

Structural failure in a wider context

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This is a personal view meant as an introduction to a discussion about some important issues related to collecting, organizing and presenting information about structural failures.

My interest in this particular topic dates back some five years when I discovered that we had no form of systematic registration of building failures in my country. For a well regulated country - some would say overregulated - and with a large public sector, I found that both surprising and a bit worrying.

I was at that time primarily interested in failures of timber structures, and since the information I was looking for did not exist in any organized form, I proposed a master thesis problem with the title *Failures of modern timber structures in the Nordic countries*. In 2004 Eivor Skaug opted for this problem and during a 20 week project she managed to dig up some 20 cases, most of them (17) in Norway.

She made use of many sources, from insurance companies to local authorities and newspaper archives, and for some of the cases information was not easily obtained. Some of Eivor's work is included in the joint Swedish-Finnish project reported by Frühwald *et al.*¹

When this "problem area" was defined as one of three sub-tasks for COST Action E55 it seemed to be an interesting arena for promoting a unified and coordinated effort in registration and presentation of structural failures.

Collecting and recording information about structural failure in timber structures in a unified and systematic manner is clearly of interest to the entire timber engineering community. But why limit the effort to timber structures, and also, what information do we collect and what do we do with it?

Assuming the information is "preserved" in some kind of a data base, the above questions lead to more questions which, I believe, should to be discussed and preferably resolved. Some of these questions are listed on the following two pages, along with some comments:

1. Eva Frühwald *et al.*: Design of safe timber structures - How can we learn from structural failures in concrete, steel and timber? Report TVBK-3053 (ISSN 0349-4969), Lund University, Sweden.

Should not all structures of a certain size/importance, irrespective of material, be candidates for the data base in case of structural failure?

Key members of our national structural timber industry would welcome a register of this nature, but only if it includes all structural materials. A reasonable demand I should think.

What failures qualify for the data base?

We clearly need to define a “lower limit” for cases to be registered. In my opinion we only consider *failures* of “*engineered structures*”. That excludes “one-family-dwellings” (except perhaps for manufactured roof trusses) and all serviceability problems.

Organization, administration and maintenance?

Do we see this as a European effort, a national effort or simply a COST E55 effort? Clearly, the more data the more reliable statistics can be derived. On the other hand, the downside of a European initiative is the sheer size and amount of organization and administration of such an undertaking.

I believe it would be useful to have a common European format, for both collecting and presenting the information, but the “project” should be organized, administered and maintained as national “sub-projects”, preferably by a “public agency”.

Availability and anonymity?

This is tricky, and the two obviously influence each other. Personally, I am in favour of as much transparency as possible, and I would like to see all relevant information in the register or data base. Having said that, I may add that I have no desire whatsoever to expose individuals or companies. From my point of view, as a teacher and a researcher, I would like to have a reasonably good knowledge of the structure, including pictures and drawings if possible, environmental conditions at failure, the nature, extent and cause of the failure (again including pictures). Moreover, time and location are of interest, but not necessarily very detailed.

Names of involved companies and individuals are of no interest to me, but they might be to some official (controlling) bodies? This of course can be resolved by restricting access to “sensitive” information.

It can be argued that if pictures, time and location are included it is possible to trace the more “sensitive” information. On the other hand, why should this information be made anonymous? It has taken place in the public domain, and all cases serious enough to make it to the data base will get or have had some media coverage. And for the “high profile cases”, like Siemens Arena, most of the information is available on the internet, and what is not there can easily be traced. Is there any reason why these cases should be singled out?

I accept the argument that information is more readily obtained if a high degree of anonymity is guaranteed, but only if we depend on involved parties for the information. If the information can be secured by a neutral body it seems to me that operators in the public domain must accept public scrutiny. However, I would like to stress again that I, and I imagine everyone involved with COST E55, have no interest in exposing companies or individuals. On the other hand, I would not like to see inter-

esting information excluded just in order to prevent parties involved in the failure to be traced.

Presentation?

I would like to see as much as possible of this information on the internet, but I realize that this rises a number of issues, like quality assurance, accessibility and maintenance to mention but some of them. The most limited scope would be to simply crank out some statistics from the registered data. Clearly the data should also be used for this purpose, but if this is our only ambition, my interest in the project would be limited.

Responsibility?

If the registration is to be an ongoing (permanent) effort, it is important to have not only well defined, and preferably common, templates for acquiring and presenting the relevant information, but also procedures for how and by whom it is collected, stored and presented. And who is responsible for it all (also with respect to funding)?

Concluding remarks

It is probably not in the mandate of COST E55 to suggest the format for a unified and comprehensive European data base for structural failures within the community, but with the advent of the "Structural Eurocodes" we might consider to put forward the idea, possibly backed by some well founded formats? If that is not a viable idea, some of us might consider a more limited, national initiative in our respective countries?

Appendix

On the following three pages I propose a **failure report** which summarizes most of my thinking on the subject.

Failure report - part 1

STRUCTURE	<p>Name:</p> <p>Place:</p> <p>Type:</p> <p>Built (date):</p> <p>Alterations: (what and when)</p> <p>Size ($b \times l \times h$):</p> <p>Structural system:</p> <p>Miscellaneous:</p>
<p><i>Picture(s) and/or drawing(s)</i> <i>(use additional page if necessary)</i></p>	

Failure report - part 2

FAILURE	<p>Time:</p> <p>Type of:</p> <p>Extent of:</p> <p>Human injury:</p> <p>Loading: (at failure)</p>
<p><i>Picture(s) and/or drawing(s)</i> <i>(use additional page if necessary)</i></p>	

Failure report - part 3

CAUSE(S)	Primary:
	Secondary:
	<input type="checkbox"/> conclusive <input type="checkbox"/> inconclusive
	<input type="checkbox"/> design error <input type="checkbox"/> construction error <input type="checkbox"/> inferior material <input type="checkbox"/> overloading <input type="checkbox"/> other (elaborate)
	Code issue(s):
Legal issue(s):	

Source / reference(s):

Comments:

Prepared by:	Date:
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