not leading. And leading can at times be bloody – unpleasant things need to be done. It is not that one should train oneself to be indifferent to others or set aside natural justice and fairness. The labour courts have a way of catching up with instances of the latter. Avoidance or delay in dealing with people issues rarely helps. Not dealing with abuses invites cynicism and low morale in those who observe them happening.

Engineers then, at least on this evidence, have some great strengths as leaders but are prone to some traps as well, ones which we need to learn to avoid by extending their style of leadership beyond that which sufficed in their early careers, to use inspiration and direction when it is needed, and to deal with the human resources issues well.

### **Training for leadership**

While it is true that leaders emerge, it is unlikely that they emerge with all the skills they need. Once someone is in a top job it is too late to do much about adding to the skills. The person is usually too busy and as well, probably both set in their ways and confident that having got there they know enough already.

The sort of base broadening widening of skills and knowledge that is needed is not needed for everyone following an engineering career, but it is needed for emerging leaders.

I think the available courses will be well known. I would urge that they not be courses run by engineers or for engineers alone – there are a few of those. It is exposure to others in the course of these training episodes that is part of their value.

What we do need is for potential leaders to be identified and given the opportunity to progress through training as well as experience.

Most New Zealand employers of engineers are not large organisations. The commitment of resources to do this is not small. You should expect some contribution from the staff member themselves. Beware, those who achieve MBAs have a high probability of changing jobs when newly qualified. If you don't support them that is very likely their intent. If you want to keep them in-house be sure there are roles likely to emerge that will use their skills, and if you contribute perhaps consider tying them for a period, with a sliding scale repayment of firm's contribution if the employee leaves prematurely.

### **Local Government as a Career Path**

Managing in local government is a tough job. Executives in local government change just as often as in other sectors. The pressure to perform is substantial. They have to manage in a very complex environment. Local government has many responsibilities and they all must be addressed. Prioritisation is essential and while there are now much better planning processes to help with setting priorities and allocating resources, the pressure of responding to a wide diversity of day to day pressures is substantial. Councils actions or inactions are subject to very direct exposure. Management attention for the day is often on what is in the morning paper's headlines.

Councillors, often people of action themselves often want to be involved in the day to day matters of the Council. Rarely do the elected members of a Council all take the same public view on a matter. Councillors with an eye to future elections and later divisions of the powerful chairmanship roles, see advantage in being publicly in opposition to the ruling majority. This is not a situation foreign to central government executives but their exposure to the political interface is through a Minister, not regular public meetings. Senior civil servants get occasional exposure to select committees. They would not welcome being there weekly. Still one skill you learn is to keep a straight face when facing such meeting and one member has a joke at the expense of another. That's difficult when they can be very funny. I am not sure it is a skill that has much application anywhere else.

In New Zealand a substantial part of the media interface is often left to the council executive as well. It was a surprise to me on starting work in Brisbane that this role, for good or bad news was firmly in the hands of the elected members. The downside was the marketing programmes were often politically captured or caused a good deal of angst with staff as the politicians did not place much value on market research.

Lobby groups do not restrict their interest to the political sides of Council. Staff too often get attention. In public meetings on issues where the political members are not the experts the staff often get "it in the neck" from the public when they have to front on controversial matters. One can forgive emotional responses from people who are unexpectedly affected by proposals. They do not always stop at that.

It might be thought from this I am characterising all local body politicians as focused on the short term and on self-publicity. I have been privileged to work with a good many who were strategically focused and who served their communities well for very little reward, and in that time only one crook. I won't embarrass living ones, but just mention Keith Hay, who was long thinking and supportive of senior council staff in often surprising ways. He was a pleasure to work with and always challenging. I am sure he knew I did not much sympathise with his social conservatism. It did not matter.

Local government management roles I think are under-appreciated by the community at large. As I said they are tough jobs. The rewards today are better matched to the demands but they need to be for most senior appointments have short sell-by dates. The non-monetary rewards in building communities are real too.

I have spent most of my career in local government engineering and management, most enjoyably, in a couple of cases under quite severe stress in dealing with crises and in only one case frustrated.



Local government engineering careers now are not as broad as they were in the past when local government took on much more design and construction with its own staff. Most of that is now outsourced and indeed operations and maintenance is often likewise. Engineers could stay in one employment and gain a wide variety of experience. One skill that local government engineers do gain is explaining technical issues to lay people. It should not be underestimated.

While there are some things to be nostalgic about in the old regime there are a lot of features of it we are well rid of. Provider capture is the main one. The organisations were not efficient – they were over-manned – the management was captured to benefit the staff not the customers. Some (but not all) operations were very good technically but did not tackle productivity investment well, because they did not follow through with the consequences of productivity investment in a fixed market – that is doing with fewer people.

The rationalisation, corporatisation and in some cases privatisation that followed local government reform was mostly a good thing. There are still engineering careers in local government but they are asset management and planning oriented. They can be excessively narrow but in my observation the people filling them are quite mobile between jobs so perhaps they are avoiding that.

Engineers are quite commonly found as local council senior executives. Some came up entirely within local government engineering roles, but increasingly the executives in local government have more diverse careers and many are recruited from outside local government. That is not unwelcome. However one sees rather too often the expectation that an outside appointment from private industry will make a council run like a private industry. It can't through its very nature and the core functions of a council shouldn't run that way. Business structures have been honed over a long time to run businesses basically to make money. While they have some things to teach local government the purpose of the core of local government is not profit and the whole of the business philosophy is not a fit.

### **Engagement in Society**

It is a modern trend and one not restricted to New Zealand, that clubs and organisations have been struggling to maintain their membership numbers. Young people do not join them in the way that happened 30 years ago. There are some shifts in society that drive that. Young people in their early and mid careers now work very long hours. Compared to the past when one income nuclear families were common, there are now many with two careers to manage, or single parent homes. The time outside work available to run a household and sustain family and friends is less. These of course get priority and I think it is interests that are suffering. As well, travel is a boon, is so much more affordable and available. Many choose to save their spare time and resources for travel.

However I do get a feeling that the young regard spending time on interests as somehow irrelevant to their careers or even in conflict with them as a demand for their time, or likely to generate conflicts of interest they need to avoid. If that is a factor it is wrong. I have enjoyed many cross-overs from my career to my interests I think to the benefit of both.

I mention a few here from my interest in New Zealand archaeology, and current involvement in the Environmental Defence Society.

- Multivariate statistics – used first in archaeology on numerical typology - reapplied in hydrology for the ARC.
- Simulation modeling used first in archaeology on demographic modelling - reapplied in hydrology for the ARC.
- Accounting, first exposure as treasurer to the NZ Archaeological Association – (with additions) to management roles.
- Interest in Maori history – to Council management when cultural issues and tangata whenua values came newly to consideration in management of councils and issues.
- HR knowledge from ARC / Watercare - to the Auckland Museum Board.
- Project skills from ARC Watercare - to Auckland Museum Board.
- Global carbon cycle knowledge from archaeology (carbon dating) - to Environmental Defence Society in climate change advocacy.

- Project and consent renewal RMA consent experience from ARC/ Watercare - to EDS in RMA change advocacy and specific consent advocacy.

Just as importantly involvement outside the engineering profession gives contact with the community which grounds ones sense of the real world.

In my case the archaeology interest turned into a substantial part of my current consulting employment.

The sorts of interests I have tended to be academic. I am not advocating that orientation at all. Following your interests be they bee keeping or Zen Buddhism, as well as your job - with a proper balance between them - will benefit you, your employer and society.

There will be conflicts. Our modern world has vast choices for how we spend our time. We inevitably have to manage them.

I see a lot of older people who take up interests in retirement that they have had no previous exposure too. Frankly they often have not much to contribute at that point and are beyond learning too much that is new. Interests are better nurtured through a life.

### **Pro bono work**

This is related to my last subject. I think a lot of professionals do more pro-bono work later in their careers and I am sure engineers are the same. Engagement in society outside work will bring it along inevitably, be it designing a retaining wall for the local scout group hall, or giving RMA evidence for some impecunious community group. Such tasks may extend skills little but they will bring community involvement outside the confines of a career and bring engineers skills to the community. There are professional issues to manage in such work, over calls on time, over responsibilities to employers and over conflicts of interest. They are manageable and they arise more and more in developing careers. Small pro bono tasks are not a bad place to practice handling them.

## **Hubris in Leadership**

A couple of quotations:

About leaders as holders of overly positive illusions:

...positive illusions comprise – exaggerated self-perceptions, illusions of control over events, and overly optimistic expectations about the future.” (Johnson 2004: 24).

About leaders generally:

“... leaders, particularly those who reach top decision making positions, are not typical people - because of self-selection of people who want to become leaders, institutional and public selection of those who become leaders, and the non-random selection of henchmen by those who are leaders...” (Johnson 2004: 23)

Hubris is a word often applied to this situation. It is observed quite often in leaders:

"I sometimes wonder whether I am a victim of my own success as a popular and competent Prime Minister" - Helen Clark.

The best antidote to hubris is accountability. Often powerful people seek to avoid it. Presidents who became presidents for life, plural democracies that became one party states, dictatorships justified by great powers of perception, leadership, divine status, history, heredity, or the superiority of some class all sadly have abounded in the 20th century. But do they persist? It is rare. Some internal or external force usually becomes unstoppable especially when the wielders of that

force have to explain to the foot soldiers why it should be used in terms they can understand.

In business powerful leaders stack boards with cronies, or get themselves appointed to be both executive and chair of the governing body. It is another form of provider capture and again not immune to external forces, but the pain of the eventual change is great. The modern emphasis of good corporate governance hopefully means that such practices in business are becoming rare.

Still all leaders need to beware of hubris. One antidote is simply to be mixing with society outside the spheres in which you have great influence. If you say something silly in an area where you are a leader, you may not be challenged. Outside that sphere you can expect to be. It is not healthy to have an environment where pronouncements are not open to challenge. It suppresses the ideas and contributions that others can make.

Some people are naturally contrary but contrary people have good ideas too even when the way they put them is irritating.

A collegial atmosphere can assist where views and philosophies are always open to challenge, preferably polite challenge. A leader needs to be able to encourage debate in a way that defuses angry responses. Its difficult though when it is the leader that is being challenged. Academic debate need not get to a conclusion. Academics are often happiest when a dispute is continuing rather than concluding. Real world situations cannot tolerate endless debate.

Collegial organisations are also prone to “group think”. External challenges are needed.

An alternative I have used is to encourage contestability of advice. Boards should be able to see and question the internal and external experts rather than have everything channelled through a chief executive. They should be able to direct on occasions what external advice they want. Executives should behave the same

way: while encouraging their internal experts should commission external advice on crucial issues and not have it channelled through their reports. The difference from a general collegial approach to debating issues is that the process is not never ending, open ended as to scope and piecemeal. Specific and measured response can be sought to specific questions or issues.

### **Some leadership Issues**

I want to touch on a couple of issues that exercise me and in which I think engineers have something to add to society.

### **Cost in the assessment of projects**

Large projects run at a political interface. While in my experience many politicians will be well aware of the importance of a long view and will operate to that end, they are all subject to the force of re-election and the short term view that brings.

At worst the political direction can initially be expansive, with a long term view in years one and two of the electoral cycle and then suddenly scrooge like in the third.

I had past involvement in a project where the political direction at the outset was that cost factors were to have a weighting of less than 20% in the scoring of alternatives. An expensive project resulted of course which had high environmental benefits. Come the third year (the election year) and funding for a design study, a tiny amount of the overall project estimate, was not available because of budgetary constraints. Clearly the weighting on cost was in reality well above 20%.

Engineers as professional advisors need to be a counterbalance to such flip flops. I am not arguing that money is all important. It isn't all important but it is important. The world does not operate by giving it scant attention.

As an outsider to the detailed considerations of the Auckland eastern expressway the same sorts of concerns seem to arise.

An Auckland road lobby has been pushing that what is needed in Auckland is completion of the motorway system. Just which system plan was being completed was never clear to me – there have been many - but it seemed to be a slogan that resonated. Nor was it clear why completion was going to be a nirvana that fixed everything for ever – that is not what happens with transport. The current spending after all is mostly on enhancements of the existing system – much of it beyond the original plans.

The proposed eastern expressway became the focus of attention. The pressure to do something seemed to generate proposals almost irrespective of cost. The fact that it did not rank for Transit funding against their other priorities seemed to be considered as a political issue only. The prospect of tolls was advanced as the saviour but back-of-an-envelope calculations could easily show they were unlikely to be of much assistance. The project persisted in having rapid transit lanes attached – this on a route that paralleled a commuter existing rail route. Clearly a nonsense.

The project had vastly expensive tunnels at various times. Then suddenly all sorts of alternative routes came into consideration, and after a bout of consultation on this that greatly alarmed many people along the alternative routes it unsurprisingly settled back on the long protected route.

Lastly after two and bit years of this, ‘eastern expressway lite’ suddenly appeared with a cut price budget, reduced to a single lane in each direction over some seemingly critical lengths and no obvious assessment as to what contribution the ‘lite’ version would make to the traffic problem in relation to its cost. One need not be a cynic to know this was just before the local body election.

At this point it was admitted that the city end of the route had not been planned and needed further consideration.

The Auckland public voted out the mayor and most of the council that was leading this, and not surprisingly. They can spot ideologically driven chaos when

they see it. Elections are rarely single issue matters and this one was not either. However the eastern expressway was a major issue. It affects the eastern suburbs and that area traditionally has a high turnout in local government polls. I personally believe that the eastern expressway may well have a role in Auckland's future transportation, but if so it is further in the future.

I have no doubt a lot of engineers were involved in this. More leadership from our profession might have avoided the unreality which attended much of it.

Politics is real and cannot be ignored, but engineers can lead in providing some counterbalance to the unrealistic swings politics can engender in progressing major projects and addressing community needs needing infrastructure as solutions.

Engineers spend much of their early careers focused on costs and affordability. It is a strength and a skill the world needs. We should seize on it as our major contribution in leadership, not forgetting the non financial factors, but not letting them get out of proportion either.

### **Research and our energy future**

New Zealanders are good at learning from the best practice of others. We are not seen as threatening because of remoteness or size, so can often get information that would be withheld from a rival or competitor. Many of us have had periods of work or study abroad and retained contacts from that. When we have first returned we have imported the ideas of our offshore workplaces with us. We are an immigrant nation still so new citizens bring knowledge and skills with them as well. We are enthusiastic users of libraries and electronic information. Our diaspora of New Zealanders settled with careers abroad is another source we no doubt tap. Then we do travel a lot and absorb the learnings of others. I would venture we are a model of technology transfer, often at little cost. There are I think not many fields where our technology significantly lags the world. In some we avoid neatly being at the bleeding edge of things not yet proven. In most we can move quickly to adopt new technology developed by others.



In the area I have spent most of my career, water and wastes engineering it is sufficient to be an early follower. There are few uniquely New Zealand issues in this field that need basic research. In these fields though there is a need for operations oriented research, selecting technologies and optimising them.

Even in fields where we are followers engineers should be advocates for operations research. Often it can be carried out by the operators with a little assistance. What they need is the time resources and encouragement.

But can New Zealand just rely on being an early follower? In the 1970's oil crisis most western economies switched from being led by heavy manufacturing to being led by the growth in service industries, by growth in industries with a high content of intellectual property. They turned away from metal bashing. It is best characterised by their energy intensity starting to fall. Their economic growth exceeded their energy use growth.

New Zealand is a rare economy where this has not happened. We have long had cheap energy. It encouraged us to use a lot of it. Adding value to timber and milk involved using a lot of it. Getting products to overseas markets, needed still more partly from our place in the world but also because many were not bulk shipped. There are no milk supertankers.

What is the prospect for our energy cost? At the margin our energy comes from fossil fuels. Geological processes are not creating new oil and gas at the rate we are using them. Prices are going to rise as they get scarcer. Liquid and gas fuels from coal might set a cap to the rise and at that point the economically recoverable oil and gas should be able to be finally determined. Or will they? In Europe carbon emissions already have a cost. Next decade that will spread to here and many other developed countries. Expect it to spread to the rest of the world in the decade after that. The reality of global warming is that the world cannot burn the available coal and stick it in the atmosphere. Maybe there will be a CO<sub>2</sub> sequestration technology that is affordable and able to be mobilised on

the scale needed – but it seems unlikely at this point. CO2 emissions to the atmosphere will need to be capped. The right to emit will have a cost. It may well be match to the cost of sequestration and even if that works it will not be cheap. Hence even in a world with sequestration of coal originated CO2, energy will not be cheap.

In any event the long term future for energy cost is upwards. We know well that the effects of new discoveries, fields that exhaust, geopolitics, cartels and oil companies will mis-report their reserves to manipulate markets and will cause wild fluctuations around that trajectory, but it will come.

How are we placed for that shock?

Not well. Our energy use per GDP is very high, it has been rising. It is predicted to fall but will that fall be faster than the present and coming price shocks? I doubt it. We face a future where adding value to our traditional products, timber and milk in particular, may well be adding cost faster than it is adding value.

That is not an unfamiliar scene to a water and wastes engineer. Schemes to convert refuse to and sewage sludge to compost have abounded in the past decades. The product is bulky and not economical to haul far. Few have found application, simply because the value of the product does not justify the cost. Beware of low valued products.

Some ongoing cheap energy would be great for NZ Inc. – it is a competitive advantage we are used it exploiting, but it seems unlikely.

I believe what we need is sunrise industries that are heavy in intellectual property, where the IP alone can be sold, or where the products of the IP are not energy intensive. So energy is a driver. Some of the answer may be research in energy technology appropriate to us, but I do not think that is the whole answer. We need selective fundamental research that will drive IP heavy industries.

Where might those be? Well I am not that prescient, but wherever they are engineers of some ilk will be key. I am sure Fisher and Paykel is a model more could follow. To succeed on a global scale they will need to grow fast, be able to raise capital, attract staff and have support infrastructure. I am sure there are some nascent ones out there already. For New Zealand Inc the question is why should they stay here? The answer I think is both commercial and personal.

We need to make this a great place to grow businesses. But lots of places are doing that. So we also need to keep this a great place to live, for that is a unique competitive advantage in attracting and keeping high worth people here.

Do our business community get it?

The lobbying of their peak institutions in the past couple of years has in large part been about retaining cheap energy as a competitive advantage and about emasculating the RMA as a barrier to growth.

Both are wrong headed.

## **Envoi**

My reading in the past year has influenced what I have said today.

I recommend these three books. The first is the book of the TV series that showed here last year. It is a better book than most of that ilk. It was for me a great re-run of the Great Eastern, the Brooklyn Bridge and the Panama Canal.

The second is about hubris and how misunderstandings of relative strength lead to conflict.

The third has a lot about how engineers communicate – on the history of communication of technical intentions between designers and builders.

I read them all from Auckland City library.

- Cadbury, Deborah            2004   *Seven Wonders of the Industrial World*, Perennial.  
(related to the BBC series shown here in 2004).
- Johnson, D. D.    2004   *Overconfidence and War*. Harvard University Press  
P.
- Lewis, E.E.            2004   *Masterworks of Technology*, Prometheus Books,  
New York.

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