Inter-Organizational Cooperation between Technical Societies and Industries in Japan

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Abstract

With respect to the increasing social demands on environmental protection and technological advancement, collaboration between universities, technical societies, industrial associations and governmental agencies are become more and more important in recent years. Particularly during the last decade, interdisciplinary and inter-industrial cooperation appeared to be significant for making Japanese industries more global and effective to cope with those social requirements whereas the individual companies could not achieve comprehensive solutions.

The author will review the current movements on the inter-organizational cooperation activities and future directions in Japan.

Abbreviations

JAST:	Japanese Society of Tribologists
JSAE:	Society of Automotive Engineers of Japan
JASO:	Japanese Automobile Standard Organization (part of JSAE)
JPI:	The Japan Petroleum Institute
JAMA:	Japan Automobile Manufacturers Association
PAJ:	Petroleum Association of Japan
JALOS:	Japan Lubricating Oil Society

1. Introduction

There are a lot of technical societies dealing with tribology and lubrication engineering in Japan. Those societies are expected to cope with social demands such as environmental issues by scientific approaches in recent years. Since the modern technologies are becoming more and more complicating and interactive, cooperation among technical societies, industrial organizations and the government appears to be essential.

The author wishes to review outlines of representative technical societies related to tribology and lubrication engineering in Japan, namely, JAST, JSAE and JPI, then to introduce examples of inter-organizational cooperation in Japan.

2. Technical Societies

Outlines of JAST, JSAE and JPI are summarized in Table 1.

2.1 JAST

JAST is a fairly academic society dealing with toribological technologies including lubrication of engines, transmissions, hydraulic systems, industrial machines, computer devices, space equipments, human bodies and so on. The organization of the JAST is shown in Fig. 1.

Main portion of the individual membership is composed by engineers from industries as seen in Fig. 2. The society is also supported by corporate members from various industries in Japan as shown in Fig. 3.

Since the foundation of JAST (formerly called as JSLE), number of individual membership had been increasing steadily corresponding with economical development in Japan, however, the

number is declining during the last decade due to the economical recession as seen in Fig. 4.

Contributions of the JAST to the industries are summarized as follows;

a) Publication: In addition to a monthly journal "Tribologist", JAST is publishing various technical books such as "Tribology Handbook" providing basic data for lubrication engineers.
b) Education: The JAST holds "Introduction Seminar" annually for young engineers.
c) Forum: The JAST holds "Tribology Forum" annually for providing tribologists an opportunity to discuss the developments in new technology and problems in the industry.
d) Seminar: The JAST holds "Advanced Technology Seminar in Tribology" annually inviting researchers dealing with advanced technology as speakers. The seminar covers recent topics such as micro-tribology, bio-tribology, tribology in the memory devices in computer and so on.
e) Conferences: The JAST holds "Tribology Conference" twice a year in spring and autumn. Each conference has around 180 presentations from wide areas of tribology.
f) International Tribology Conference: Every 5 years, The JAST organizes the "International Tribology Conference (ITC)" in Japan. The last event was held in 2000 at Nagasaki having around 560 papers and 800 participants from the world.
g) Symposium: The JAST organizes symposia depending on the requests from industries. The "International Symposium on the Tribology of Vehicle Transmissions (TVT)" held in February 2001 at Toyota City which was co-organized with JAMA was an example of this activity.
h) Research Activities: The JAST has three types of research groups. Type-1 research group is organized by the Research Committee of JAST to investigate generic problems in tribology. Currently, a study on the sliding bearings to cope with ISO/JIS survey has been carried out as a type-1 research group. Type-2 research groups are organized by corporate members to study the specific problems in the industry. Five research groups have been formed on the solid lubrication, additives technology, micro-tribology, grease and the evaluation method for non-ferrous compositions in bearing steel. The type-2 research groups are sponsored by the corporate members who organize the groups. Type-3 research groups are organized by individual members of JAST who has interest in specific subjects such as engine lubrication, rolling contact, maintenance tribology and so on. Twenty one research groups are working now. The annual participation fee by individual members funds the type-3 research groups.

2.2 JSAE

The JSAE is an industry-oriented society dealing with comprehensive aspects of automotive technology. The organization of JSAE is shown in Figs. 5, 6 and 7.

Most of the individual memberships are composed by automotive and parts/materials industries as seen in Fig. 8, as well as the composition of corporate memberships summarized in Fig. 9.

Contributions of the JSAE to the industries are summarized as follows;

a) Research Activities: The Technology Board is expanding their activities from pure automotive technologies to vehicle related areas in recent years. Each Planning Committees under the Technology Board holds a lot of symposia.
b) Conventions: The JSAE holds regular conventions in spring and autumn that contain technical sessions, forums and exhibitions.
c) Publications: The JSAE publishes a monthly journal "Automotive Technology" and a quarterly issue for technical papers. Besides those periodical publications, they annually issue the "Vehicle Specification Book" and "Summaries of Technical papers on Automotive Technology".
d) Specifications: The JAST is one of the liaison societies for ISO standardization in Japan. The Standard Committee under the Standardization Board has 11 sub committees working on the standardization of automotive related technical fields including lubricants. As the results of these activities, JASO standards are widely used in the automotive industries in Japan.

e) Cooperation with other technical societies: The JSAE is carrying out a lot of cooperative activities with other domestic or international organizations related to automobile industry. The "Petroleum/Automobile Technical Liaison" has been formed to make a consensus between JSAE and PAJ for establishing joint research projects on environmental issues.
f) Education: The JSAE puts importance to support student activities on automotive technology.

2.3 JPI

The JPI is also an industry-based society for petroleum related technologies. The organization of the JPI is shown in Figs. 10, 11 and 12. The individual memberships are predominantly composed by industrial people from petroleum related firms such as petroleum refiners, petrochemical and engineering companies as seen in Fig. 13.

Contributions of the JPI to the industries are summarized as follows;

a) Convention, Symposium and Seminar: Various types of conferences are held by annual basis organized by different technical committees such as petroleum refining, petroleum products and instrumentation.
b) Publications: The JPI publishes a monthly journal "Petrotech" and a bimonthly publication "Journal of the JPI".
c) Research and Technology Exchange: Main part of research activities of JPI are the entrusted research projects requested by the governmental organizations. Examples of the entrusted research projects are "Market survey on the Octane Number requirement", "Evaluation of low temperature drivability of diesel powered vehicles", "Test method for the lubricity of diesel fuels" and so on. Approximately 55% of JPI's budget is sponsored by the entrusted research projects.
d) Test Methods: The JPI is developing the petroleum related test methods by themselves or introducing available test procedures from out side of Japan based on the industrial needs.
e) Approval of Reference Materials: The JPI manages an approval system for the standard materials for petroleum analyses such as the standard gasoline for Octane number measurement and the standard diesel fuel for pour point measurement.

3. Inter-organizational Cooperation

With respect to the increasing social demands on environmental protection and technological advancement, collaboration between universities, technical societies, industrial associations and governmental agencies are become more and more important in recent years. Particularly during the last decade, interdisciplinary and inter-industrial cooperation appeared to be significant for making Japanese industries more global and effective to cope with those social requirements whereas the individual companies could not achieve comprehensive solutions.

Typical examples of inter-organizational cooperation in Japan are described below.

3.1 JASO 2Cycle Engine Oil Standard

Until 1990s, there was no appropriate standard for specifying performance of 2cycle engine oils for small air-cooled 2stroke engines widely used as a power source of motorcycles. In 1987, a survey group was formed in JAST as a type-3 research group to investigate the necessity of a new standard for the application. The research group was composed by engineers from motorcycle, lubricant and additive industries. After two years period, the research group reported the necessity of the establishment of a new standard.

Following to the recommendation made by JAST, the "2-Stroke Engine Oil Sub Committee" was formed under Motorcycle Technical Committee at JSAE in 1989. The sub committee developed test procedures for evaluating key performances such as lubricity, detergency, smoke and exhaust muffler blocking. Then, the sub committee drafted classification and performance requirements (pass/fail limits) as a JASO standard.

Upon establishment of the JASO 2cycle engine oil standard, a working group for developing quality management system was formed under the JAMA/PAJ joint committee on engine oils in 1993 aiming to create an implementation system of the standard. The working group made a proposal in 1994 recommending to introduce an on-file system as a quality management system.

The history of the development is illustrated in Fig. 14, a schematic diagram of the on-file system is shown in Fig. 15 and organization of the implementation panel is drawn in Fig. 16.

3.2 JASO DH-1 Standard

The establishment of JASO DH-1 heavy-duty diesel engine oil standard is another example of the inter-organizational cooperation between automotive and lubricant related organizations.

The need of a new standard had been proposed by JAMA in 1998, due to the differences in engine design among geographic areas caused by differences in emission regulation. Upon the proposal of JAMA, the DX-1 Working Group was formed under the JAMA/PAJ Joint Sub-Committee in December 1998 and started to develop a set of performance requirements and an implementation system for DX-1.

In parallel to the activities in the DX-1 WG, the JASO Engine Oil Sub Committee started to develop a quality standard for DX-1. Though two engine tests have been developed by JASO, test methods readily available by JPI, ASTM and CEC are also adopted in the DX-1 standard to minimize the cost of development and to harmonize with other international standards as much as possible. In the process of introduction of JASO engine tests, the working committee under JALOS, partly sponsored by the government, conducted discrimination and precision matrix tests.

As same as the case of JASO 2cycle engine oil standard, a quality management system was investigated by a task force under the DX-1 WG and finally a modified on-file system was introduced under management of the JASO Engine Oil Standards Implementation Panel.

The DX-1 standard was renamed as JASO DH-1 and became effective in April 2001. The development process for DH-1 standard is schematically illustrated in Fig. 17.

3.3 TVT Symposium

Another example of cooperation between technical society and automotive industry is the International Symposium on the Tribology of Vehicle Transmissions (TVT) held in 1998 and 2001. The objectives of the symposium are to exchange information on advanced transmission technology and discuss about future directions of transmission fluids.

As one of the activities of JAST, the organizing committee is founded at non-regular basis. The committee invites experts from the JAMA to consider technical need from automotive industry. The TVT Symposium was successfully held having over hundred engineers who have specific interests on transmission lubrication.

4. Summary and Conclusions

Importance of interdisciplinary collaboration becomes more and more obvious for getting further progress in the technologies for the future, and the tribology might be one of the key issues for lots of mechanical field seeking higher efficiency, better performances and environmental protection. The technical societies relative to lubrication engineering in Japan have put priority to contribute the industries in terms of providing updated information, education, place of discussion and research. Particularly, there are few laboratories in universities dealing with tribology, therefore technical societies can play an important role to educate engineers in industries.

Restructuring of industry allows less basic research work in the individual companies and technical societies can take a part of the substitution. Open discussions through symposia held by technical societies can also create new idea for the future. Network type cooperation between technical societies and industries will be essential for further progress in technologies.

Table 1 Outlines of Technical Societies relative to Tribology and Lubrication Engineering in Japan

Society	JAST	JSAE	JPI
Year of Foundation	1955	1947	1958
Number of Individual Membership	2,703	34,116	3,924
Number of Corporate Members	175	475	341
Anuual Budget	190	1,100	420
Main Activities			
Publications	X	X	X
Investigation and Research	X	X	X
Convention	X	X	X
Symposia and Forums	X	X	X
Seminars	X	X	X
Exhibition		X	
Standardization		X	X
Competent Authorities *	MEXT		
		METI	
		MLIT	

* MEXT: Ministry of Education, Culture, Sports, Science and Technology
METI: Ministry of Economy, Trade and Industry
MLIT: Ministry of Land, Infrastructure and Transport

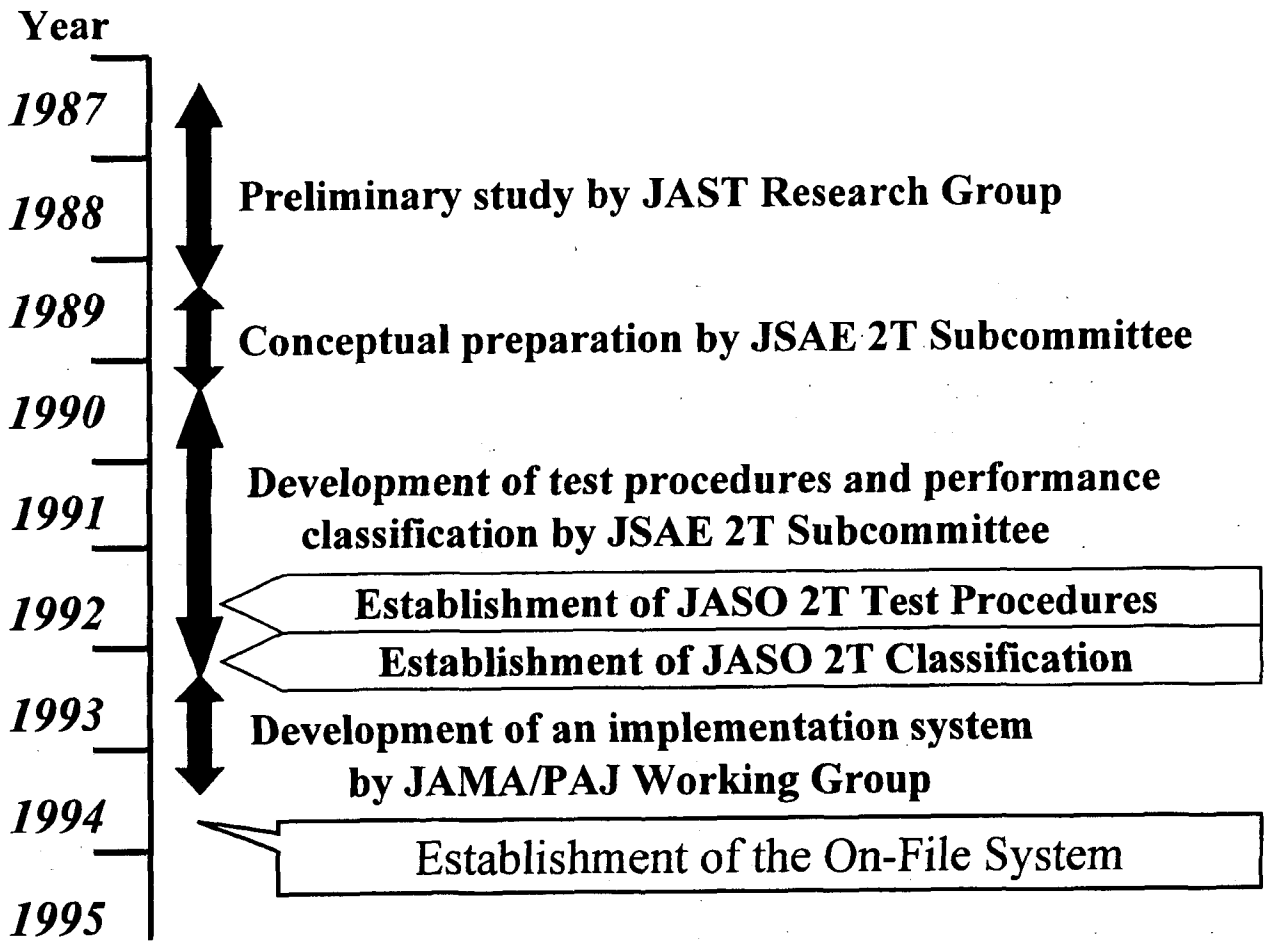

Fig. 14 Development of JASO 2Cycle Engine Oil Standard

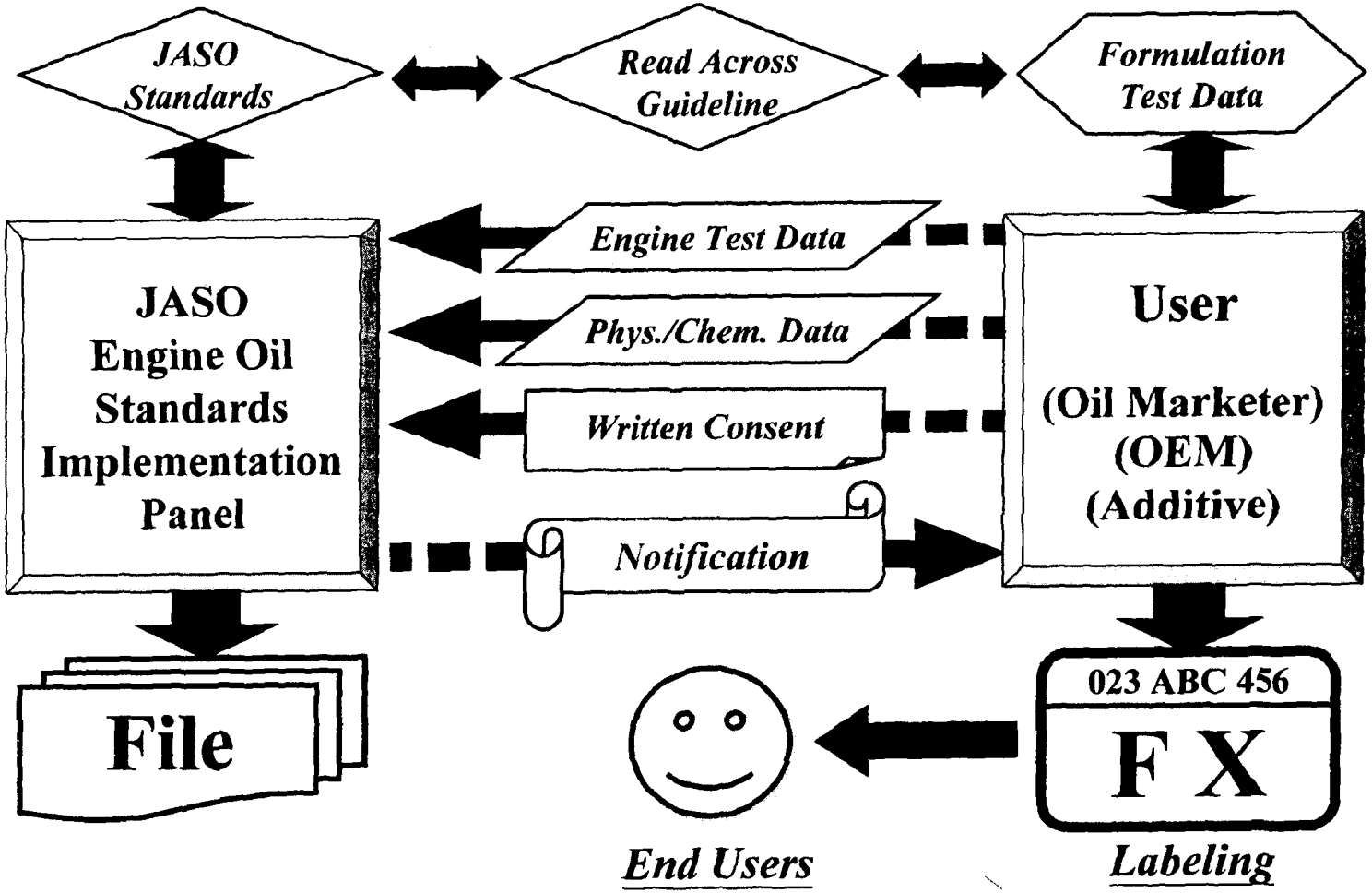

Fig. 15 The On-File System for JASO Engine Oils

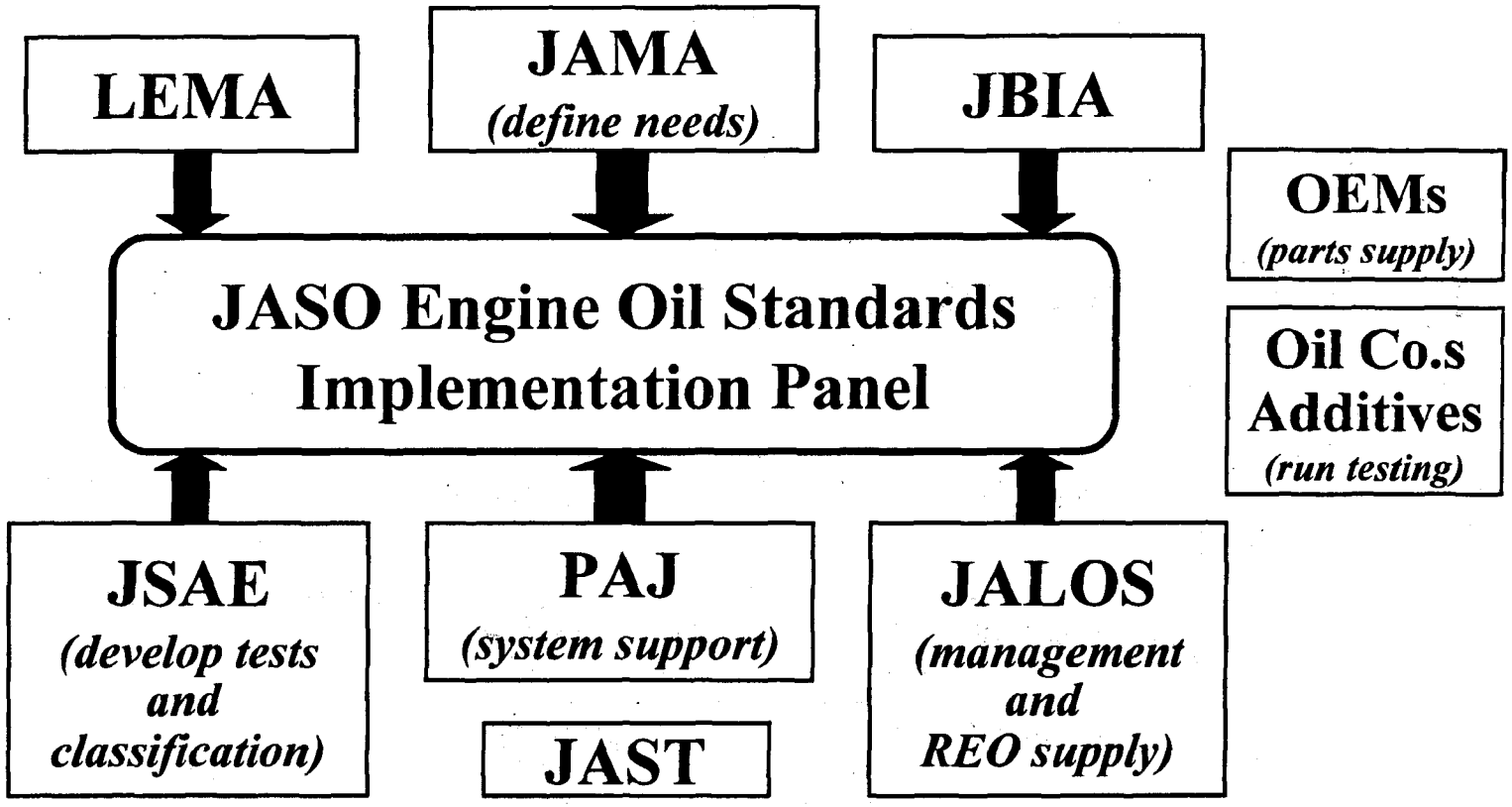

Fig. 16 Organizations Supporting the JASO On-File System in Japan

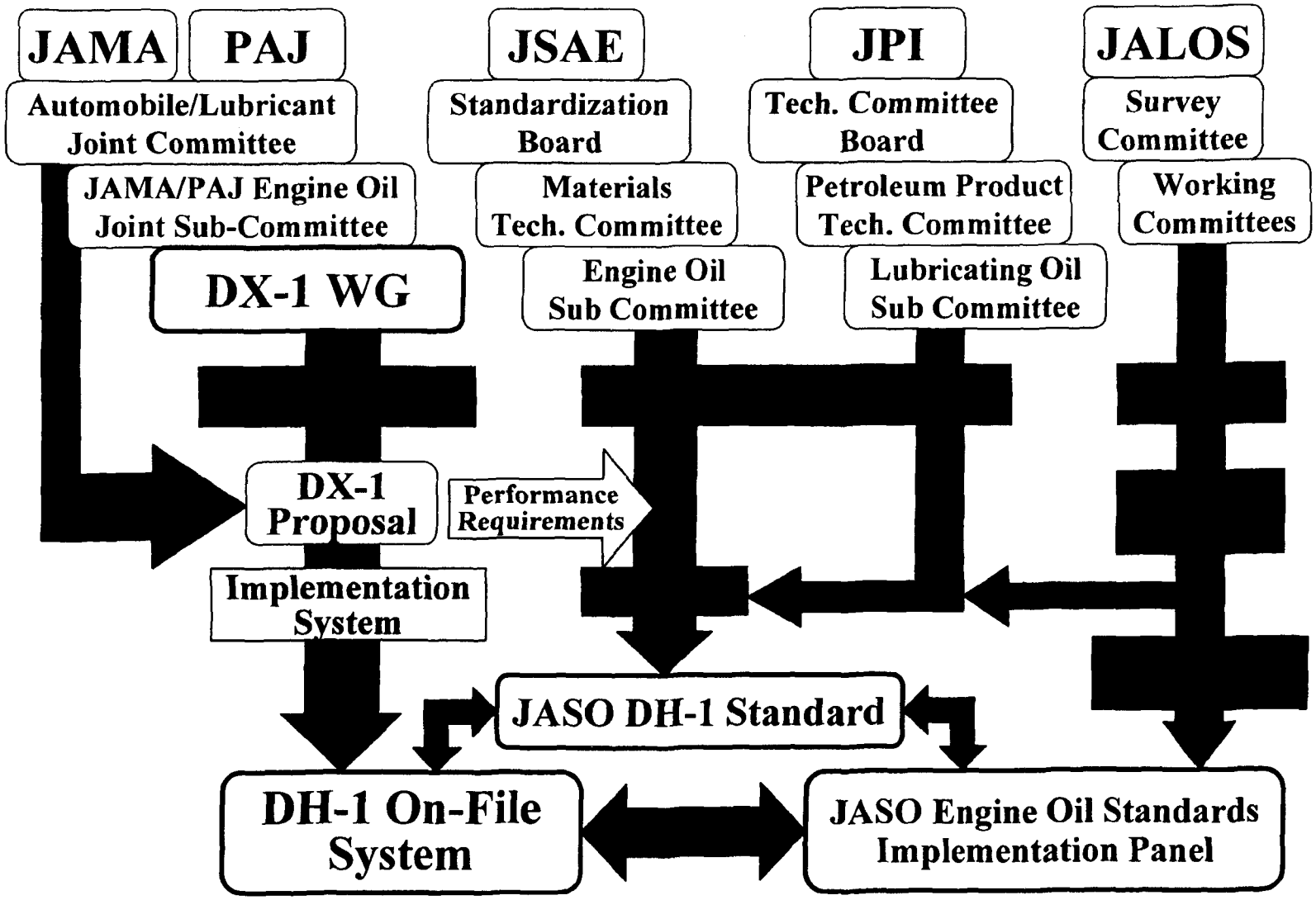

Fig. 17 Development Process for JASO DH-1 Standard