

**Maintaining technical expertise in the insurance /  
reinsurance industry**

**Authors:**

Oscar Treceno, SwissRe (Chairman)

Wilko Emmens, Praevenio

Mats Gadin, If-Insurance

Helmut Heller, Allianz

Philipp Kusche, SwissRe

Louis Wassmer, Infrassure

## Table of contents

<a href="#">1. Introduction and objective of paper</a>	3
<a href="#">2. The problem, cause and consequences of declining technical expertise</a>	4
<a href="#">2.1. The problem of declining technical expertise</a>	4
<a href="#">Engineers as knowledge carriers – why?</a>	4
<a href="#">The problem</a>	5
<a href="#">2.2. The cause of declining technical expertise</a>	6
<a href="#">Migration of know-how</a>	6
<a href="#">Insufficient development of know-how, training</a>	6
<a href="#">Concentration of know-how on individual knowledge carriers</a>	8
<a href="#">Shortage of engineers on the market prevents new recruitments</a>	8
<a href="#">2.3. Consequence of a decline in technical expertise</a>	10
<a href="#">Know-how migration – Solution: Professional development</a>	11
<a href="#">Insufficient development of know-how, training – Solution: Optimise development and training</a>	11
<a href="#">Concentration of know-how on individual knowledge carriers – Solution: Focus know-how, form internal expert groups and create centres of competence</a>	12
<a href="#">Shortage of engineers on the market preventing new recruitments – Solution: Attract engineers for insurance and reinsurance industry</a>	13
<a href="#">Other solutions: Hiring of non-engineers</a>	14
<a href="#">Other solutions: Outsource expertise</a>	14
<a href="#">4. Conclusion</a>	15

## **1. Introduction and objective of paper**

During the 2003 IMIA meeting in Stockholm, a working group was formed to analyse the issue of declining technical expertise in the insurance and reinsurance industries engineering line of business. A workgroup of six insurance and reinsurance professionals was formed to discuss this topic in more detail.

The objective of this paper is to describe the issue of declining technical expertise in the industry, to identify the cause and to explore possible solutions to secure and further develop technical expertise in engineering insurance.

The paper is designed to inform interested parties about the characteristics and potential of engineering insurance and should be used as an internal framework by insurance and reinsurance companies faced with the issue of declining technical expertise in their engineering insurance units.

## 2. The problem, cause and consequences of declining technical expertise

### 2.1. The problem of declining technical expertise

#### Engineers as knowledge carriers – why?

For the most part, the knowledge carriers in engineering insurance are and always have been engineers. Before exploring ways to deal with the decline of technical know-how, the question should be examined whether engineers are needed at all in engineering insurance and, if so, in what area.

Currently, engineers employed in the insurance industry have various backgrounds and many different skills. Virtually all engineering disciplines are represented, e.g. civil, chemical, electrical, electronic, geotechnical, hydraulic, mechanical, marine, mining and structural. These specialists are employed in various areas, and the following section describes the role of engineers in the four main areas of engineering insurance, i.e. claims investigation and claims handling, underwriting, risk control and prevention and risk inspection.

#### ▪ **Claims investigation and claims handling**

While the engineer's role in processing claims is varied, the primary task is to identify the full extent of damage, i.e. causation, nature and procedure of repair of damage and control of the quantum. Investigations must be conducted to establish the exact cause of failure and obtain a detailed understanding of causes in order to establish the different liabilities involved.

It is imperative for the engineers to monitor all activities involved during the repair procedure and to attend testing and commissioning of machines once repairs have been completed.

#### ▪ **Underwriting**

Many direct insurers and reinsurers employ engineers as underwriters (or advisors to underwriters), where their task comprises the preparation or identification of:

- ⇒ risk profiles
- ⇒ risk hazards requiring special consideration
- ⇒ risks that need to be excluded or restricted
- ⇒ probable and possible loss features applicable to risk factors

Engineers are also expected to identify and appraise technological developments in all engineering disciplines as well as deficiencies, weaknesses and abnormal hazards affecting a given risk. Concerning the commercial or contractual aspects involved in this area, e.g. premium calculation and wording issues, they are also obliged to undergo several years' training to ensure that they have the necessary in-depth knowledge and sound underwriting skills.

- **Risk control / loss prevention**

The engineer's core assignment is to identify risk factors and evaluate potential losses under the relevant insurance policy. Physical and moral aspects as well as maintenance programmes are of key factors to consider in this process.

Engineers must focus their efforts on loss prevention and avoidance, which in itself presupposes that the potential origin of a given loss is first identified and that procedures and/or activities are implemented to eliminate or minimise any possible adverse effects.

- **Risk inspections**

In Anglo-American countries, inspections for boilers and certain types of machinery tend to be mandatory and are conducted by insurance companies. In some European countries, this task is taken over by independent control offices, such as the "Technische Überwachungsverein" in Germany. Insurance companies have also developed activities in this field, eventually through subsidiaries, employing numerous engineers from all disciplines.

To be a successful risk carrier in engineering business, an insurer clearly must have engineers on its staff. The identification, appraisal and control of risks alongside claims investigation and repair monitoring are all part of the job description for insurance engineers, who work in close co-operation with the insured's engineers, loss adjusters, brokers or directly with risk managers.

Before this setting, it becomes clear that today's engineers are focused not only on technical aspects but also on legal issues (e.g. wordings) and commercial criteria, such as underwriting risk appetite. Moreover, advanced loss of profit and delay in start-up covers require a sound understanding of balance sheets and profit and loss statements. Engineering insurance being one of the most global business segments, an excellent knowledge of several languages is a must in international engineering business. Finally, the ability to work well in a team rounds off the demanding requirement profile of an engineer working in the insurance business.

## **The problem**

More than other industries, the insurance industry is based on experiences made in the past. Empirical values are used to develop models and techniques with which to estimate and handle future losses and claims. Retaining historical data and knowledge is therefore key to ensuring long-term profitability and a high quality client service.

In engineering insurance in particular, there is an urgent need to adapt quickly to technical developments and industry trends, and to include findings made in these areas into wordings, clauses and claims adjustments. To secure and develop technical and insurance know-how is therefore of crucial importance, and options must be developed to retain the know-how currently available in engineering insurance. This is all the more urgent since not only hard statistical data but other aspects of expertise are of equal importance, and much of this information and skill is

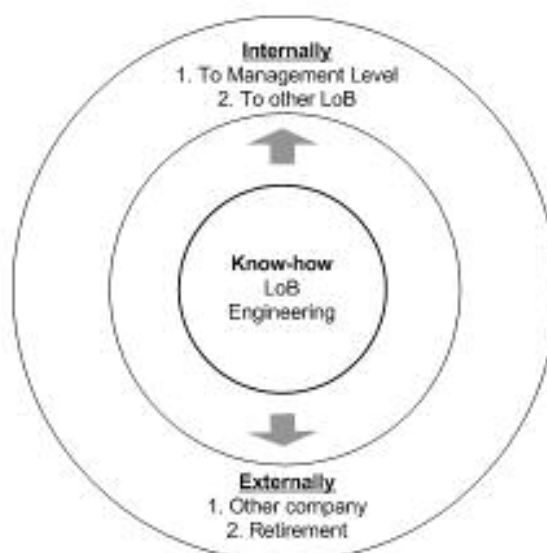
currently concentrated on a limited number of persons. Undeniably, this represents a substantial operational risk. One effective way to reduce operational exposure is to develop and recruit qualified personnel.

## 2.2. The cause of declining technical expertise

Having identified the issue of declining technical expertise in engineering insurance, the next step is to examine the contributing causes for this trend. In general, the causes identified here are similar to those existing in other lines of business and organisations. Even so, the consequences (see section 2.3) are more severe in engineering insurance, since the time required to regain an adequate level of expertise is generally much longer than in other lines of business.

### Migration of know-how

The main reason for declining expertise is the migration of knowledge carriers and experienced staff into two possible directions (see Figure 1). The individuals concerned either move to the management level or to another line of business within the same organisation, or they take on a position in another company. Retirement also contributes to the knowledge drain.



**Figure 1, Migration of knowledge carriers**

There are many reasons for this phenomenon, ranging from career opportunities in another line of business – mainly property, since engineers tend to be well educated, analytical and equipped with the necessary underwriting expertise – to lacking career opportunities and possibly the absence of prestige in the insurance organisation, since engineering is regarded as a niche market.

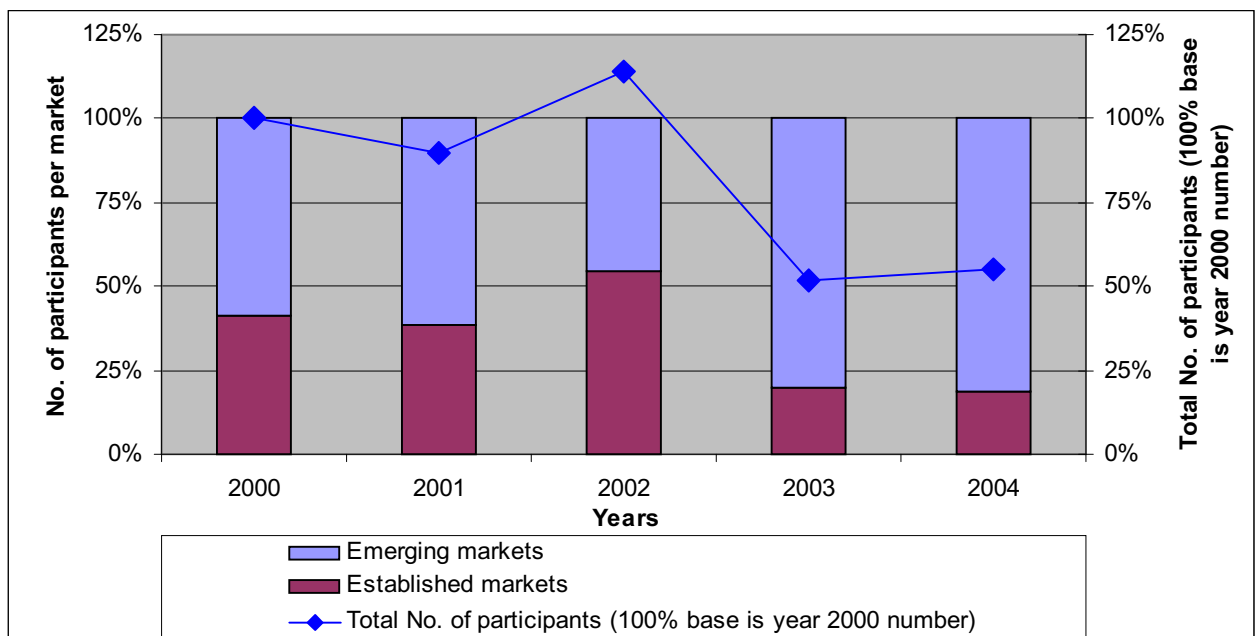
### Insufficient development of know-how, training

The rapid technical developments in the construction industry and the changing environment for construction projects, e.g. with project finance and turnkey projects, require ongoing training of insurance staff. Unfortunately, many insurers and reinsurers have cut their training budgets in

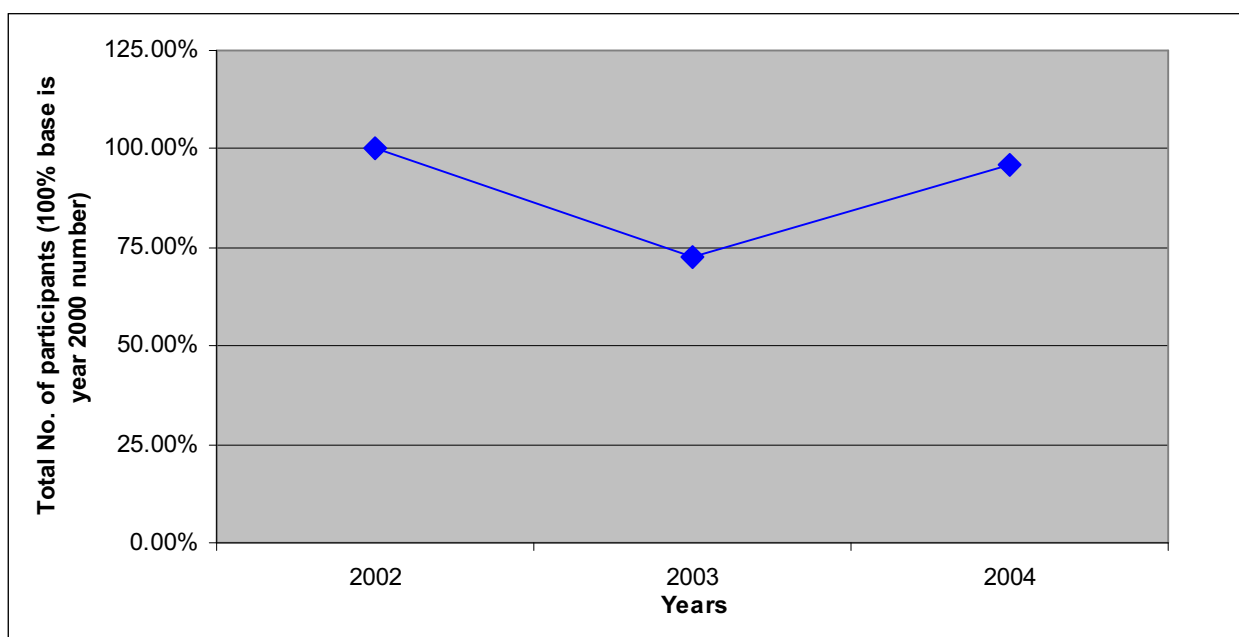
recent years, thus achieving savings in the short term but at the same time triggering huge deficits in securing and developing insurance and engineering know-how, which in turn may have an impact on the long-term profitability of the engineering insurance business.

Figure 2 shows a significant decline in the number of participants attending SITC (Swiss Insurance Training Centre) between 2000 and 2004. The figure also reveals a shift in the type of markets represented by the participants. While companies in established markets often sent their staff on courses prior to 2002, these figures have dropped sharply since then, due to cost cutting programmes. Comparing these numbers with the Munich Re training statistics, a similar trend can be observed in the year 2003, where a reduction of some 25% against the previous year was observed. Both statistics indicate a recovery in 2004, with a more pronounced increase of Munich Re's figures.

**Figure 2, SITC training statistics**



**Figure 3, Training Centre Munich Re statistics :**



Note : The department Risk and Knowledge currently managing the trainings has been created in 2001. Prior to this date the counting of the participants was done on a decentralised basis.

### **Concentration of know-how on individual knowledge carriers**

Based on the increasing diversification of the engineering insurance business and on the reduction of expertise throughout organisations in general, a great deal of specific know-how is concentrated on individuals in a single location. As mentioned before, this heightens the operational risk and reduces any opportunity of cross-fertilisation.

### **Shortage of engineers on the market prevents new recruitments**

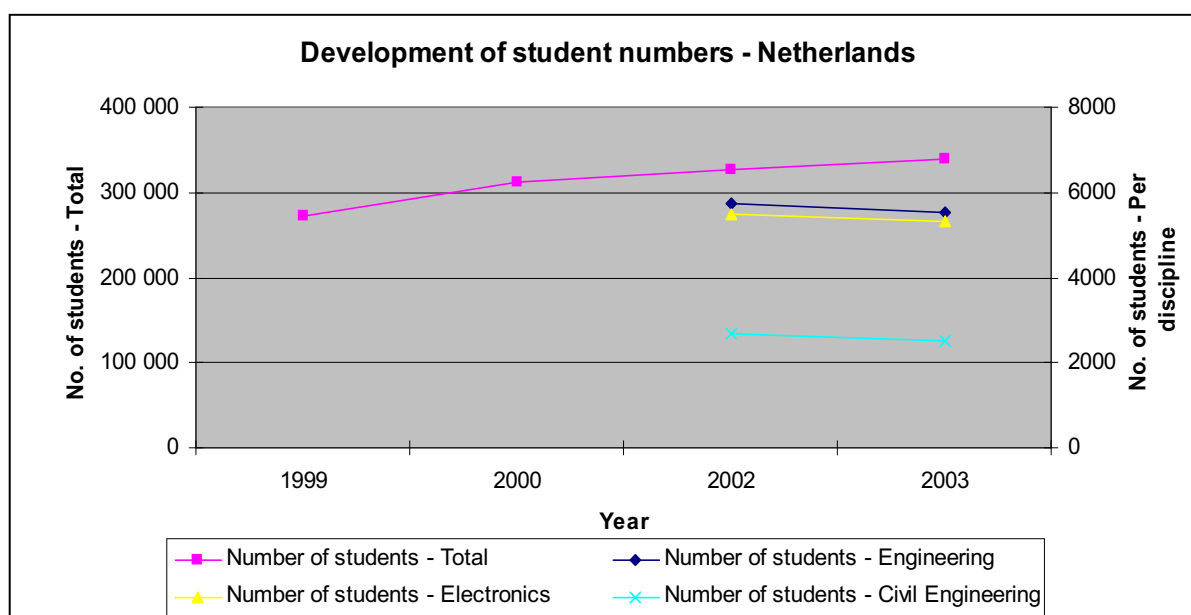
New engineers must be recruited to stabilise and develop resources in engineering insurance.

One problem of recruiting adequate numbers of engineers is the already limited number of engineering students and graduates on the market. The following quotes give a good reflection of the current situation:

- The “Engineers’ Association” (VDI) in Germany: “42% of the companies in the survey say they face problems in filling open positions for engineers. The companies consider the limited interest in technical studies and the insufficient management qualification of candidates to be the main reasons for their problems to fill their openings. “
- The “Central Bureau for Statistics” in the Netherlands: A similar trend is evident in the Netherlands. As shown in Figure 4, the number of graduates in technical studies continues to decrease even though overall student numbers are increasing.

**Figure 4, Student numbers in the Netherlands**





- Organisation for Economic Co-Operation and Development (OECD) report: “The education level of young people was never as high as it is today. More than a quarter (26%) of the “OECD” population aged 25 to 64 had a completed tertiary level education in 2001 and about one fifth of all university graduates obtain degrees in science and engineering.”
- “OECD” Observer / US National Science Foundation: “42% of science and engineering PhDs were working outside their field of training, chiefly for financial reasons, a change in professional interests or lack of opportunities in their field. A significant portion of them are not finding jobs in occupations that are closely related to their studies. This might signal another problem: a mismatch between what the market needs and is willing to pay and the skill sets, interests and salary aspirations the graduates have.”

Analysing these quotes, a shortage of engineers is evident and will not be solved on a short term basis considering the graduate numbers. Nevertheless, the mentioned mismatch between acquired and required skills puts this shortage into perspective.

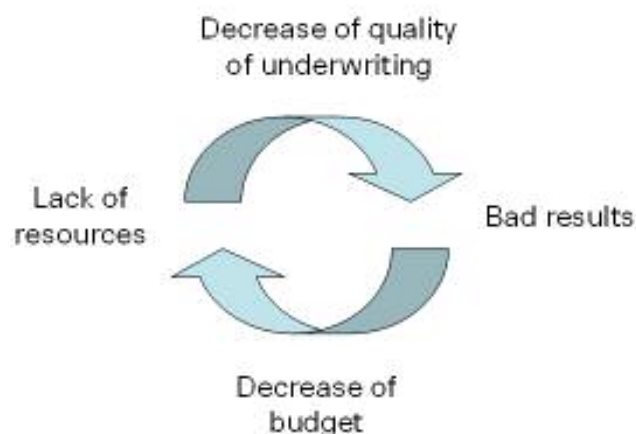
The trend of a shortage of engineers on a world-wide basis is even more evident in developed countries. This is mainly due to the fact that, assuming a consistent number of students, there is high demand particularly from the services industry for graduates trained in business and finance. This prompts a reduction in the number of first-year students in engineering studies and a corresponding shift to finance-oriented studies. In addition, engineering has the reputation of being a hard discipline to study, with low salary expectations at the end.

Conversely, the demand for graduates with an engineering background is higher in emerging markets, where students are more motivated to become engineers as a result. Recruitment of graduate and experienced engineers is thus easier in emerging markets, where the services industry (e.g. insurance and banks) is still in a developing phase and has less expertise to transfer.

Apart from the lack of graduates, there is also a shortage of experienced engineers who could be recruited for engineering insurance. The different tasks and skill sets largely depend on the specific jobs described in section 2.1. Even so, the industry continues to focus on experienced engineers in the construction industry, preferably with project management and site work experience of 5 to 10 years. Another aspect to consider is the fact that engineers are hardly aware of the job opportunities existing in the insurance industry, and after 5 to 10 years of field experience, they make comparatively expensive staff, particularly considering that insurers still need to invest substantially in their education to make them experienced underwriters.

### 2.3. Consequence of a decline in technical expertise

The consequences of a decline in technical expertise either through a lack of resources or reduced training are severe. This can be seen, for example, from the increasing trend to rehire retired experts with the assignment to feed in their know-how and expertise into daily business. A lack of qualified resources impairs the quality of underwriting and thus affects results. This may prompt the beginning of a vicious circle, since poor results lead to budget restrictions and thus to reduced training and qualified hires, which in turn affects underwriting quality and leads to poor results (see Figure 5).



**Figure 5, Vicious circle of reduction of know-how**

### 3. Possible solutions to secure and develop technical expertise



The decline in technical expertise poses a threat to the engineering insurance and may have a severe impact on the long-term profitability of the insurance business. Therefore, ways have to be explored in order to secure and develop the current technical expertise.

#### Know-how migration – Solution: Professional development

The internal and external migration of experienced staff represents a significant danger for engineering insurers, since replacement times and in particular the replacement of know-how is very difficult and time consuming. Ways to counteract the mitigation of resources and know-how are manifold and are no different from those in other industries. The key factor is to motivate and develop experienced staff.

One possibility of doing this is to develop career paths in parallel to the management career in order raise the significance of a technical career and demonstrate appropriate recognition within the organisation. This can be achieved by launching professional development programmes. Many insurance companies have launched development programmes for their experienced underwriters. The concepts are based on the understanding that underwriting is of vital importance to insurance companies and that adequate recognition must be established. Therefore, selected experienced staff are appointed *key underwriters*; they are considered experts throughout the organisation and incorporate their know-how and experience in insurance products and underwriting guidelines. This nomination is viewed as a promotion similar to a promotion to management. This approach demonstrates the recognition of the underwriters by top management and offers the experts an interesting and challenging career opportunity.

It is understood that such development programmes increase the budget and can only be launched when the value added and a long-term profitability of the line of business can be proven.

	
<ul style="list-style-type: none"> <li>⇒ Recognition of knowledge carriers</li> <li>⇒ Identification of knowledge carriers</li> <li>⇒ Offering of career possibility beside management career</li> <li>⇒ Satisfaction of personnel development needs</li> </ul>	<ul style="list-style-type: none"> <li>⇒ Increase of development budget</li> </ul>
<ul style="list-style-type: none"> <li>⇒ Favoured option which motivates and challenges underwriters, improving underwriting quality and recognition</li> </ul>	

#### Insufficient development of know-how, training – Solution: Optimise development and training

As Figure 2 in section 2.2 explains, training budgets are being cut throughout the insurance industry. This reduction and increasing time pressure in daily underwriting work has led to higher demand for training. In order to respond to employees' needs, to develop existing know-how

further and to stay abreast of the technical developments, the offer of professional training seminars for employees should be enhanced, and specialist magazines dealing with the latest developments should be made available. In addition, staff should be encouraged to visit sites and relevant exhibitions on a regular basis in order to help them build their knowledge and develop their network within the industry.



⇒ Higher underwriting quality due to increased know-how leading to better results

⇒ Satisfaction of staff development needs

⇒ Favoured option which develops know-how and follows technical and insurance developments



⇒ Increased development budget

### **Concentration of know-how on individual knowledge carriers – Solution: Focus know-how, form internal expert groups and create centres of competence**

The concentration on individual knowledge carriers leads to an operational risk and several companies are looking into possible ways of solving this issue. There is a strong trend towards knowledge management.

This can be done by developing a strong network of experts within a company, i.e. by bringing together selected experienced underwriters in a given area – such as tunnels – as experts with certain referral rights in a diversified organisation against other underwriters. This ensures a high-quality underwriting standard. These referral procedures are generally applied in certain situations, e.g. if a specific risk type or a sum insured exceeds a given limit.

In order to compound this strict process and to support the underwriters within an organisation, some companies have established knowledge networks. These virtual networks are web-based internal databases where information can be centrally stored and accessed, and where information, opinions and experiences can be exchanged within the company's underwriting community. Furthermore, information should be produced to transfer the know-how from individual knowledge carriers, i.e. experienced underwriters should feed information into accessible databases in order to allow the entire organisation to benefit from it and to reduce the organisational risks.



⇒ Reduction of operational risk

⇒ Higher underwriting quality leading to better result

⇒ Favoured option which increases underwriting quality



⇒ Time-consuming and complex process involving organisational changes

## **Shortage of engineers on the market preventing new recruitments – Solution: Attract engineers for insurance and reinsurance industry**

One identified problem was the shortage of engineering graduates combined with a certain mismatch of skills and qualifications. According to the mentioned “OECD” report, it is not really a lack of engineering graduates but rather a mismatch of the skill set. Therefore, the insurance industry and the universities have to work closer together and develop win-win situations for both parties and for the graduates. The earlier the two institutions share their expectations the better. In-house insurance experts can offer lectures and information events at universities to prepare the students better for the market expectations after they have graduated.

This frequently mentioned mismatch between acquired and required skills from the industry can nevertheless only be solved on a political level to make studies more practical and more efficient. In addition, the financing of technical studies and universities is becoming more difficult to ensure high quality education. More emphasis must be placed on financing, and alternative financing methods need to be explored.

The mentioned unattractiveness of the insurance industry mostly is not due to antipathy but rather to ignorance. As engineering students are not exposed to the insurance industry throughout their studies, ways must be explored to raise awareness and interest of the students. This can be done by offering information seminars during their studies and showing the practical use of their skills within the insurance industry in a similar way as consulting companies approach technical students. They must understand that their special skills, i.e. their analytical thinking and problem solving approach are essential and important for the insurance industry, and that there are tremendous opportunities within the industry. Intensive marketing at universities, student job fairs and the like will raise awareness and attract candidates automatically. The wide base over different project types, the financial link, the world-wide perspective and the possibility to become one of the rare specialists in a challenging area will raise the interest of many graduates. A prerequisite for convincing arguments is the long-term profitability of engineering insurance.

In order to target experienced engineers, the intensified marketing at universities will help in the long term. From a short to mid-term perspective, experienced engineers can predominantly be targeted via job advertisements. Furthermore, universities and other institutions can be encouraged to offer training seminars and educational programmes to offer the interested engineers development opportunities. Ideally, these institutions could offer an accredited title at the end of such programmes, such as an “Engineering Underwriter”. For example, the Chartered Institute of London could develop an accredited certificate which proves a certain qualification and becomes recognised by the market.



⇒ Increased number of candidates for engineering insurance





⇒ Long-term process

- ⇒ Match of acquired and required skills of candidates
- ⇒ Low investments
- ⇒ Favoured option with following actions: Create a win-win situation with universities in order to render studies more practical and efficient, intensify marketing at universities to increase visibility of insurance industry with engineering students and encourage institutions to offer accredited and recognised certificates such as an “Engineering Underwriter”

### Other solutions: Hiring of non-engineers



One possibility is to outsource all relevant engineering know-how to external specialised companies. This extreme solution should just draw the picture of the impact such a decision might have.

Staff with no engineering background is in most cases cheaper to employ and their availability on the market is higher. On the other side, employees within engineering insurance work where technical know-how is essential, as seen in chapter 2.1. This technical know-how has to be developed and trained if employing non-specialists by intensified extensive training and developments which heavily increase the budget and might absorb the cost savings on the salary side. Therefore, a lack of experience in the construction industry and technical knowledge can only be compensated by extensive training and experience, which makes this option unrealistic on a larger scale, i.e. replacing all engineers by non-specialists.

	
⇒ Short-term cost saving of salaries	⇒ Intense training needs which eats up cost savings
⇒ High availability of resources	⇒ Due to lack of technical know-how lower underwriting quality
⇒ Not favoured option due to danger of low underwriting quality	

### Other solutions: Outsource expertise

Another rarely discussed possibility is the outsourcing of the entire engineering expertise to another specialised company. The advantages are short-term savings of in-house specialised staff. The clear disadvantages are the loss of in-house expertise and the loss of influence over it. Furthermore, the practicality within the daily underwriting work is low, since external specialists cannot be consulted in every case. Nevertheless, the possibility of having external consultants for very specific questions in place is an advantage and should be part of an underwriting process but can not replace it.

	
⇒ Short term cost saving of salaries	⇒ No control / influence over external company
	⇒ Low practicality within the daily underwriting process
⇒ Not favoured option due to impracticality. Nevertheless, should be considered to complement the underwriting process at specific issues.	

## 4. Conclusion

The decline of know-how is threatening the long-term profitability of engineering insurance since it affects underwriting quality and leads to higher claims and lower profit.

This decline in know-how has several causes, most of which can be solved by outsourcing the expertise or by employing non-engineers. Precisely this mistake should not be made, since engineers are of crucial importance for the profitability of the business in claims investigation and handling, underwriting, risk control and loss prevention or risk inspection. In all areas, the technical know-how and insurance knowledge is of major importance. Of course, there are many areas where staff from other backgrounds add value and contribute to the business. However, the technical background and expertise of engineers should not be underestimated, especially for technical risks.

The line of engineering, as any other niche line, is confronted with the migration of experienced staff, the lack of suitable candidates and the need to regain an appropriate level of know-how. The main opportunities are professional career programmes parallel to the management career, the provision of time and budget for regular training, and the focus of know-how via internal expert groups. An adequate “supply” of candidates can only be guaranteed in the long run if the awareness among engineers is raised and development opportunities are clearly mapped out.

In general, the solution for counteracting the decline of know-how within the engineering line is quite simple: it consists of investing in and motivating staff, and of managing and further developing in-house knowledge.

This calls for the organisation itself to step into action and translate these solutions into reality. Investments in this area are justified only if the long-term profitability of the engineering line can be guaranteed.