

An Engineering Career as a Transfer Function

David Murray

The Real-Time Data Co. Ltd. - Eng.D. EE Dept UCL

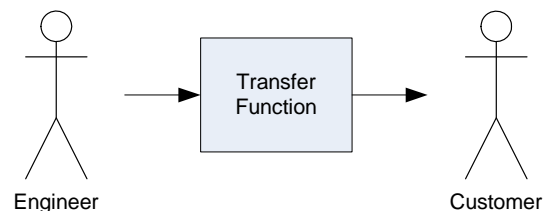
Abstract: 18% of Engineers move from the Engineering sector to other branches of the economy, a further 20% move to business and finance - (ETB Report Dec 2006). Why is this and what can be done to minimise it?.

Introduction

Engineering courses teach us the mechanics of Engineering. There may be some acknowledgement of Systems Design, even some business aspects and languages. If we assume that 35% of Engineering students don't set out to leave their chosen calling, then there is some cause for concern that, despite the training, disillusionment sets in at a later stage. These statistics are taken from the Engineering and Technology Board's report, Dec 2006 [1]. Some of the possible causes are explored, together with some suggestions to help avoid the issues.

Transfer Function

Employment can be considered to be a transfer function, the means by which an individual's skills and experience are



transformed to deliver a customer's needs. In a perfect situation this would be a simple function, all of the customer's needs are delivered by a combination of all of the individuals' skills (Figure 1). This would result in perfect satisfaction for both the customer and the individuals who provided the solution. So, a measure of the effectiveness of the transfer function is the 'satisfaction factor'. In considering the individual Engineer, we will assume that if an individual's satisfaction factor is high, they would not wish to change career.

Figure 1 - Simple Transfer Function

However, the perfect situation seldom exists and distortion is present in the forms of poor communication, misunderstand and poor management. This means that the customer may not get what is required. The customer is dissatisfied and this ripples back to the delivery team; most people would be de-motivated if, after a lot of work, the objective was not met. If the distortion also conspired to underutilise their skills, the results are seriously dissatisfied individuals. In addition to utilisation of taught skills, we have introduced a feedback factor from the customer and the possibility of an unappreciative management. These go beyond taught skills, to include expectations; working environment, and inter-personal relationships. The transfer function is getting more complex than an application of the skills taught by the educational and training processes (Figure 2).

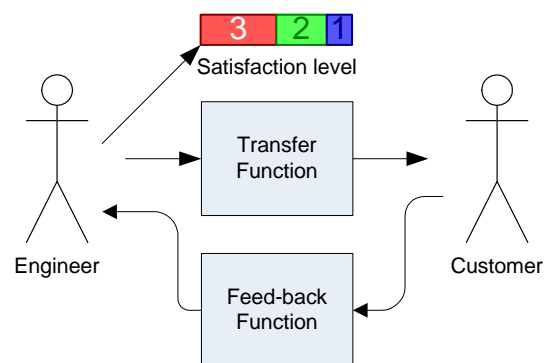


Figure 2 - It's more complex

These go beyond taught skills, to include expectations; working environment, and inter-personal relationships. The transfer function is getting more complex than an application of the skills taught by the educational and training processes (Figure 2).

The Value of Analogy?

Of course, this is a pseudo-technical, tongue-in-cheek perspective, but there is an underlying reality. There is more to job satisfaction than being a good specialist. It is necessary to consider the wider aspects. It is often the case in large organisations that Engineers don't meet customers and never see the end-results of their work, I found this frustrating and left to work in a small company. I know people in another large organisation who were exhorted to work long hours to achieve a goal, unfortunately the management decided to close the project and make the team redundant. This had a de-motivational effect far beyond the affected team and some good members of other teams left.

One of the main de-motivators that I have seen in the industry is job transfer, often called 'promotion'. The 'best' people are moved into management roles on the basis that this is reward. It is happening less now, but it still exists in those organisations that have pay-structures offering managers more potential earning power than Engineers. Changing career-path is an obvious move in these circumstances.

But is it? Work done by Frederick Herzberg [2] identified a number of factors (see Figure 3) that either motivate or de-motivate employees. He found that money is down around 7th on the list, it has more power to de-motivate (because it is too low) than to motivate (people don't work harder if they get paid more). This means that either the pay was very bad (at the level that a 'reasonable' lifestyle cannot be maintained), or around 6 other factors must have worked their effect for people to leave their career path, ostensibly because of the pay. Higher on the list are company policy and administration, supervision, and the work itself, perhaps the better solution in these circumstances is to change employer not career. Poor management will affect all jobs in the organisation.

Hertzberg: The headings are rather small in the Figure 3; from the top down, they are organised to show the greatest de-motivator (red) and are:

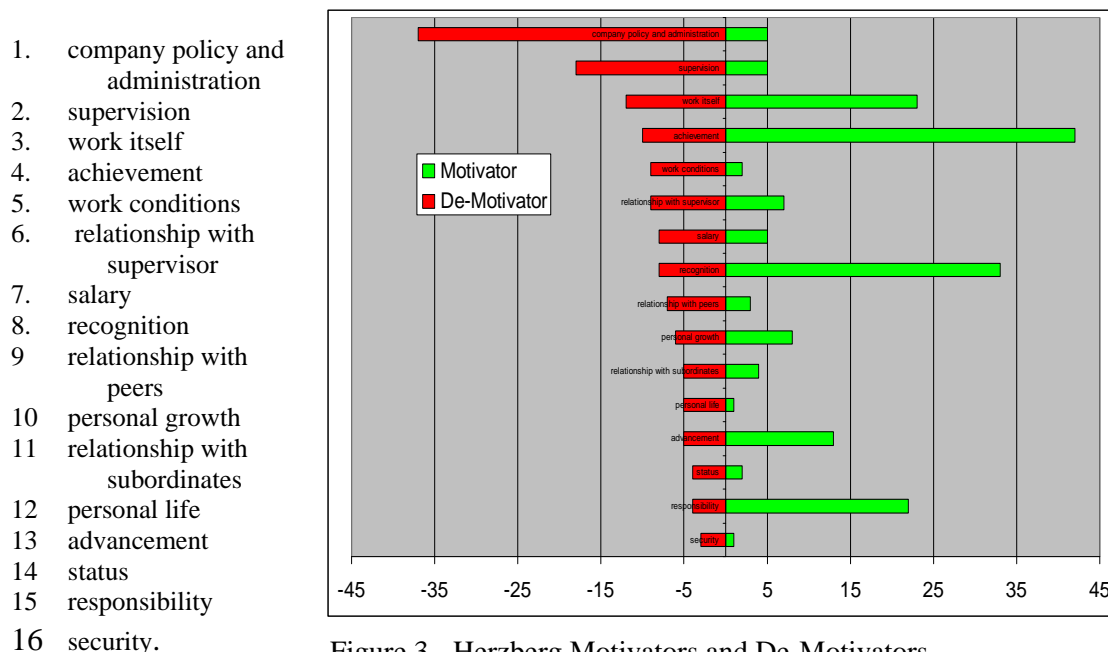


Figure 3 - Herzberg Motivators and De-Motivators

The graph shows, for each heading the relative effects to motivate and de-motivate. Company policy can be a killer if it's bad (remember the redundancy example above), but will be barely recognised if it's good. Conversely, the work itself will hold people together if the match is good, and there is a fair tolerance if it isn't.

Using the Information

So, what do potential employees ask about at interview? The smarter ones don't put money at the top of the list. They are interested in the organisation, their position and responsibilities, who they will be working with and, the really smart ones, ask about turnover of staff - a good measure of the health of the management policies. Those organisations that promote people to management positions because they are good at their (current - technical) job are failing to observe the rules established by Herzberg. Promotion can be achieved by escalating technical responsibility levels for technically biased people; the 'management' aspects of the more senior positions are handled in other ways by the better employers. The principle of the surgical team, as described by Fred Brooks [3], is one example of this. What matters is what matters to the employee, according to Herzberg.

Utopian Employment Criteria: Charles Handy [4;5] takes this a step further. He believes that the successful companies of the future will be almost virtual. They will employ intellectual property from a pool of people who organise themselves to work in this way. Taken to its extreme, there would be no permanent employees, and people would not have a single employer. A misty cloud of people would coalesce for a project; achieve the objectives required by the employer and re-form for another project, another employer, another day. The successful companies would be those with clear strategies and objectives, the current method of employment would be close to a handicap. People would be repositories of skills and knowledge, a different career hierarchy would evolve based upon core skills of both the employing companies and individuals. This may be not quite the way it is at the moment, but there are parallels in the way larger organisations apply matrix management and utilise the skills of smaller organisations. It is also flickering into life with the recent trend for small companies to work in exactly this way.

What to look for: To find an employer with whom to have the best chance of staying motivated, with least risk of wishing that you had chosen another career, take a look at their company policy and administration; whom you will be working with, and what the job actually is. See how, and how often, they reward achievement (4th on the list and also the greatest motivator) and you will have the tools to make a decision. Achievement, we are learning, is not necessarily rewarded by paying more; ideally, it would create more opportunity to achieve personal goals - the greatest motivator.

Reward might be a move into management, if that aligns with a person's career plan; it might also be a training opportunity, or a peer-group reward. Rewards are often group-achievement related because this is what matters to the company, the best ones allow peer-group acknowledgement of 'outstanding contribution', they are 'open' in that participants know their position in the hierarchy, they are enabled and encouraged to move up it. There are very few companies that have an effective reward scheme that meets all of these criteria, as reported by a PA Consulting Group report [6], so don't be surprised if the question is not adequately answered!

Stereo-Types

Clearly, the best organisations to work for are the large multi-nationals. They are the brand leaders, they carry prestige and everyone knows their name, so they must be good. They will have long-term prospects and offer a reliable job - maybe.

FACTS: The Government's UK Statistics website <http://stats.berr.gov.uk/ed/sme/> tells us there were 4.3 Million businesses in the UK at the start of 2005, 99% of which are 'small businesses' employing 47% of people in the private sector.

My own experience is that a large organisation can be constricting and frustrating. A small company generally offers specialist services to large organisations, it needs specialist skills and it needs to maintain them - that's what it sells. In addition, it offers a much wider exposure to other specialist skills and business issues - there are fewer people and no supporting departments. Frequently, we hear remarks about the freedom that our employees can display in getting a task done, the decision-making process is a very flat one, often delegated to the individual with the issue to be resolved. However, they are not the right place for all people. Those people that wish to have this freedom would be struggling in a large organisation. Conversely, we have also experienced those that do not wish to have this freedom ('responsibility') and feel insecure because of it - it's one of those personal issues that are not always given sufficient importance in the initial job-selection decision.

Conclusions

The number of Engineers changing their career path is of concern, especially as the number entering the field is declining. Employers have a duty to retain employees in the industry and some work is self-evidently needed to get this right. In the face of persistent failure such as is reported by these annual statistics, a good Engineering precept is to step-back and review basic principles. Herzberg attempted to teach us what people look for, frequently we hear that the money is inadequate and a career move is required to correct this. Although money is a factor, there are others with higher importance.

It should not be assumed that the best way to avoid this problem is to join a large organisation - or a small one; the importance is joining the appropriate organisation.

Unfortunately, there are no statistics about the previous jobs of those that left the industry. Do we think they left large organisations or small ones? Maybe it was a mix. Maybe they were in the wrong jobs, maybe they were with the wrong employer - whilst mourning their loss, let's hope they found the right Herzberg-mix in their new careers, and that we can all learn from their experience.

References

- [1] J. D. Morton, "Engineering UK 2006 (ETB)," Engineering and Technology Board (ETB), Dec. 2006.
- [2] F. Herzberg, "One More Time: How Do You Motivate Employees?," *Harvard Business Review*, vol. 46, no. 1, pp. 53-62, 1968.
- [3] F. P. Brooks, "Mythical Man Month," in *The Mythical Man Month* Addison Wesley, 1995.
- [4] C. Handy, *The Future of Work* Blackwell, 1984.
- [5] C. Handy, *The Age of Unreason* Harvard Business School Press, 1995.
- [6] M. Thomas, "Design and Delivery of Employee Reward Systems," PA Consulting Group, 2007.