EXPLOSION PROTECTION IN SMALL AND MEDIUM-SIZED ENTERPRISES

SUMMARY REPORT

IMPLEMENTATION OF EXPLOSION PROTECTION – IMPACT OF INFORMATION AND ADVICE

A CAMPAIGN WITHIN THE FRAMEWORK OF THE OCCUPATIONAL HEALTH AND SAFETY STRATEGY

Involving motor vehicle paint shops and joineries

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SMALL AND MEDIUM-SIZED ENTERPRISES (SME) CAMPAIGN
EXPLOSION PROTECTION IN MOTOR VEHICLE PAINT SHOPS AND JOINERIES

IMPLEMENTATION OF EXPLOSION PROTECTION IN SME IMPACT OF INFORMATION AND ADVICE BY THE LABOUR INSPECTORATE

INTRODUCTION

The Explosion Protection Campaign among small and medium-sized enterprises (SME), carried out in 2006 established the following:

a) The extent to which explosion protection was implemented in SME in specific sectors was achieved in a short period of time.

b) The impact of information and advice was achieved in a short period of time.

The campaign “Explosion Protection in SME” in 2009 was designed to complement the 2006 campaign, in order to identify medium-term developments in this area.

The campaign was designed as a **random sample study** in order to be able with relatively little effort to additionally extrapolate findings to the total study population of the specific sector in each case.

Conclusions were drawn for the total study population, where statistically relevant and while stating quantifiable levels of accuracy and reliability, on the basis of the random sample study.

A statistically meaningful quantity of businesses was selected using a random number generator. The random number generator, developed in compliance with the most state-of-the-art technical requirements for statistical techniques, was provided by Prof. Neuwirth.

The accuracy level of the partial findings derived from the random sample is specified at approximately 10% when applied to the campaign as a whole.

The **total study population** includes all of the approx. 5 700 potentially relevant businesses (in this case within the joinery and motor vehicle paint shop sectors in Austria).

The **sample** includes only a small portion of the total study population, selected randomly.

A random sample consisting of 570 businesses was selected, i.e. about 10% of the total study population.

This sample was divided into thirds, comprising 190 businesses each, in 2006.

One third was assigned to METHOD 1 "**advice**" by the Labour Inspectorate;

one third was assigned to METHOD 2 "**information**"; and

one third was assigned to the control group "**no advice or information**" by the Labour Inspectorate.

The objective was to identify and quantify methods suitable for supporting the Labour Inspectorate in introducing the explosion protection document.

A further objective was to verify the extent to which explosion protection had been implemented at the selected companies.

Phases involving set periods were defined:

Phase 1 in early 2006:

a) Analysis of the baseline situation and advice provided to one sample group

b) Printed information provided to one sample group

c) One sample group as a control group, receiving neither advice from the Labour Inspectorate nor information

Note:
All businesses across the country belonging to the selected sectors received detailed printed information from other institutions during the first six months of 2006. This had to be taken into account when interpreting the results.

Phase 2 in late 2006:

This phase was divided in two parts.

Part 1: Inspection of the businesses that had received either advice or printed information from the Labour Inspectorate in early 2006. In addition, a survey of the extent to which explosion protection had been implemented in these sample companies by this time.

Part 2: Survey of the extent to which explosion protection was implemented in the sample group that had neither received advice nor information from the Labour Inspectorate (control group).

Phase 3 in early 2009:

Follow-up inspection of businesses that had received advice in early 2006 and been inspected in late 2006. In addition, the extent to which explosion protection had been implemented was again surveyed for purposes of comparison.

Note:
The follow-up inspection was announced when advice was provided by the Labour Inspectorate, thus representing an instance of advice with inspection or of a consultation inspection.

It had already been previously established in 2006 that both method 1 “advice” and method 2 “information” resulted in a significant increase in the extent to which explosion protection was implemented. This was established during the phase 1 and phase 2 periods (early 2006 and late 2006) of the 2006 campaign.

The increase was in general significantly greater for advice than for information. In this context it should be noted that an inspection was announced when advice was provided, which was, however, not the case with printed information. The following findings can therefore be identified for the short-term improvement of explosion protection within the 2006 campaign:

a) Announcing an inspection when providing advice (consultation inspection) generally leads to a significantly greater improvement in the implementation of explosion protection than providing information without announcing an inspection.

b) Information is efficient inasmuch as the method can easily be applied to the total population of the sector selected in each case and achieves a significant improvement in the implementation of explosion protection.

c) With respect to information, we were additionally able to establish that, at least in the short term, “good” (i.e. compact) information material results in a significant improvement, when provided to businesses by a trustworthy institution. Additional information from other institutions does not increase the effect significantly in statistical terms, i.e. it is inefficient to provide more information in such cases.

d) Advice with inspection is a method that is only able to be applied to the total study population of the selected sector in each case by utilising a great deal of personnel. This method renders considerably better results than information alone, yet, due to the great effort involved, it must be viewed as effective but not efficient.

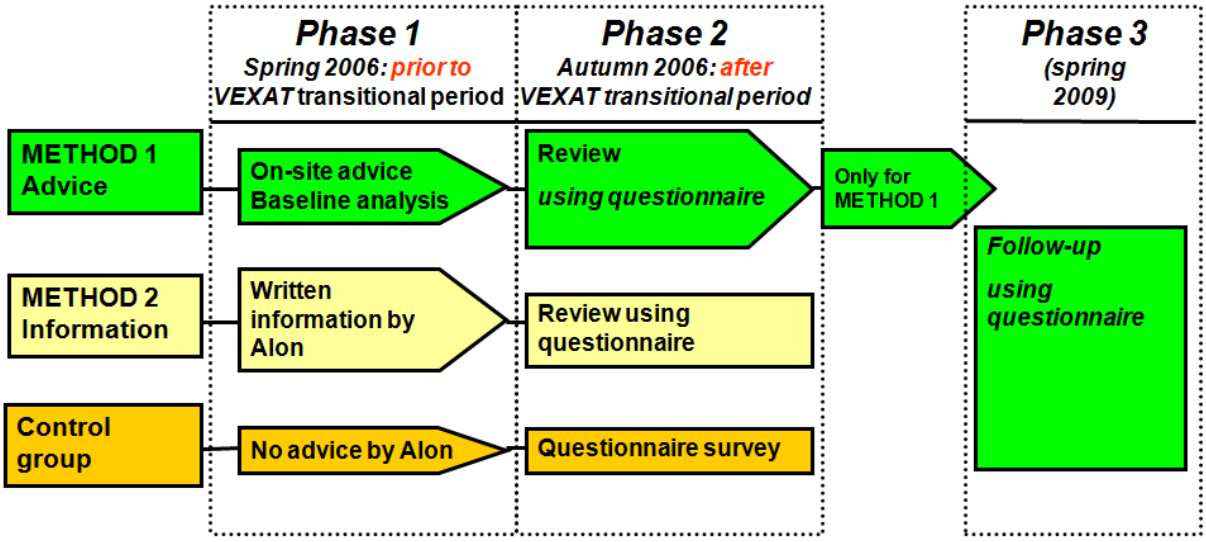
The short-term trends identified in 2006 were confirmed through the 2009 campaign “Explosion Protection in SME”. In other words, these trends can be identified over time, not only for the short term but also for the medium term.

On the basis of the campaigns in 2006 and 2009, the following findings have been derived and identified:

a) Compact information, wherever possible provided jointly with other institutions (e.g. as part of the Health and Safety at Work Strategy scheme) is an efficient method for improving occupational safety and health at businesses.

b) Compact information from the Labour Inspectorate, particularly when potential inspections are simultaneously announced, is also an efficient method for improving occupational safety and health at businesses.

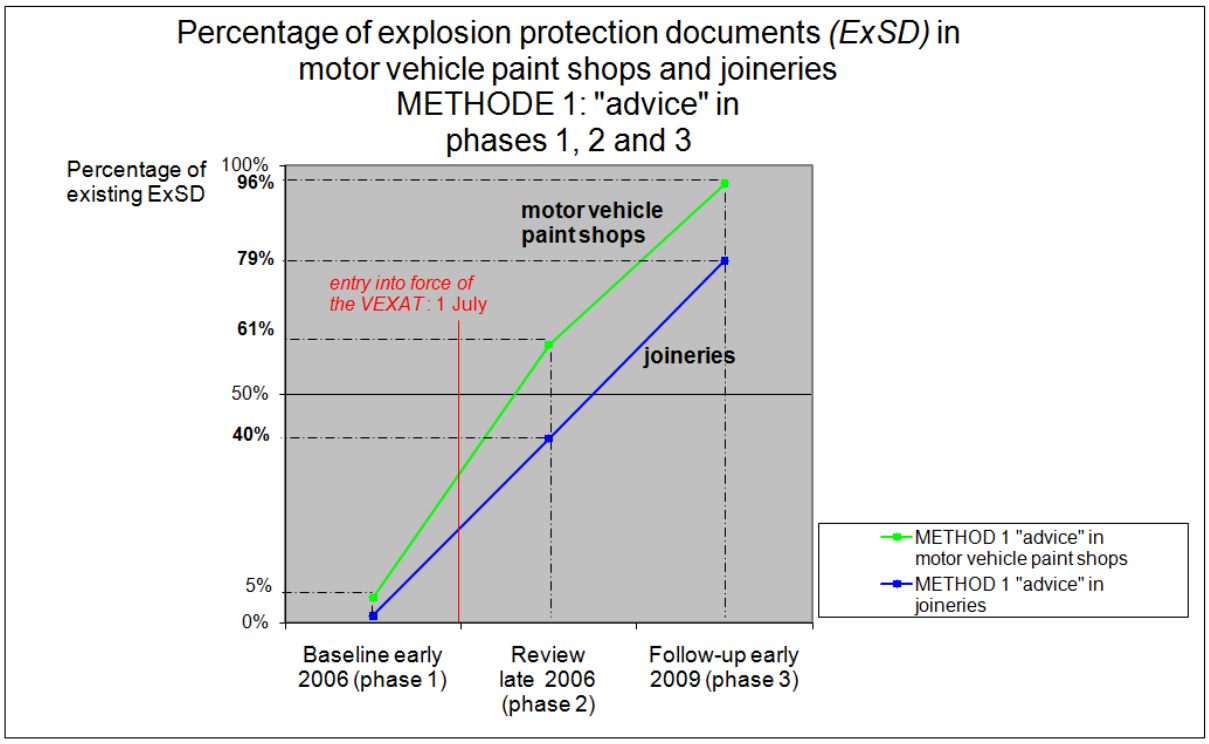
c) Advice with inspection (consultation inspection) or focused campaigns over a longer period of time are effective. Due to the considerably greater amount of effort required when compared to compact information campaigns, consultation inspection campaigns are recommended in particular for sectors in which an increased risk exists.



/Fig.1/: Methods and phases

FINDINGS IN DETAIL

EXPLOSION PROTECTION DOCUMENTS EXISTING AT VARIOUS TIMES



/Chart 1/: Percentage of explosion protection documents (*Explosionsschutzdokument, ExSD*) existing in the sample of businesses receiving advice (method 1 “advice”) over various phases in time

It could be demonstrated both for joineries and for motor vehicle paint shops that advice in combination with inspections can achieve implementation on site in a highly efficient manner. The findings presented above are only valid for the sample, however. In order for the same results to be achieved with the total study population, all businesses would need to receive advice with inspections announced.
It should be noted by way of limitation that the statistics were also impacted by the implementation of the Ordinance governing explosive atmospheres (*Verordnung explosionsfähige Atmosphären, VEXAT*; cf. phase 1).

In early 2006 (phase 1), prior to the *VEXAT* entering into force, practically no explosion protection documents existed. After advice was provided in early 2006 (phase 1), a statistically relevant percentage of explosion protection documents could already be identified on the occasion of the inspection in late 2006 (phase 2). This trend has continued in the medium term. During the follow-up inspection in early 2009 (phase 3), the percentage of joineries in the sample having explosion protection documents was as much as nearly 80% and about 100% even for motor vehicle paint shops.

It may be concluded from this that implementing legal measures using affirmative measures, as is the case with advice followed by inspection, is very effective. It is effective because the large extent of implementation is associated with a relatively large amount of effort (in terms of personnel and professional resources).

Printed information, in contrast, in the context of a joint coordinated information campaign (e.g. the Austrian Workers' Compensation Board, the Labour Inspectorate, the Chamber of Labour, the Austrian Federal Economic Chamber, etc.) as carried out before launching the 2006 campaign, enables results to be achieved in a highly efficient manner. It is efficient because a clearly measurable improvement can be achieved with relatively little effort.
The clearly identifiable trends toward improvement as a result of advice (consultation inspection) or information may also be expected for other sectors or areas of occupational health and safety.

The method “advice with inspection” could, for example, be applied as part of targeted campaigns aimed at high-risk sectors in order to reduce to a measurable extent the accident rate or the number of sick days.

Similarly, the “information method” could be applied upon the introduction of new legal requirements or significant changes in state-of-the-art technology.

The campaigns in 2006 and 2009 clearly demonstrated that measurable improvement can be achieved when a number of institutions cooperate in order to jointly provide information to businesses.
Cooperation makes the information more public and probably also increases the level of acceptance among businesses to implement the measures recommended in the information provided.

It could also be clearly demonstrated that the method of advice with inspection applied by the Labour Inspectorate is highly effective.

OVERALL RESULTS – CONCLUSIONS

CONCLUSIONS FROM PHASE 1 (2006 CAMPAIGN)

Observations concerning legal requirements

(derived from: charts 2 and 3, red bar)

Both for joineries and for motor vehicle paint shops it can be seen that implementation of partial aspects of explosion protection substantially depends on how specifically the legal requirements are stated. In the case of joineries it may be seen that merely listing an explosion protection document, as did the Austrian Ordinance on Safety and Health Documents (*Verordnung über die Sicherheits- und. Gesundheitsschutzdokumente*, *DOK-VO*) 2006, hardly results in implementation on site. On the other hand, implementation on site is more frequent when this is a permit requirement, as is for instance the case with classification in terms of zones (required by authorities prior to the *VEXAT*) or constructive explosion protection, which had been previously specified by the Ordinance on the protection of workers at work

(*Allgemeine Arbeitnehmerschutzverordnung, AAV*) and later by the Ordinance on work equipment (*Arbeitsmittelverordnung, AM-VO*).

Up to now it has been assumed that the extent to which requirements are implemented increases with the specificity of those requirements, a fact now confirmed by this study. The reasons for this are without doubt to be found equally among employers, authorities and institutions providing advice.

Important note:
The more generally a requirement is worded, the lesser the extent to which it will be implemented. Or, stated conversely, specifically worded requirements result in implementation to a greater extent.

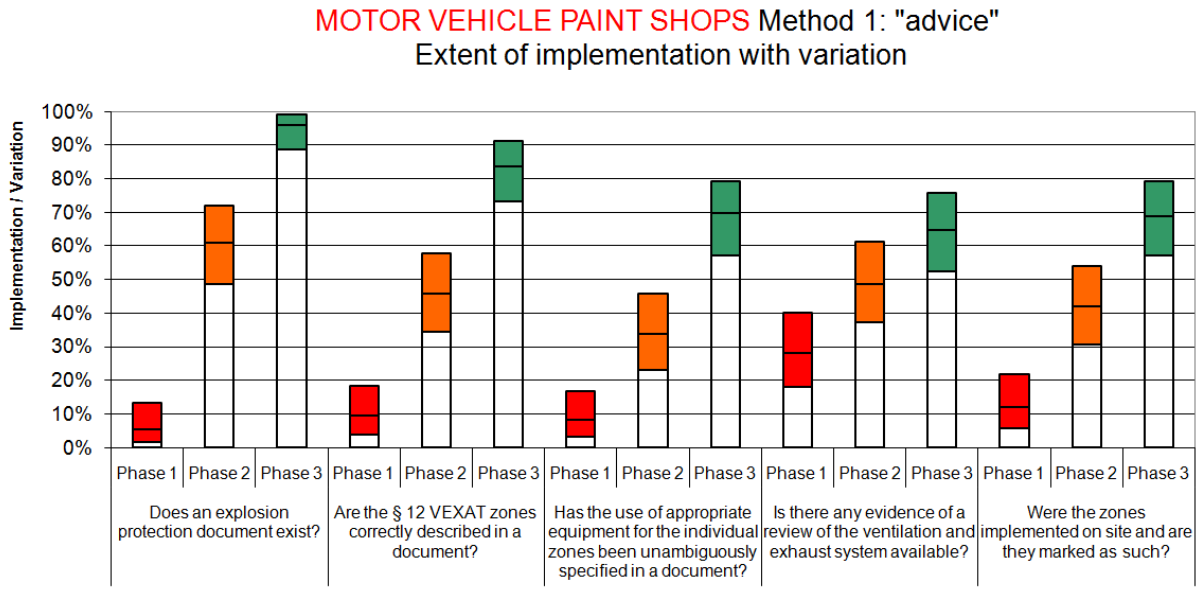
CONCLUSIONS FROM PHASE 2 (2006 CAMPAIGN)

METHOD 1 "advice"

(derived from: charts 2 and 3, orange bar)

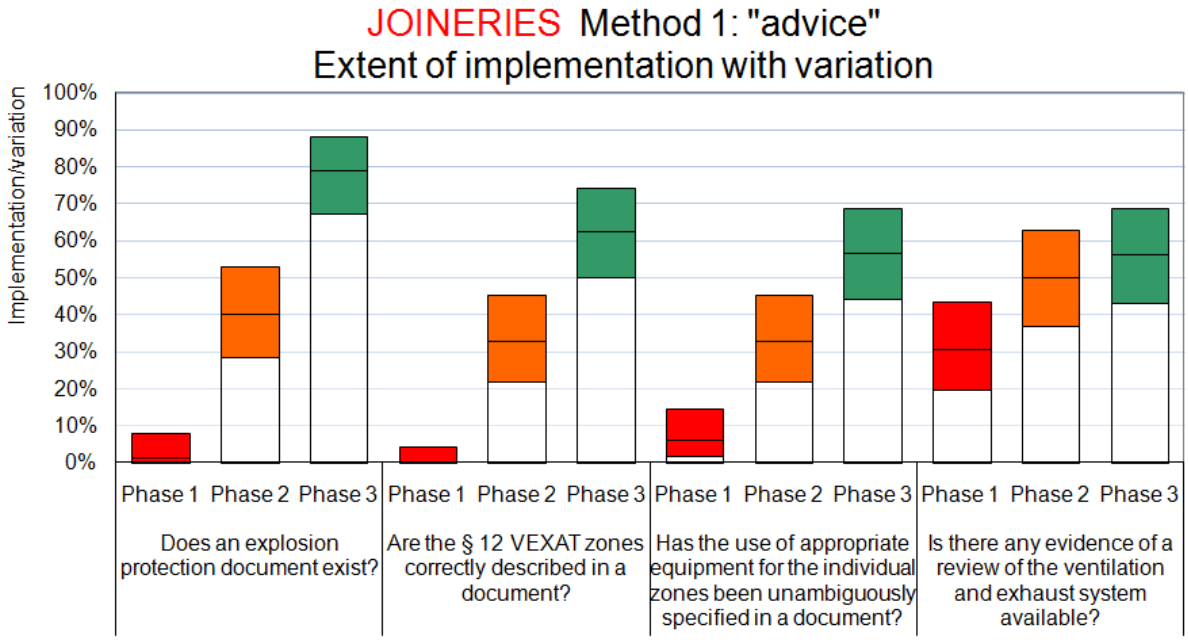
With regard to the implementation of the main explosion protection requirements, the results of the analysis performed in phase 2 revealed that, with only few exceptions, there was a large statistically significant percentage of improvement within the METHOD 1 "advice" group in comparison to the control group (no advice or information) from phase 1; this effect was seen generally.

Nonetheless, this important observation is not valid for the total study population but only for the sample of businesses receiving advice. Similar results could, however, be expected if advice were provided and inspections performed among all businesses without exception.
Method 1 "advice" is therefore to be viewed as especially effective. It is effective because, while achieving substantial improvements, it requires a relatively large amount of effort (in terms of personnel and professional resources).



Legend:
Phase 1: baseline - early 2006
Phase 2: sample baseline - late 2006
Phase 3: sample baseline - early 2009
Note: variation for total study population is ficticious as advice was provided only in sample.

/Chart 2/: MOTOR VEHICLE PAINT SHOPS: Method 1 “advice”



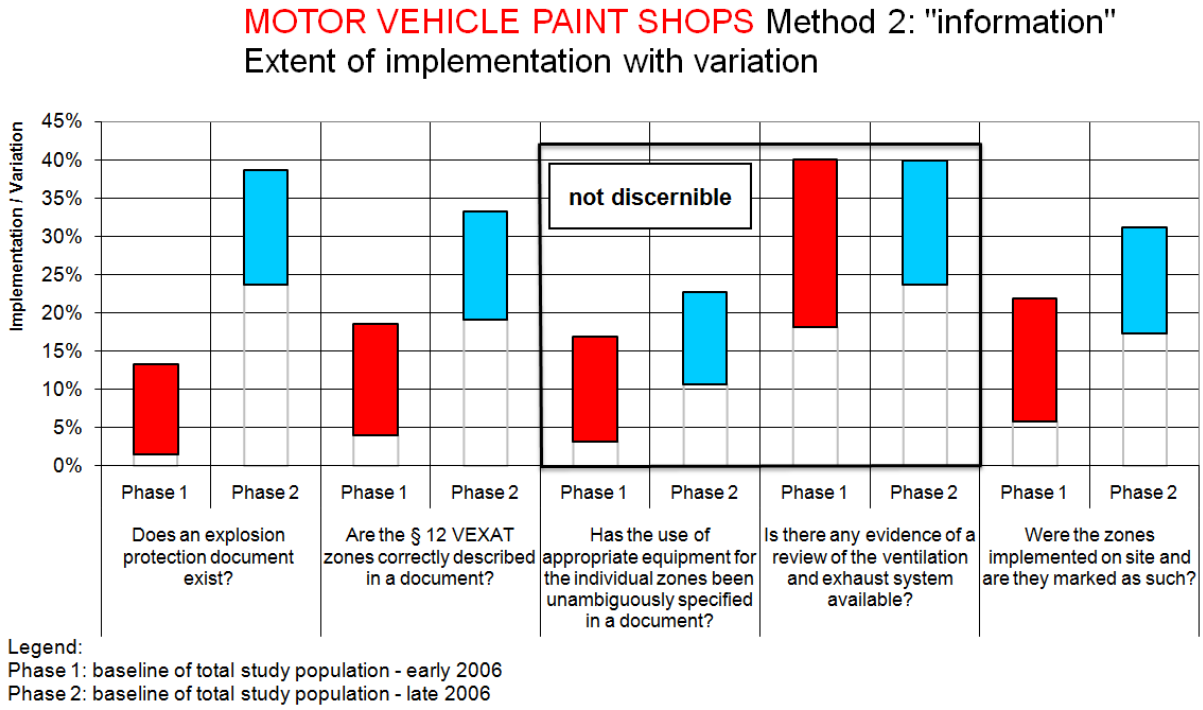
Legend:
Phase 1: baseline - early 2006
Phase 2: sample baseline - late 2006
Phase 3: sample baseline - early 2009
Note: variation for total study population is ficticious as advice was provided only in sample.

/Chart 3/: JOINERIES: Method 1 “advice”

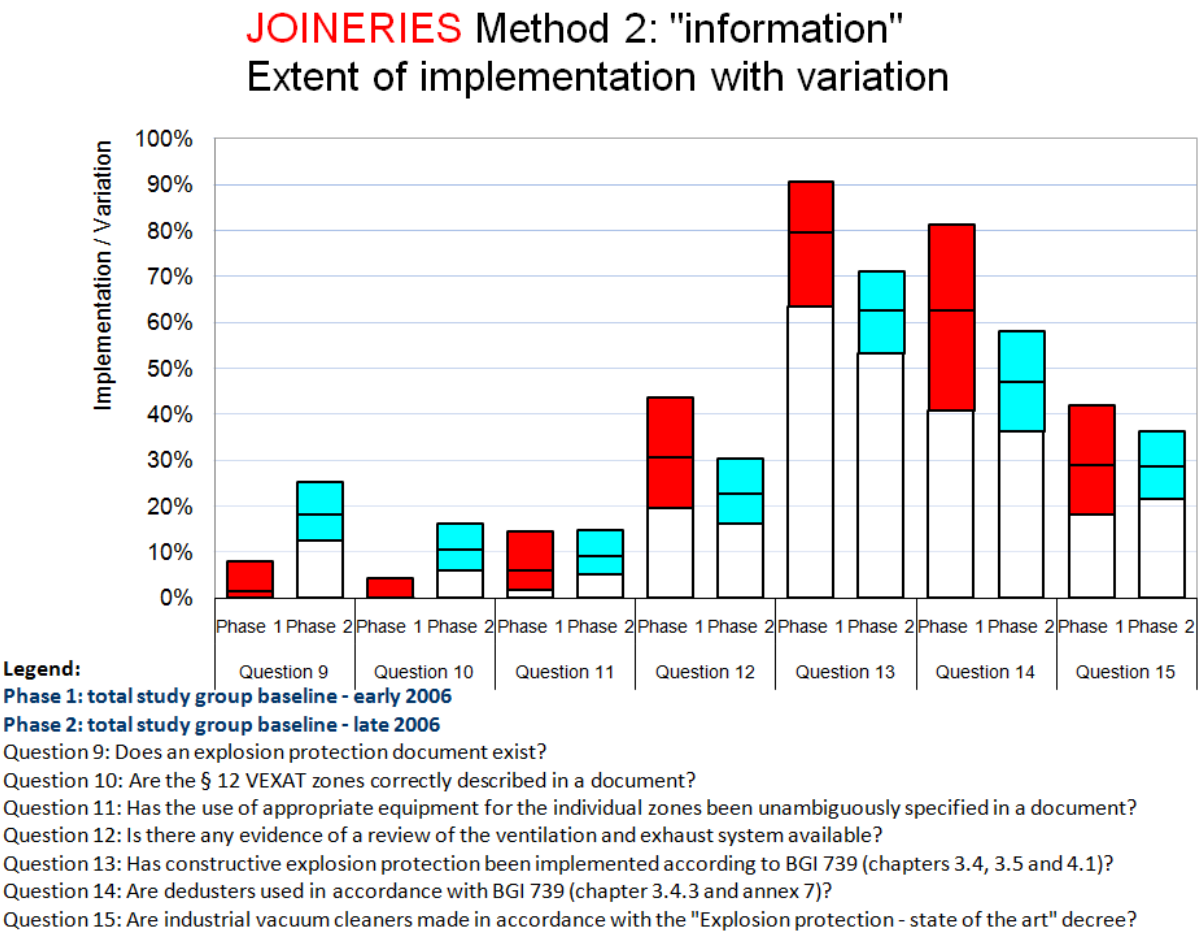
In other words, due to its effectiveness (see above) method 1 “advice” should be applied in a highly targeted manner, for instance in sectors with an elevated risk or frequent accidents.
It should be noted that advice was provided in the 2006 campaign with inspections being announced, so that, strictly speaking, these were cases of “consultation inspections”. It should be further pointed out that some time had passed until late 2006 and that, with the *VEXAT*, specific explosion protection requirements entered into force for all businesses as of 1 July 2006; these facts might also account for some of the improvement.

METHOD 2 “information”

Charts 4 and 5 indicate that information by itself also results in significant improvements.



/Chart 4/: MOTOR VEHICLE PAINT SHOPS: Method 2 “information”



/Chart 5/: JOINERIES: Method 2 “information”

The following should be noted:
the control group was supplied with comprehensive information by other institutions (Austrian Workers' Compensation Board, the Federal Economic Chamber and others) in early 2006.

The analyses revealed that the additional printed information provided by the Labour Inspectorate was not statistically relevant in this case.
In other words, additional printed information provides no added value if comprehensive information has previously been supplied.

The chart on the "information method" reveals two facts:

1. Method 2 "printed information" is a highly efficient method for bringing about improvements. It is efficient because measurable improvements can be expected when using relatively little effort (i.e. printed information).

2. Comprehensive information provided jointly by institutions engaging in occupational health and safety and institutions of significance for the businesses has a decisive positive effect toward improvement (probably also due to more widespread acceptance).

CONCLUSIONS FROM PHASE 3 (2009 CAMPAIGN)

METHOD 1 "advice"

A follow-up inspection (phase 3) was performed in early 2009 only for the method 1 "advice" group which had received advice and inspection in phase 1 and phase 2 in 2006.

(derived from: charts 2 and 3, green bar)

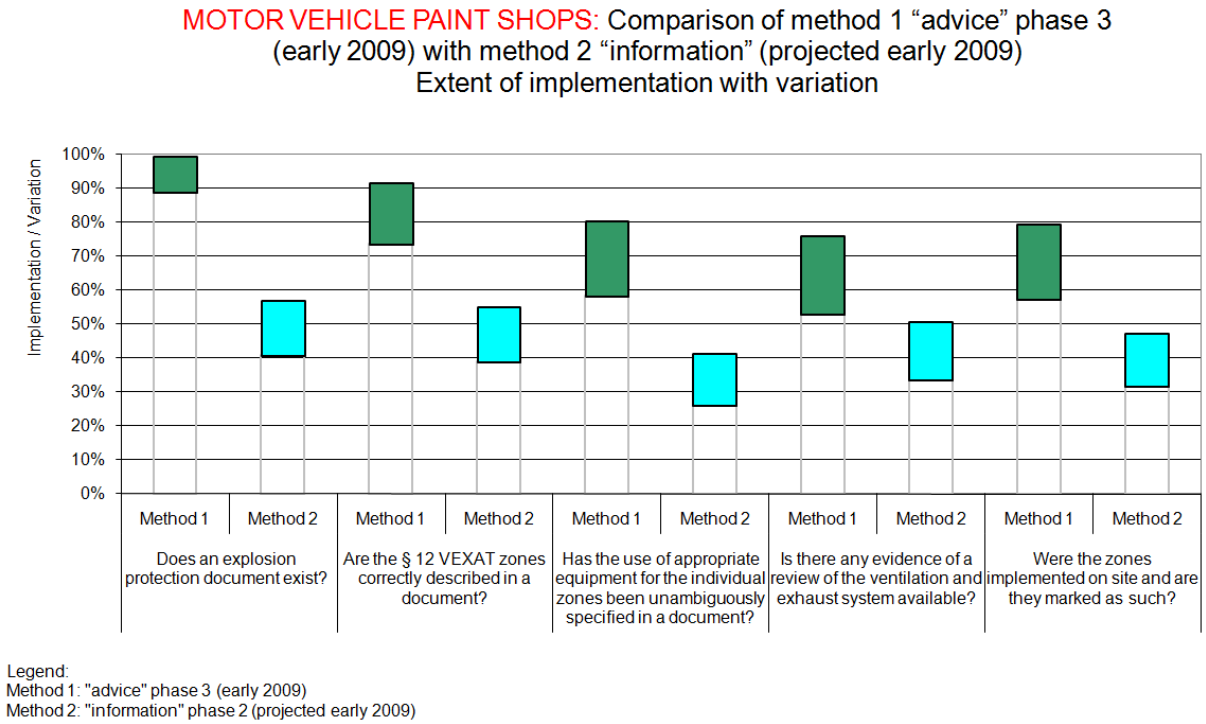
It was demonstrated both for joineries and for motor vehicle paint shops that advice in combination with inspections can achieve implementation on site in a highly efficient manner.
It should be noted by way of limitation that the statistics were also impacted by the implementation of the Ordinance governing explosive atmospheres (*Verordnung explosionsfähige Atmosphären, VEXAT*; cf. phase 1), which entered into force on 1 July 2006.
The findings presented above are only valid for the sample, however. In order for the same results to be achieved with the total study population, all businesses would need to receive advice with inspections announced.
The short-term trend toward improvement as a result of applying method 1 "advice" that had been previously identified in 2006 could in any case be demonstrated to persist in the medium term in early 2009.
This finding can be applied to future projects carried out as part of the Austrian Health and Safety at Work Strategy scheme in other sectors as well, where this tendency can be expected, too.
It should be noted, however, that method 1 "advice" is an effective method, i.e. the significant improvement entails a relatively large amount of effort (in terms of personnel and professional resources). The "advice method" is thus suited for carrying out targeted campaigns aimed at high-risk sectors in order to reduce to a measurable extent the accident rate or the number of sick days.

METHOD 2 “information”

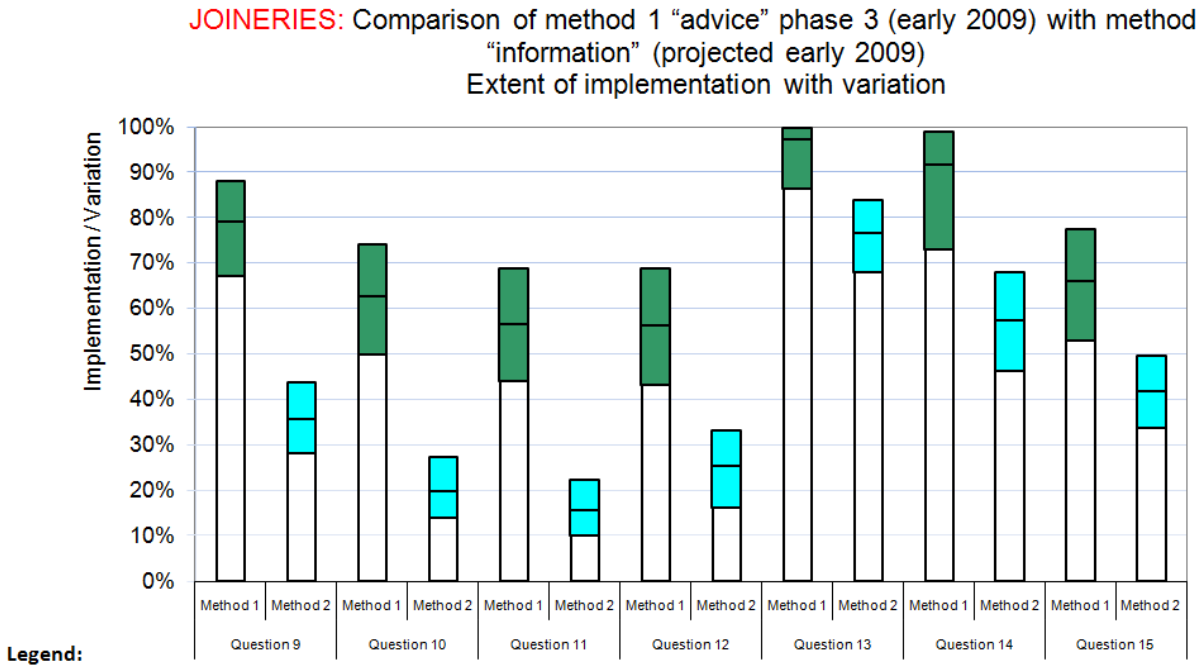
(Charts 6 and 7)

A follow-up inspection was performed in phase 2 in early 2009 only for the method 1 “advice” group. The reason was the limited personal resources available for the 2009 campaign.

Yet, logical reasons can be given to support observations concerning the area in which greater improvement could be achieved in the medium term using printed information.



/Chart 6/: MOTOR VEHICLE PAINT SHOPS: Comparison of method 1 “advice” with method 2 “information”



Legend:
Method 1: "advice" phase 3 (early 2009)
Method 2: "information" phase 2 (projected early 2009)
Question 9: Does an explosion protection document exist?
Question 10: Are the § 12 VEXAT zones correctly described in a document?
Question 11: Has the use of appropriate equipment for the individual zones been unambiguously specified in a document?
Question 12: Is there any evidence of a review of the ventilation and exhaust system available?
Question 13: Has constructive explosion protection been implemented according to BGI 739 (chapters 3.4, 3.5 and 4.1)?
Question 14: Are dedusters used in accordance with BGI 739 (chapter 3.4.3 and annex 7)?
Question 15: Are industrial vacuum cleaners made in accordance with the "Explosion protection - state of the art" decree?

/Chart 7/: JOINERIES: Comparison of method 1 “advice” with method 2 “information”

With regard to method 2 “information”, only a conclusion can be given based on logical grounds for the medium term up to early 2009 (phase 3), whereas the conclusion is founded on statistical confirmation in two instances.

Statistical confirmation is provided on the one hand by the improvement seen in the 2006 campaign, in the extent to which explosion protection was implemented as a result of “comprehensive” printed information, as well as by the continued trend observed from 2006 to 2009, toward improvement as a result of advice.

The projection of the maximally expected implementation level for method 2 “information” in 2009 is based on:

- Firstly, the actual data surveyed for method 2 “information” in late 2006, and
- secondly, the logical assumption that the trend from 2006 to 2009 for the “information” method can show a maximum increase as actually identified by the respective questions in the “advice” group.