National Center for Manufacturing Sciences

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TTANET SAE

eAuto – Business-to-Business Ecommerce for the Automotive Supply Chain

A NCMS-InfoTEST Collaborative Project

Concept Proposal

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Associated sponsors include: AIAG, RosettaNet, SAE, SME, CommerceNet and Ontology.org

Project Scope and Objectives

The Business-to-Business Ecommerce for the Automotive Supply Chain project (eAuto) will define specifications for and demonstrate the integration of electronic commerce services with product design services through common technical information interchange mechanisms for the supply chain of the automotive and associated industries. Automotive and associated industries include passenger automotive, light-weight vehicle, heavy trucking, agricultural, mining and construction equipment. Supply chain product categories include all parts and assemblies supplied through to final assembly by ground vehicle OEM manufacturers.

This project will enable both small and large companies to make effective use of electronic commerce technology across the automotive supply chain. The project will validate and demonstrate the use of open systems and standards to efficiently share both technical and business data across organizations, and will aid the development and testing of critical new automotive-specific specifications. The eAuto project includes the following tasks:

- Adopt appropriate cross-industry Internet electronic commerce standards that meet the needs of the automotive supply chain in cooperation with the Society of Automotive Engineers, RosettaNet, Commercenet and Ontologies.org.
- Identity and develop industry-specific specifications required to take advantage of the latest cross-industry Internet electronic commerce standards. Specifically, this project will identify, name, define and provide sample values for the properties of ground vehicle supply chain product categories and sub-categories.
- Publish with the Society of Automotive Engineers an automotive industry roadmap of Internet electronic commerce standards and specifications to support broad and aggressive adoption of the technology required to implement the broad business changes occurring within the automotive industry.
- Establish a test-bed for Internet electronic commerce for automotive supply chain. This test-bed will be established with the Automotive Industry Action Group (AIAG) and the Society of Manufacturing Engineers to validate the use of standards and specifications identified in the automotive industry Internet electronic commerce roadmap.
- Disseminate project results throughout the automotive and associated industries to encourage the adoption of these technologies to speed efficiencies within the automotive supply chain by reducing the marketing, engineering and manufacturing costs across the automotive supply chain.

Benefits / Impact:

The results of this project will benefit companies who develop corporate implementations of supply chain electronic commerce solutions over public and private Extranets by:

1. Decreasing supply chain partner support costs, product rollover costs, time to market, time to add new partners and overall supply chain sales costs;
2. Increasing potential rate of new product introductions, speed of new product acceptance and adoption, percent of Internet-based business, channel sales revenue and overall channel sales profit;
3. Providing a vehicle to demonstrate new systems to both internal an external customers and speed orderly organizational change;
4. Providing a low risk, low cost opportunity for participants to "test drive" new combinations of applications and environments, selecting best of breed prior to committing to corporate implementation.

For example, the RosettaNet electronic commerce consortium for the PC industry has predicts the following improvements as a result of new Internet electronic commerce standards:

Repository Update Performance Metrics (per SKU)

Measurement	Cycle Time	Working Time	Cost
Current	20.1 hours	1.5 hours	$29.54
Expected	10.9 hours	0.51 hours	$12.54
Improvement	9.2 hours	0.99 hours	$17.00
% Improvement	46%	66%	58%

With 60,000 new SKUs per year in the US, Ingram Micro expects to see a potential yearly savings of $1.02 million on catalog updates alone. (60,000 x $17 = $1,020,000)

This example focuses solely on the savings in cost of catalog updates as the result of improved integration between trading partners. When extended to include the savings that result from improved trading partner management, improved direct engineering integration and ultimately improved demand planning, the savings could grow by an order of magnitude. This effort may also enable new business practices that drive new and previously unavailable revenue opportunities for participating companies.

Problem / Opportunity

The Opportunity

In the past two years a number of industry joint venture projects have demonstrated the effectiveness of integrating electronic commerce, procurement and engineering software technologies. (e.g. NIST Internet Commerce for Manufacturing, RosettaNet, CommerceNet) These projects shown the tremendous cost-savings, leverage and return on investment in these technologies for industries as diverse as financial services, printed circuit board manufacturing, personal computer reselling and networking hardware product sales. However, the results of these projects have not been applied to the automotive and associated industries supply chain.

There is a “sea change” occurring within the automotive supply chain. Responding to global competition, manufacturers are increasingly recognizing their competitive dependence on speed and quality performance of their supplier chains. Company downsizing and associated increases in outsourcing have resulted in only primary suppliers being managed comprehensively. Lower tier suppliers who often need the most direction, often receive the least.

The integration of Internet electronic commerce and computer aided design technologies can form the foundation of success for suppliers as the business practices within the automotive supply chain evolve in the face of this “sea change”. To enable the integration of these needed technologies, new specifications specific to the automotive industry must be developed.

We have the opportunity to leverage the work of previous Internet electronic commerce projects pursued for other industries and apply their results to the automotive industry.

- The RosettaNet consortium is developing a comprehensive electronic commerce framework and associated standards for electrical and electronic components for the PC industry. Since electrical and electronic components represent a significant percentage of the automotive supply chain trade, using common standards for mechanical component trade within the automotive supply chain would reduce confusion and duplication of effort. The RosettaNet Project Framework includes EDI and XML-based standards defining Open Content Interfaces (covering supply chain trading content, reporting and rules) and Open Transaction Interfaces (covering supply chain querying, search and commodity processes). RosettaNet's first proposed standards include the Catalog Information specification (covering structured product description, product classification and product shipping data). A revision is under development extending the specification to cover marketing information including pricing information and marketing collateral. In addition to the general catalog specification, RosettaNet is defining product class specific specifications for memory, cables, CPUs, etc.
- The Society of Automotive Engineers has defined a proposed standard for representing product class specific servicing information for the automotive industry. This specification was originally defined using SGML and has recently been translated into XML.
- The NIST Internet Commerce for Manufacturing Test-bed explored the use of electronic commerce and direct engineering for sourcing custom printed circuit boards. This project defined the business processes for initial job quote, change negotiation during the production cycle and product updates between production cycles.
- The CommerceNet consortium is defining electronic commerce catalog interchange standards and common electronic commerce framework standards.

Across these and many other standards efforts there is the strong refocus on the use of the World-Wide Web Consortium's eXtensible Markup Language (XML) for representing information standards and implementing information exchange. There are now XML mappings and integration tools for EDI, Enterprise Resource Planning interfaces, Workflow interfaces, and CORBA. This dramatic industry focus on XML provides an opportunity for he automotive industry to exploit the broad range of existing XML work with low long-term risk.

The Problem

Traditionally, an automotive OEM would contract out the manufacture of assemblies and components which had been designed in-house. In turn tier-1 suppliers would contract out the supply of major components to upstream suppliers based on the OEMs design. The OEMs design has hundreds of assemblies and thousands of components

supplied by thousands of participants in the supply chain. With the design of vehicles in constant flux, both before and after the close of Design Intent, a major problem with this traditional model is ensuring that all participants in the supply chain are working from the correct design specifications. This is particularly challenging when the design lacks manufacturing details, is too often not transmitted electronically and when exchanged electronically, arrives in incompatible formats with varying levels of design knowledge.

However, a sea-change within the automotive supply chain is resulting in OEMs pushing more responsibility onto their supplier chain:

- The OEMs have recognized that only 20% of the design content of their products represent product differentiation and competitive advantage. The remaining 80% of the design are commodity components. In an effort to focus on excellence in competitive features, the OEMs are pushing design responsibility for commodity components out to their suppliers.
- The industry is developing standards, or "harmonization", for many of these commodity components to improve manufacturing reuse and ease after-market installation.
- The OEM manufacturers are requiring turn-key manufacturing of entire assemblies – pushing responsibility for all component procurement, inventory and assembly onto their suppliers.
- The suppliers, in turn, are offering more design, manufacturing and upstream supply chain management services.
- With higher design costs, the suppliers must gain new economies of scale through which those costs can be amortized. This is leading to consolidation within the previously fragmented automotive supply chain.
- The "commoditization" resulting from the turn-key manufacturing trend, industry consolidation and "harmonization" efforts creates an opportunity for commodity assembly manufacturers to sell to multiple OEMs, resulting in higher volumes and lower unit costs.

One can readily extrapolate these scenarios up through the entire supply chain. This creates new sourcing challenges for both buyer and supplier – how does the buyer adequately represent their requirements and how does the supplier adequately represent their product capabilities while avoiding the business and technical problems inherent in exchange of non-standard design geometry information. To address these challenges we need to integrate product design, procurement and supply chain sales and marketing to ensure that the appropriate component information is available in the appropriate form for each participant in the sourcing process.

While many general electronic commerce, design automation and procurement standards have been defined by projects in other industries, new specifications

specific to the automotive industry must be developed to allow application of these general standards to the needs of the automotive supply chain.

Proposed Project Tasks

Automotive Electronic Commerce Framework – Selection of appropriate EDI, electronic commerce and XML specifications as foundation for integrating product design, procurement, marketing and sales processes. Candidate specifications include SAE J2008 (XML), RosettaNet methodologies, framework and catalog specifications, EDI-XML mapping and Commercenet Catalog Interchange.

Automotive Electronic Commerce Scenarios – Definition of business scenarios for the automotive supply chain. Example scenarios may be leveraged from RosettaNet and NIST ICM.

Automotive Electronic Commerce Catalog – Extend selected catalog standards to meet the specific needs of the automotive industry (if necessary).

Automotive Electronic Commerce Trading Partner – Extend selected trading partner standards to meet the specific needs of the automotive industry (if necessary).

Automotive Electronic Commerce Component Specifications – To be able to exchange standard after-market, service, marketing and design requirements information for the many components that are traded within the automotive supply chain, automotive-specific specifications must be defined that provide common definitions of those various types of components. (e.g. automotive electrical switches, automotive glass, tires, axles, bearings, engine ignition systems, etc.) Examples from SAE (J2008 – the standard for automotive service information) and RosettaNet (standards for electronic component marketing information) will be used to guide our definitions of automotive components marketing information. Since there are dozens of components types and the potential of hundreds of variations that must be addressed, we will address a small number of these specifications at a time. The selection of the specifications we design will be driven by the Steering Group plus the OEMs and Suppliers participating in the program.

Automotive Electronic Commerce Demonstrations – Testing the specifications defined by this project is critical to ensuring the usability of those specifications. At least once a year the technology suppliers, systems integrators, OEMs and suppliers will test current specifications on a demonstration test-bed in cooperation with the AIAG Automotive Network Exchange and the Society of Manufacturing Engineers “Computer Technology Solutions Show” (previously know as “AutoFact”).

Automotive Electronic Commerce Standardization – The specifications defined by this project may be proposed to the Society of Automotive Engineers and/or other appropriate standards bodies upon approval of the project steering group.

Potential Participants:

Contacted	**Current ANX Core Team**	NCMS Member
	Organizations:	
X	NCMS-InfoTest	N/A
	Software Vendors:	
X	WebEnable (sales channel software)	X
X	Cognition (knowledge mgmt software)	X
X	Knowledge Technolgies (CAD software)	X
X	MacNeal Schwendler (CAE software)	X
	NexPrise?	X
	SDRC (PDM software)?	X
X	Syncra (supply chain software)	
	Systems Integrators:	
X	Computer Sciences Corporation	
X	TRW Supply Chain Solutions	X
	OEM End-Users:	
X	Ford	X
X	Caterpillar	X
	Supplier End-Users:	
X	Emerson Electric	
	Cooper Tire	
	Ford Visteon	
	Ford Supplier 1	
	Ford Supplier 2	
	Ford Supplier 3	
	Caterpillar Supplier 1	
	Caterpillar Supplier 2	
	Caterpillar Supplier 3	
	Harbec Plastics	X
	Howmet	X

	Key Plastics	X
	Liberty	X
	Standard Products	X
	Tower Automotive	X
X	TRW Automotive	X
	UT Automotive	X

	Related Supportive Organizations:	
	SAE (Automotive Standards)	N/A
	SME (Manufacturing Association)	N/A
X	RosettaNet (E-commerce Standards)	N/A
	AIAG (Auto Industry Association)	N/A
X	Ontology.Org (E-commerce Repository)	N/A
	CommerceNet (E-commerce Standards)	N/A
	ASC X12 (EDI)	N/A
	NIST (ICM Project)	N/A
	Uniform Code Council (UCC)	N/A
	Independent Experts:	
X	Ken Kuna	N/A
X	Bill Waddell - TEWE	N/A
X	Dianne Kennedy – SAE J2008	N/A
X	Dr. Chris Hoffman - Purdue University	N/A
X	Dr. Bill Estrem - St. Thomas University	N/A
X	John Waraniak	N/A

Costs:

The following expectations drive the industry-funded cost model proposed for this project.

Project Expectations:

- A NCMS managed, industry-led collaborative cost-shared project is proposed.
- NCMS (InfoTEST sector) will serve as the Project Manager for this effort. NCMS will provide project formation, day-to-day management, accounting, and contractual project support.
- The project will be managed according to a multi-year plan, but funded in annual renewable increments. This ensures high visibility to participant return on investment.

- Participants in one program project may participate in other projects with no additional management fee.
- Cash support from industry will be sought to pay for NCMS Project Management. Otherwise, each participant is expected to pay their own expenses.
- Vendors will be sought who are willing to lend equipment and software for business trials.
- NCMS InfoTEST will fund their own staff time.

NCMS Project Management Tasks:

Project Planning

- Managing project formation meetings
- Briefing participants on issues
- Preparing preliminary statements of work

Project Organization

- Project formation
- Preparing final statements of work
- Preparing project management plans
- Preparing collaborative project agreements

Project Administration

- Managing meetings and reporting progress
- Providing legal and accounting support
- Technical Editing
- (With SAE) Publishing project reports

Estimated Cash Costs to Participants:

1. Companies which are not members of NCMS will be allowed to participate in the project, subject to the approval of the project steering group, and upon payment of the non-member annual project participation fee.

2. Companies which are members of NCMS will be allowed to participate in the project upon payment of the NCMS member annual project participation fee.

3. Non profit organizations and government entities will be will be allowed to participate in the project upon payment of the NCMS member annual project participation fee.

4. Individual independent experts may be invited to participate in the project subject to the approval of the project steering group with no required participation fee.

	Member of NCMS	Non-member
Steering Group Member (independent of revenue)	$20,000/year	$30,000/year
Large company (>$500M annual sales)	$10,000/year	$20,000/year
Mid size company (>$5M, <$500M annual sales)	$5000/year	$10,000/year
Small Company, non-profit org & government	$1000/year	$2000/year

Duration:

Launch project before 3/1/99. A three year plan for initial tasks is expected. However, each year a project schedule and budget will be proposed and project participation will be requested. This ensures that commitment to the project is required only from those companies realizing direct benefit from the project each year. It also, however opens the potential for growth in the number of participants, sponsors and amount of work that can be accomplished. Finally, it ensures that project participants remain focused and productive each year.

Appendix A - Associated Documents:

RosettaNet Project Framework

RosettaNet Technical Specifications Definition

RosettaNet Catalog Information Specification V1.0, V1.1

RosettaNet Trading Partner Information Specification V1.0

SAE J2008 Automotive Service Information - SGML DTD

SAE J2008 Automotive Service Information - XML DTD

NIST Internet Commerce for Manufacturing Demonstration Scenario

NIST Internet Commerce for Manufacturing Business Activity Model

Appendix B – Potential Automotive Component Types:

The following list was created based on the current list of SAE standards. I have assumed that if SAE sees fit to define design standards for a component that we should consider defining electronic commerce standards. In creating this list I edited out SAE standards that appeared to be associated with processes rather than specific component types (e.g. “Safety”). This list is **not** all inclusive.

- **Adhesives/Sealants**
- **Air Bags**
- **Air Conditioning**
- **Air Conditioning Refrigerant**
- **Air Filters**
- **Aluminum**
- **Antifreeze/Coolant**
- **Axles**
- **Batteries**
- **Bearings**
- **Bodies/Structures**
- **Braking Systems**
- **Clamps**
- **Clutches**
- **CNG**
- **Coatings/Paint**

- Communication Buses
- Connectors/Terminals
- Cooling Systems
- Dashboards & Instrument Panels/Cockpit Cntrls
- Diesel Engines
- Diesel Fuels
- Drivetrain Components
- Electrical Parts
- Engine Components
- Engines
- Exhaust Systems
- Fasteners
- Ferrous Castings
- Ferrous Sheet & Strip
- Filters
- Fuel Filters
- Gas Turbine Engines
- Gasoline
- Gears

General Parts

Glass

Grease

Hydraulic Systems

Insulation

Interiors

LNG

Lighting Systems

Lubricants

Machinery

Magnesium

Nickel

Oil

Oil Filters

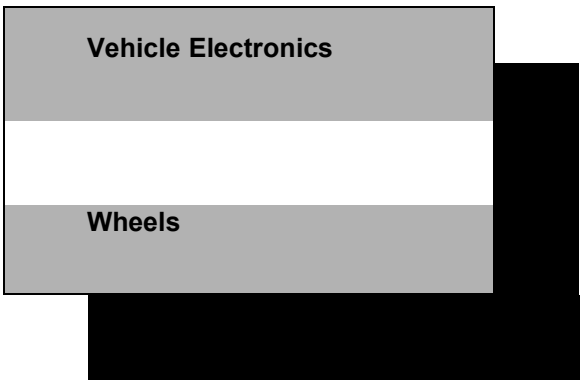
Parts/Accessories/Components

Plastics/Composites/Fiberglass

Propellers

Protection Devices

- Protective Structures
- Restraint Systems
- Roll Over & Falling Object Protective Structures
- Rubber/Elastomerics
- Seals & Gaskets
- Seat Belts
- Seats & Seating
- Spark Ignition Engines
- Spark Plugs
- Springs
- Steering & Suspension Systems
- Switches
- Test Equipment/Instruments
- Tires
- Transmissions
- Two-Stroke Cycle Engines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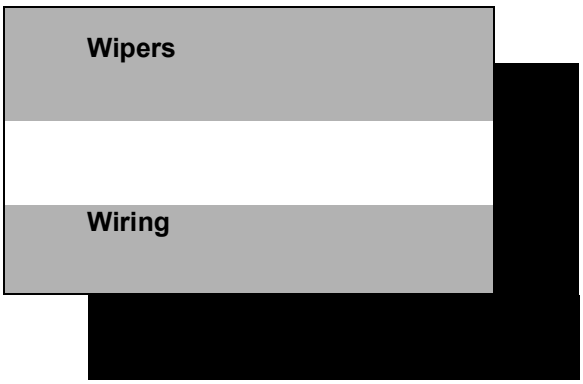
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