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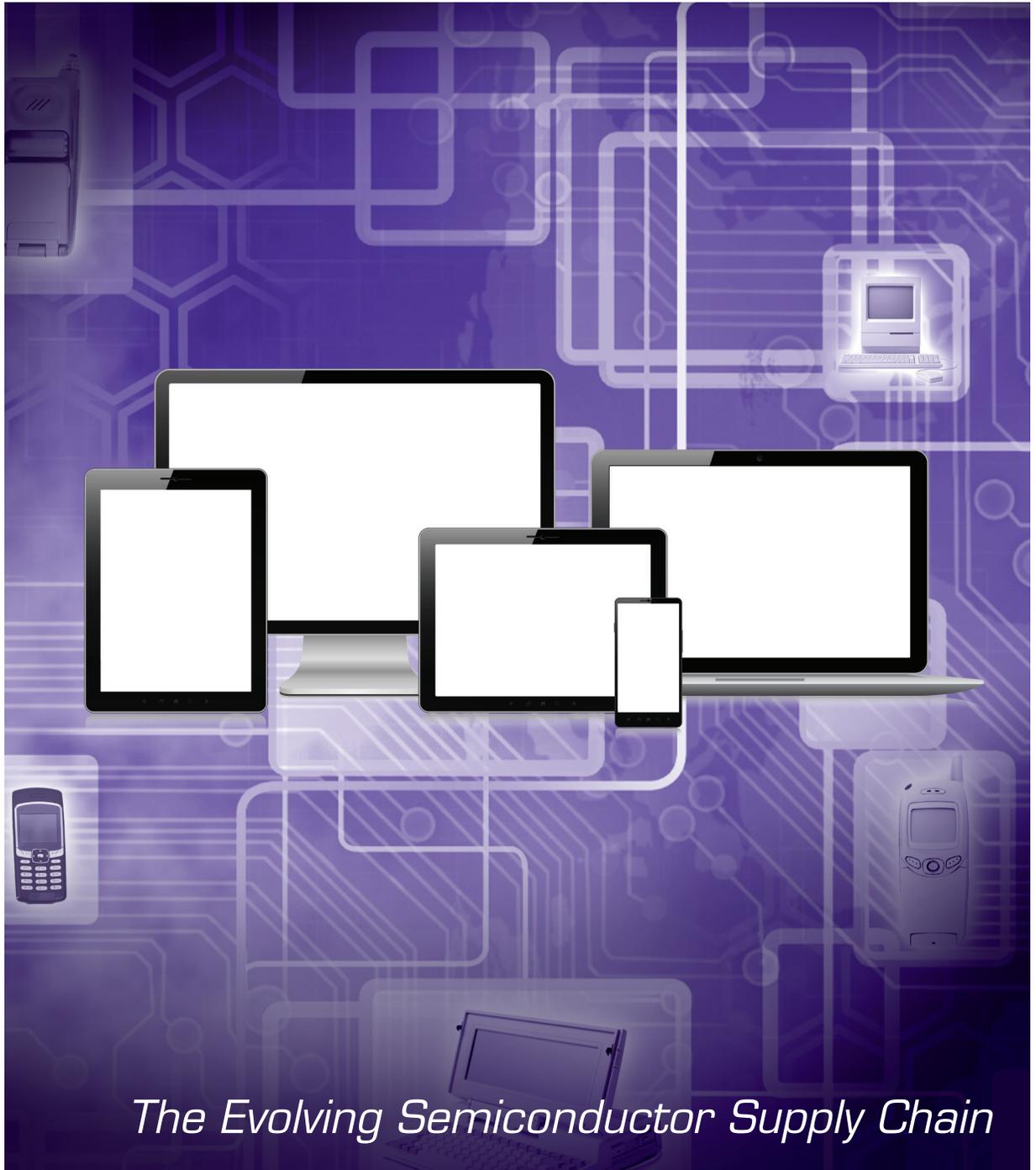
*HIGH-TECH ADOPTION NEEDS HIGH-TOUCH DISTRIBUTION*

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*HOW POWER CONSUMPTION AND COST IMPACT MOORE'S LAW AND MORE-THAN-MOORE ROADMAPS*

*EVOLVING STRATEGIES FOR TODAY'S SUPPLY CHAIN CHALLENGES - FROM DISRUPTION  
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**ANATOMY OF A SUCCESSFUL SUPPLY CHAIN INTEGRATION**



# ANATOMY OF A SUCCESSFUL SUPPLY CHAIN INTEGRATION

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**C**ollaboration is essential for semiconductor companies today. Nowhere is this more true than supply chain integrations for outsourced production processes. Semiconductor companies and their suppliers need to exchange information as seamlessly as possible to ensure timely and accurate inventory production. This article looks more deeply into this topic from three unique perspectives. The semiconductor company, the supplier and the supply chain provider all add their unique voices to this topic. The three companies collaborated in the supply chain integration for the semiconductor company.

This type of information exchange collaboration benefits from understanding each perspective on three questions: (a) What are your goals for the integration? (b) What tips do you have for effective partnering? (c) Can you apply these goals and tips to a sample project implementation?

## Participants Overview

The three companies supporting this article include a fabless semiconductor company, an assembly and test provider and a fabless semiconductor industry supply chain management (SCM) provider.

## What are Your Goals for Supply Chain Integration?

### Fabless Semiconductor Company

An accurate and up-to-date view of work in process (WIP) and activity to support planning and customer fulfillment is needed. Meeting finance department requirements for procurement management, transaction traceability and inventory tracking to manage expenses and to value inventory are also needed. Without

supply chain integration, information is entered manually, which delays insight and introduces possible human error. With the supply chain integration, the information comes straight from the supplier's system and is pre-processed by the SCM provider and is then checked by our operations team before being allowed into its system.

### Assembly and Test Provider

Data integration and reporting are viewed as a high priority service to customers, and a centralized data warehouse for all worldwide operations is key and requires significant investment. There are external and internal goals for this investment. These include providing customers with near real-time high quality production data that supports their internal business process and helps them reduce costs and increase productivity. Internally, this should be done as repeatably and efficiently as possible. Custom integrations for each customer slow the ability to meet customer goals, increase internal costs and can impact the quality of the data since non-standard processes are used in customized routines. One preference includes implementing business-to-business (B2B) reporting using an industry standard such as RosettaNet, or a data warehouse-driven customer portal and data repository.

### SCM Provider

SCM integration should be approached as a service. While there is technology involved with the delivery, the customer goal is the ongoing successful operation of the SCM integration, rather than software deployment. Responding and addressing any issues that arise, no matter what the source of the issue is necessary. All goals relate to the quality of the service provided and the effectiveness and efficiency of the team in providing the service. Like the assembly and

test provider, repeatable, robust and sustainable processes are desired. SCM providers want the best quality data possible, so seek to leverage standard supplier processes rather than asking them to adapt to us. SCM Providers also need to build in responsiveness, and to monitor the health of many simultaneous integrations, so should look for built-in monitoring and communications along with appropriate error trapping and precautions to handle the unexpected.

## What Tips Do You Have for Effective Partnering?

### Fabless Semiconductor Company

The most important learning experiences revolve around the importance of communication at every step of the process. In the beginning it is important to establish basic definitions. It may appear clear what good outs, yield loss and vendor loss are, but data definitions – even for fairly common information in some cases – are not universal. Supplier billing might be based on one step in the process, while the production receipt from supply chain integration might be from another step. The number of outs from these steps might be the same most of the time, but when discrepancies occur, it is very difficult to figure out the reason why. In addition, the procedures for common exceptions like reversals, where lots are sent back to previous steps or are merged and re-worked, need to be clearly defined so that the factory, supplier headquarters, supplier billing and the fabless company are in agreement about how to handle these occurrences.

### Assembly and Test Provider

It is very helpful to identify and involve all stakeholders who will be directly or indirectly impacted by the B2B integration project. For this integration, the list included the assembly and test provider's IT, factory, finance and sales teams; the semiconductor company's planning, operations and finance teams and the SCM provider's technical project team. This let us train stakeholders on how the B2B integration works: What are the key triggers? What is the critical data for reporting? How is the data being applied in the customer system? Once stakeholders are trained, they will understand how a change in process (manufacturing or billing) can impact the B2B integration and notify others of changes. Additionally, we are looking to develop test plans and scenarios that will validate that all requirements have been met during User Acceptance Testing (UAT).

### Fabless Semiconductor Company

The amount of different UAT test cases was not expected at the start of our project – but we see how it is a critical part of ensuring the entire process works as needed. Beyond basic process and data definitions, it is important to establish the timing of when suppliers are to send transactions through their B2B feed. This has been an issue with many assembly and test suppliers at one time or another. Examples of timing challenges include the supplier sending invoices a few days before the supply chain integration data is sent, or sending test transaction data before the assembly data, or holding back on production data until after shipment or even sending no data at all unless requested each time.

### SCM Provider

The tips above on specific communication topics are very important, including UAT. A project plan or task list based on best-practices, an ongoing commitment from decision makers, as well as the doers among the stakeholders, and the need to leverage a best-practices

approach to the implementation are also necessary. Deviation from best-practices may be required – but should be explained and approved. While it may appear obvious, busy schedules and executive focus are not always easy to obtain. At the same time, getting all parties involved at the appropriate times remains critical for an efficient and effective supply chain. These projects are not massive efforts with hundreds of tasks, but they do require coordination among multiple teams in multiple time zones – all with multiple demands on their time.

### Assembly and Test Provider

Any new business processes or data input requirements should be addressed ahead of the B2B integration project (i.e. change in customer part numbers to be reported or a new service being introduced) since this type of effort can be time-consuming and negatively impact the B2B project schedule. If such changes cannot be made ahead of the B2B integration project, then these activities should be planned for in the B2B Integration project plan.

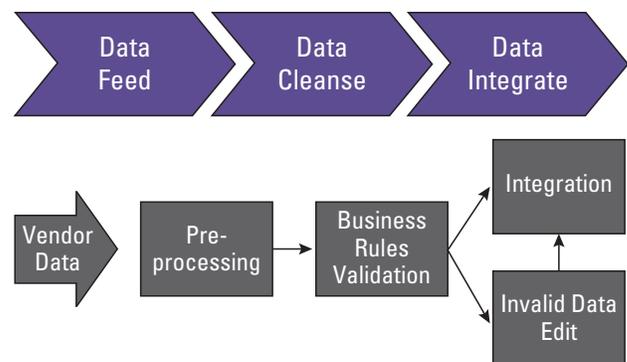
### Fabless Semiconductor Company

A third important communication requirement is the need for a clear escalation procedure – not just for the semiconductor company – but for the SCM and assembly and test providers as well, when problems with the supply chain integration occur. A daily e-mailed dashboard that shows what vendor files were processed without issues the night before, as well as those that may have failed, should be provided by the SCM Provider. With this daily e-mailed dashboard, both the fabless company and the SCM provider will know that there is an issue and to investigate. Knowing who to contact to quickly address the issue keeps the collaboration operational.

### SCM Provider

Our final tip is to stress the importance of visibility in supplier data quality and successful B2B integrations. Integration quality can suffer from a lack of internal focus on the quality and repeatability of SCM integrations and perceived value at the executive level of collaboration. It is often amazing to see the impact of small changes, such as adding supply chain integration quality to the semiconductor quarterly supplier review meetings. Knowing what is important helps all of the collaborators deliver!

Figure 1: Supplier Integration



## Sample Project Implementation

The integration project outlined above occurred at the end of 2011 and the beginning of 2012. The goals and tips above were applied during the implementation. This list of tasks was addressed by each collaborator to achieve a successful B2B integration:

### Fabless Semiconductor Company:

- Initiate the request with the SCM and assembly and test provider and send out 3-way non-disclosure agreement (NDA).
- Analyze semiconductor company-specific requirements.
- Initiate kick-off meeting to go over requirements with the SCM and assembly and test provider and to give background to all parties involved. Reach agreement on timeline and deliverables.
- Monitor the SCM and assembly and test provider progress to initiate the B2B links.
- Send out sample purchase orders for UAT with test cases and ask for B2B reporting to be uploaded to file transfer protocol (FTP) site.
- Ask SCM provider to process sample information.
- Perform UAT, provide feedback and repeat with the SCM and assembly and test providers until satisfied.
- Ask SCM Provider to deploy to production.
- Continue to monitor the B2B integration in live operation.

### Assembly and Test Provider:

- Receive request from the fabless semiconductor company and start the process to initiate the project, identify all stakeholders and obtain necessary approvals.
- Perform analysis to identify assembly and test provider sites and billable services being performed to select the standard WIP transactions that align with customer-specific bill trigger/pay points.
- Configure and test B2B reporting (unit test, integration test, connectivity) and promote to quality assurance (QA) environment.
- Deliver data to assembly and test provider's FTP service via a secured customer account for pick and processing by the SCM provider.
- SCM provider to transform data into the SCM provider system and work with the customer to support UAT.
- Upon UAT approval, deploy to production.
- Perform post-deploy validation and customer satisfaction survey.

### SCM Provider:

- Help define required data and training on the required system processes.
- Supply best-practices knowledge and templates to the process.
- Deploy the required software tools.
- Support accurate definition of the required information to the assembly and test provider's team.
- Focus on data quality first and the supportability of the resulting integrations.
- Complete required data transformation from the assembly and test provider's format to support the SCM system.
- Support the semiconductor company's testing and UAT processes.
- Continue to monitor and support operational B2B integration. ■

#### ***About the Authors***

*Trisha Giacomazzi has over 25 years of experience in manufacturing. For the last 18 years, she has been with Amkor Technology, Inc., one of the world's largest providers of contract semiconductor assembly and test services. Her current role is with Amkor's IT Department, managing customer B2B projects and activities with a special emphasis on Amkor Standard Reporting of WIP, shipment and invoice information by way of RosettaNet, EDI, flat files or from Amkor's Web. data™ self-service customer Web portal. In her past roles at Amkor, she supported end-users, developing and deploying internal software training programs and beta testing applications.*

*Heather Salonga joined Amalfi Semiconductor, a fabless semiconductor company specializing in cost-effective, high-performance CMOS power amplifiers and transmit modules in 2010 as their cost accounting manager. She was integrally involved with the implementation of Tensoft FSM and Microsoft Dynamics, acting as their SCM project lead. Before joining Amalfi, Heather was a senior financial analyst at Intel for over four years. She holds both an MBA from the Booth School of Business at the University of Chicago, and an MS in computer science from the University of Chicago.*

*William White is a co-founder and CTO at Tensoft, an ERP and supply chain management (SCM) software provider to semiconductor companies. His business management system experience includes large-scale projects to support over a thousand end-users. In addition to supporting Tensoft customers, William oversees technical development at Tensoft. Prior to co-founding Tensoft, William was manager of software development at Lockheed Martin in Santa Clara, CA. He holds a BS in electrical engineering from Texas A&M University, and an Executive MBA from the Anderson School at UCLA.*