Tuck School of Business at Dartmouth

Deere & Company: The Global Operating Model and the Worldwide Harvesting Cab Initiative

Deere & Company today announced a new global operating model that will combine the technology, expertise, experience, channels and investments of the Worldwide Agricultural Equipment Division and the Worldwide Commercial & Consumer Equipment Division into a single unit called the Worldwide Agriculture and Turf Division, effective May 1, 2009. Through the new operating model, this combined organization will be positioned to achieve the alignment and efficiency necessary to develop a more complete portfolio to meet worldwide customer needs – while reducing overall costs. The new division's global operating model will leverage common processes, standards and resources to develop solutions more quickly. It is designed to enable the division to grow profitably across many geographic markets, increase its competitiveness, and achieve and sustain exceptional operating performance – at all points in an economic cycle.

Deere&Company Press Release April 14, 2009

It was November 2011 and David Wilson, Vice President and Head of Global Platform Services for Deere's Agriculture and Turf Division, was traveling to Bruchsal, Germany to hold a quarterly business review meeting with Tracy Campbell and her Operator Station platform group.[1] With the impending launch of the Worldwide Harvester Cab (WWHC), the meeting would provide a timely opportunity to review the WWHC development and operations strategies and also to review the ongoing implementation of the new Global Operating Model (GOM). David hoped the meeting would help answer a number of questions. How had the GOM facilitated the WWHC initiative? What lessons could be applied to future development programs across Deere? How had the WWHC initiative implemented standardization and commonality in factory operations and supply management?

Company History and Overview

With design centers, factories, and sales office in over 30 countries, and with a net income of $2.8 billion on $32.0 billion in net sales in 2011, Deere &Co. has come a long way from its origins as a blacksmith shop in Grand Detour, Illinois, where in 1837 John Deere began producing polished-steel plows for local farmers. With a growing demand for its plows, John Deere moved the business to Moline, Illinois in

[1] Names of individuals have been disguised in this case.

This case was prepared by Brian Tomlin, Aran Brosnan and George Craft at the Tuck School of Business, with the support of the Tuck School's Center for International Business. The case was written for the purposes of class discussion and is not intended to illustrate effective or ineffective management practices.

1848. By 1912, Deere had 25 sales offices in the U.S. and Canada and 11 manufacturing facilities. The emergence of the gasoline engine tractor in 1915 threatened to disrupt the agricultural equipment industry, and Deere's 1918 acquisition of a gasoline engine tractor producer was a pivotal moment in the company's history, with the tractor being one of its dominant products over the following century. Deere's product portfolio grew in the 1940s and 1950s with its entry into the construction-equipment business. However, Deere did not expand its manufacturing footprint outside the U.S. and Canada until 1956, when it built an assembly factory in Mexico and acquired a majority interest in a German agricultural equipment manufacturer.

The following decade saw Deere's footprint expand in Europe, South America and Africa. New product introductions in 1960 paved the way for Deere to become the world's largest manufacturer of agricultural and industrial tractors and related equipment. The 1960's also saw the company's entry into consumer markets, making and selling garden tractors. In the following decades Deere's business grew both in scale and complexity, with the company acquiring a forestry-equipment producer in 2000 and building or acquiring a variety of production facilities in India (1998), Brazil (2004), Russia (2005) and China (2007). Deere's global footprint was not limited to production facilities; it also had technology centers in a range of countries.

By 2008, Deere was organized into four divisions: Agricultural Equipment, Commercial & Consumer Equipment, Construction & Forestry Equipment, and Financial Services. As described in the company's 2008 Annual Report:

> The company's Equipment Operations generate revenues and cash primarily from the sale of equipment to John Deere dealers and distributors. The Equipment Operations manufacture and distribute a full line of agricultural equipment; a variety of commercial, consumer and landscapes equipment and products; and a broad range of equipment for construction and forestry. The company's Financial Services primarily provide credit services, which mainly finance sales and leases of equipment by John Deere dealers and trade receivables purchased from the Equipment Operations.

The Agriculture division generated 64% of Deere's $25.8 billion in net sales in 2008, with the Commercial & Consumer division and the Construction & Forestry division accounting for 17% and 19% respectively.

To be successful in their markets, Deere products must be technologically advanced and reliable and come with effective after-sales field-support. Agricultural equipment, such as harvesters for example, are highly sophisticated machines, integrating complex hardware, electronics and software. In fact, "today's large John Deere tractors have more lines of software code than early space shuttles [and Deere's] GPS technology can guide a tractor and implement in the field with near-perfect precision. This means less overlap in tillage and chemical application, saving time and money and minimizing environmental impacts."[2] Exhibit 1 shows a scene from the Virtual Reality Lab at Deere's Waterloo Product Engineering Center. Examples of Deere products are shown in Exhibit 2(a)-(c).

[2] David Everitt, President, Agriculture and Turf Division – North America, Asia, Australia, and Sub-Saharan and South Africa, and Global Tractor and Turf Products. Quote from speech to Ag Investment Summit, 10/20/11.

The Agriculture and Turf Division and the Global Operating Model

Deere's relentless expansion in the second half of the twentieth century created a global footprint of design centers and factories that developed and manufactured products for different regions of the world. Products and regions tended to have a large degree of autonomy in designing products, selecting suppliers, running factories and managing distribution channels. Decentralization was a key organizational philosophy. While this organizational model had served Deere well for a number of decades, the increased competition and globalization in the 2000's caused senior management to ask whether the existing model was enabling Deere to fully leverage its expertise, technologies, talent, sales channels and global footprint. There was a growing sense that the business was not as fast as it could be, not as cost competitive as it needed to be, and that it was harder to do business with it than it should be.

In 2008, Deere began to develop a new organization structure and operating model. The Agriculture Equipment and Commercial & Consumer Equipment divisions were combined to create the Worldwide Agriculture and Turf Division in 2009. At the same time, Deere began the implementation of a new Global Operating Model. The objective of this transformation was to significantly improve Deere's ability to understand and act on global market opportunities, to leverage global scale, to share resources, and to optimize global product line results.

The Global Operating Model (GOM) was founded on five guiding principles.

- Customer driven: All efforts are aligned to understand, design and deliver a differentiated John Deere experience to targeted customers.
- Differentiating speed: Reduce cycle times to differentiate the customer experience and achieve business results.
- Standard Processes: Utilize globally standard processes, terminology and metrics.
- Partner Collaboration: Integrate partners to generate shared value and drive business results.
- Talent Development: Attract, rapidly develop and retain global talent (at all levels).

To achieve the objective of better leveraging its global resources, the GOM organized the newly formed Ag&Turf division into Customer Focus Regions, Product Platforms, Platform Services, Customer Focus Services, Strategic Marketing, Core Enablers, Solutions, and Division Level Functions. See Exhibit 3 for an illustration of the new organization structure.

Customer Focus Regions

Rather than grouping countries solely by geographic proximity, Deere analyzed customer needs and market characteristics to identify collections of countries that exhibited sufficient similarities that Deere could leverage to its own and to its customers advantage. For example, Australia was grouped with Canada and the United States in one region. The four regions are shown in Exhibit 4. Each of the four regions would be responsible for sales, tactical marketing and customer support and each had accountability for its marketing strategy, profitability, and market share growth.

External Platforms

Deere's extensive product line contained families of products that performed a similar set of functions; for example, although different types of crops require different harvesting equipment, many of the underlying customer requirements are similar from one crop to another. So as to leverage these functional similarities across products, Deere created five External Platforms: Tractors, Crop Harvesting, Turf and Utility, Hay and Forage and Crop Care. Each external platform was to be managed as a profit center to globally optimize its product and manufacturing portfolio.[3] External platforms would have global accountability for portfolio decisions, portfolio sourcing and product delivery. They would be responsible for product planning, product development, product line management and production planning.

Platform Services

The Platform Services organization was designed to be a shared service producing parts for and delivering services to the External Platforms. Global Platform Services comprised three Internal Platforms: Operator Station; Hydraulic Cylinders and Components & Fabrication. The intent of the Internal Platforms was to efficiently leverage common components and systems across External Platforms to enable effective technology development and to optimize asset usage. In addition to the Internal Platforms, the Platform Services organization comprised Product Engineering Services, Manufacturing & Manufacturing Engineering Services, Process Management and Business Process Transformation. Managed as a cost center, the vision was for Platform Services to improve Deere's overall competitiveness by driving performance improvement through leverage and synergy across common processes, capabilities, and components. The Platform Services organization chart is shown in Exhibit 5.

Customer Focus Services

The Customer Focus Service organization would be responsible for providing the four regions with support and shared services in the areas of customer and product support and order fulfillment.

Strategic Marketing

The Strategic Marketing organization would be responsible for gathering and prioritizing customer needs globally and to help inform the regions and external platforms on how to sustainably grow market share.

Core Enablers

The Core enablers would be responsible for the worldwide management of standard processes, systems and shared services in the areas of Finance, Human Resources and Information Technology.

Division Level Functions

Certain functions, such as Quality and Supply Management, would be managed as division level function supporting the external platforms and customer-focus regions.

The Global Operating Model represented a major transformation of Deere's structure, and its impact would be felt across all facets of the organization. Taking Platform Services as an example, the GOM would fundamentally alter a number of key dimensions. For example, prior to GOM, core technologies in

[3] Whereas Customer Focus Regions were concerned with profitability by geography, External Platforms were concerned with profitability by product.

components, cylinders and operator stations were driven by individual product line requirements, resulting in a technology portfolio that had potential for significant overlap and redundancies across product lines. Perhaps not surprisingly, opportunities to share parts across products were not always exploited. Post GOM, leveraging part commonality (while still being responsive to External Platform needs) would receive a higher priority when creating technology roadmaps.

The organization and vision for manufacturing engineering was also transformed by the GOM. Instead of individual products and factories owning the deployment and development of manufacturing services and competencies, the GOM created a Manufacturing/Manufacturing Engineering (MFG/ME) organization within Platform Services. While certain MFG/ME resources would still be located at factories, the MFG/ME Internal Platform would enable Deere to align these resources with their respective External Platforms and would also enable the deployment of common manufacturing engineering processes, tools and standards on a division-wide basis.

Decision Rights

As is the case for all globally complex business, crucial processes (such as translating customer requirements into a product specification) have the potential to impact a range of internal constituents. This introduces a natural organizational tension as different constituents have different perspectives and objectives. While some level of tension is constructive and can lead to better outcomes, tension can sometimes delay decisions and lead to globally suboptimal outcomes. To drive clarity and alignment on critical functional and cross-functional business decisions, the GOM launched a key initiative called Decision Rights.

> Decision rights are the foundation for progress and speed in a globally distributed, matrix organization. Without clarity on decision rights, at best the organization will be engaged in solving the same issue multiple ways around the globe resulting in waste and confusion. At worst, issues will be drowned in a swirl of debate and decisions will be continually questioned and revisited with no progress as a result.
>
> \- Vice President, Global Platform Services, Ag&Turf Division

The Decision Rights initiative identified and reviewed more than 150 potential decisions before settling on approximately 80 critical decisions to focus on initially. These decisions were selected because they fell into one or more of the following categories: the decision required strong cross-functional inputs and interaction; authority for the final decision required clarity; and/or the decision rights were changing in the GOM. For example, one such decision was the global manufacturing footprint and capacity for an External Platform. For each of the decisions, the relevant functional leaders (e.g., an External Platform head or a Customer Focus Regional head) were identified and assigned one of the following three responsibilities:

- P: Primary responsibility for making the decision. There could be only one primary for any given decision.
- S: Shared Responsibility for making the decision. Those with shared responsibility must agree on the decision.

- C: Contributor of key input or information to the decision process. Contributors have no veto over the decision.

For example, the External Platform leader would have primary responsibility for the global manufacturing footprint and capacity for the External Platform, while Internal Platforms, Manufacturing Engineering, and Supply Management might be contributors to the footprint decision. In rare cases, the primary responsibility for a decision might not reside with a functional leader but instead with a coordinating mechanism, i.e., a council of various functional leaders. This Decision Rights initiative resulted in a Decision Rights Matrix that characterized the above responsibilities (P, S, or C) for each of the critical decisions, with the intent of driving decision-making clarity into the processes. The Matrix could be accessed via the Deere intranet and it was intended to be living tool that could be expanded over time and that could serve as a model for decisions at lower levels in the organization.

The Operator Station Internal Platform

With operators spending many hours a day maneuvering and controlling their equipment, the operator station is a crucial element of agricultural turf & utility, construction and forestry products. The Operator Station Internal Platform was one of the three Internal Platforms created by the new Global Operating Model. It was responsible for the development (design) and production (manufacturing and sourcing) of operator stations across the product portfolio, partnering with the External Product Lines and Platforms that were its customers.

The Operator Station Internal Platform (OSIP) had a global reach, with 9 manufacturing locations and 5 design centers. In some instances, operator stations were procured from external suppliers. The OSIP global footprint is shown in Exhibit 6. Manufacturing facilities were either standalone or imbedded factories, where an imbedded factory was co-located on the site of an External Platform manufacturing facility. One of the visions of the OSIP was to create a distinctive John Deere operator experience across the product portfolio by working with the External Platforms to identify opportunities for commonality. In addition, commonality would enable cost reduction. At its inception, the OSIP needed to both implement the GOM vision as well as manage a number of existing development programs. One such program was the Worldwide Harvesting Cab Initiative.

The Worldwide Harvesting Cab (WWHC) Initiative

Cabs are a key differentiator in harvesting products; with customers valuing comfort, technology, ease of use and visibility. By 2007, Deere competitors such as New Holland, Krone and Claas had recently introduced new cab designs while Deere's combine-harvester cab design had not evolved significantly in almost twenty years. Faced with increasing competition and market-share pressure, Deere launched a multi-year program to develop a new generation of cabs for its harvester product portfolio, with a rolling release scheduled to start in 2012. The interior and exterior of the new cab is shown in Exhibits 7 and 8. With this next-generation cab having a planned production life in the range of 10-15 years, it was crucial to develop an industry-leading product (as perceived by customers) that would be supported by an effective global operations strategy. It was imperative to achieve alignment between the development strategy and the operations strategy because decisions in one domain would have significant implications for the other.

The development strategy for the WWHC applied a gates-and-milestones process that Deere uses for all Enterprise Product Delivery Programs (EPDP). This activity-and-time based methodology focuses on crisp program execution and rapid development cycles. Deere's methodology is based upon 14 internal sub-processes that work as an integrated team to develop optimal programs that meet customer and business expectations. Examples of sub-processes include Customer Acquisition Integration, Product Design, Manufacturing Design, and Supply Chain Integration. The methodology is highly structured with detailed activities, activity sequencing, and tools and templates. However, the structure can be scaled by the individual programs and focused on the specific needs of the program. These highly aligned teams are responsible for defining the program efforts, gaining management approval, and executing based upon the program bounds established and approved by the business management team. While all of the sub-processes participate in the development of the program, the methodology is focused on defining the best solution with heavy emphasis on customer needs, business integration, and financial return.

The operations strategy embraced a "build-anywhere" concept that would be supported by a modular assembly strategy and part commonality. With the build-anywhere concept Deere would be able to build (almost) any variant of the cab in any of the production facilities chosen for the WWHC. In the modular assembly strategy, components in close proximity in the cab would be brought to the assembly line already assembled into fully tested modules. Modules can be thought of as building blocks that comprise the major portion of the components and labor in the cab. Examples of modules are the steering column, the roof assembly, the seat and command arm, and the cab structure. Modular design would allow Deere to deliver extensive product variety from a limited set of module variants. To support this, module variants would need to be designed to have consistent interfaces with the other modules and to allow common production tooling across variants of a module.

For the WWHC, the main production activities would be cab-structure welding and cab assembly. Other modules such as the roof assembly, steering column and seat & command arm would be procured as (almost-complete) modules from either internal or external suppliers and then assembled into the cab. No new factory was being constructed as part of the WWHC initiative. Production of the new cab would occur in three of Deere's existing production facilities: Bruchsal (Germany), Waterloo, Iowa (U.S.), and Horizontina (Brazil). It was anticipated that the total annual production would by approximately 20,000 units, with Bruchsal accounting for 55%, Waterloo 25% and Horizontina 20%.[4] Unlike Bruchsal which was a standalone factory, the Waterloo and Horizontina cab facilities were imbedded factories. Bruchsal would supply cabs to two Deere factories in Germany (Mannheim and Zweibrücken), one in Finland and one in the Netherlands.

Welding operations were highly automated in Waterloo and Bruchsal but less so in Horizontina. Assembly in Bruchsal had typically been much more automated than in Waterloo and Horizontina which were more labor intensive. Exhibit 9 shows two views of the Bruchsal assembly line for tractor cabs; recall that factories made cabs for different external platforms. Other differences existed, for example the tractor assembly process was based on a synchronous flow in Bruchsal but an asynchronous flow in

[4] **To preserve confidentiality, all non-public data about Deere costs and volumes and supplier metrics have been disguised in this case.**

Waterloo. Also, the production-planning software differed across locations, as did some of the material handling processes and equipment. Workers in all three factories were represented by some form of labor union but the union form varied across countries, for example there was a Works Council in Germany. Also, the specifics of the labor agreements, for example rules about job assignments, varied across locations.

The WWHC Seat Decision

Because increased part commonality was a goal of the WWHC initiative, the engineering, manufacturing and supply management teams worked together to identify and evaluate opportunities for leveraging common components across regions and products. One such opportunity was in the area of seats. With comfort being a key customer requirement for cabs, the seat plays a central role in the operator experience. As one customer said, "we live in these things all summer. I'd rather feel good at the end of the day." Seat design, and its integration with the other parts of the cab interior, was therefore a crucial work stream in the overall development program. For harvester-cab engineering, most of the seat design and integration team members were located in Germany. Because the seat accounts for a significant portion of the overall cab cost, it would also be imperative to create an effective operations strategy for seats.

For the most part, seat production is not vertically integrated in the agricultural and construction equipment industries; original equipment manufacturers (OEMs) source seats from external suppliers. Seat design is a somewhat collaborative effort between the OEM and supplier. The seat industry has three major suppliers with a global presence: Grammer, Sears Manufacturing, and Commercial Vehicle Group. There are also a number of niche and regional supplies in the industry.

Early on in the WWHC initiative, two potential suppliers were identified from the set of three global players. Deere had extensive experience working with each of these suppliers (A and B) in the past.[5] Supplier A had at least one manufacturing facility in each of the following regions: Asia, Europe, South America and North America. Supplier B had a somewhat similar global footprint except that it lacked a manufacturing facility in South America. Supplier A's design center was located in the U.S., whereas Supplier B's was located in Europe.

There is a large degree of heterogeneity in customer preferences and perceptions when it comes to seats, both within a geographic region but also across geographical regions. For example, while the typical customer in one part of the world might prefer a softer seat, the typical customer in another part of the world might prefer a firmer seat. In addition, customers were very knowledgeable about seat suppliers and often exhibited strong preferences for a particular supplier. Upon sitting in a seat, some customers could tell exactly which supplier it came from.

Deere conducted extensive market research to gather "voice-of-the-customer" data to inform its seat design and to evaluate suppliers. Customers from all regions were asked to evaluate seats on more than twenty dimensions. On average, Supplier A was better on some dimensions and Supplier B on others, but

[5] **To preserve confidentiality, supplier names are masked and all supplier metrics are masked. Furthermore, while there was variation in the supplier metrics, with each outperforming the other on certain dimensions, the case purposefully mixes these dimensions so that neither supplier can be identified.**

neither was clearly superior. The market research did observe heterogeneity in customer preferences within and across regions. On average, Supplier A was slightly preferred in Europe whereas Supplier B was slightly preferred in North America and South America.

Deere evaluated the cost of each supplier to supply each of its three production facilities. Table 1 below presents the fully loaded (purchasing plus logistics) per-unit cost that each Deere production location would experience from each seat supplier. The regional difference in fully loaded costs is driven partially by the different manufacturing footprints of the suppliers. Based on past experiences, Deere also evaluated the two suppliers on (i) ability to adhere to the seat development schedule, (ii) non-cost supply metrics such as delivery and quality, technical support and "wavelength" [alignment and ease of doing business], and (iii) product reliability, durability and warranty performance. The two suppliers were relatively evenly matched on these dimensions.

Based on their evaluations, the WWHC engineering, manufacturing and supply management teams had to decide on a seat strategy, and in particular, what degree of standardization to pursue. Should they standardize on one supplier for all regions? If so, which supplier? Should they standardize within a region but allow differences across regions? If so what supplier should each region choose? Should they offer both seats in all regions?

Conclusion

As David Wilson settled into his seat for the return flight to the U.S., he mentally reviewed some of the discussions from the Operator Station business meeting. There had been a general agreement that the Worldwide Harvester Cab development program had been a success to date and that the program could be used to highlight the benefits of the Global Operating Model. One aspect of the WWHC success was the degree to which it had implemented commonality and standardization. However, it had been clear in the meeting that different individuals in the Operator Station Internal Platform had somewhat different perspectives on how much further to drive commonality and standardization in future programs. As the plane took off, David's thoughts turned to the quarterly review meeting with the Manufacturing/ Manufacturing Engineering Services organization that was to be held the following week at Deere's World Headquarters in Moline, Illinois. How would this organization view the merits of commonality and standardization?

Table 1: Cost per-unit (in $) for seats at each Deere factory.

	Deere Cab Factory		
	Bruchsal	**Waterloo**	**Horizontina**
Supplier A	$1,600	$1,360	$1,760
Supplier B	$1,520	$1,428	$1,900

For reasons of confidentiality, these costs are masked and do not represent the actual or relative costs for the suppliers.

Exhibit 1: A scene from the Virtual Reality Lab at Deere's Waterloo Product Engineering Center

Exhibit 2(a): Combine Harvester

Exhibit 2(b): Self-Propelled Sprayer

Exhibit 2(c): Large tractor

Exhibit 3: Illustration of the Global Operating Model structure

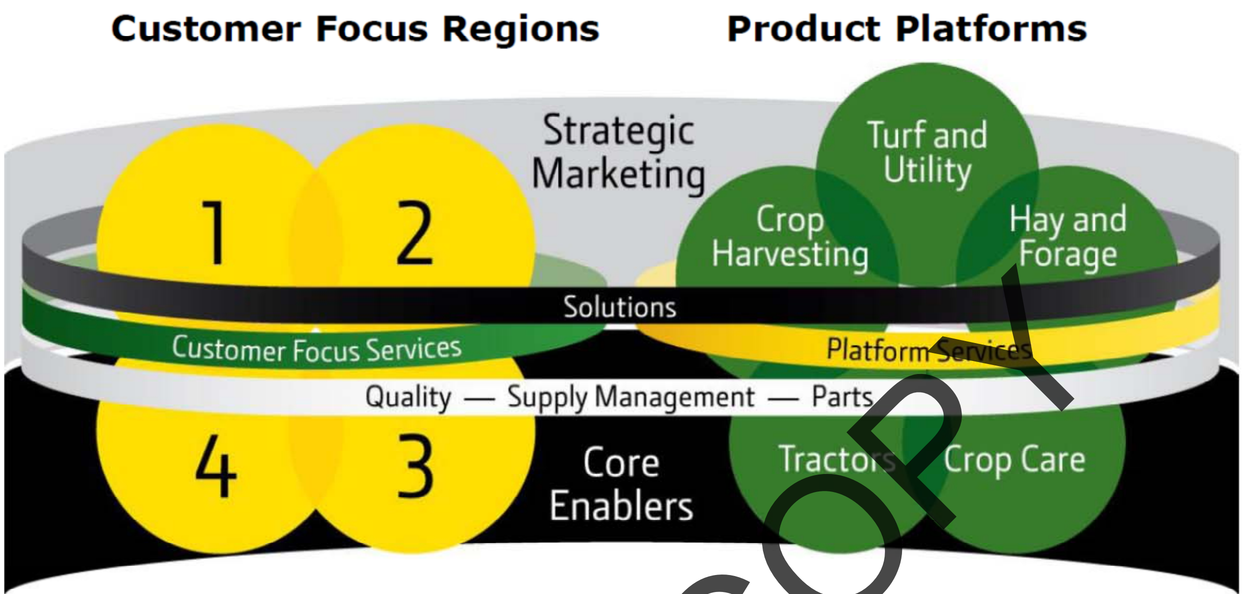

Exhibit 4: The Four Customer Focus Regions

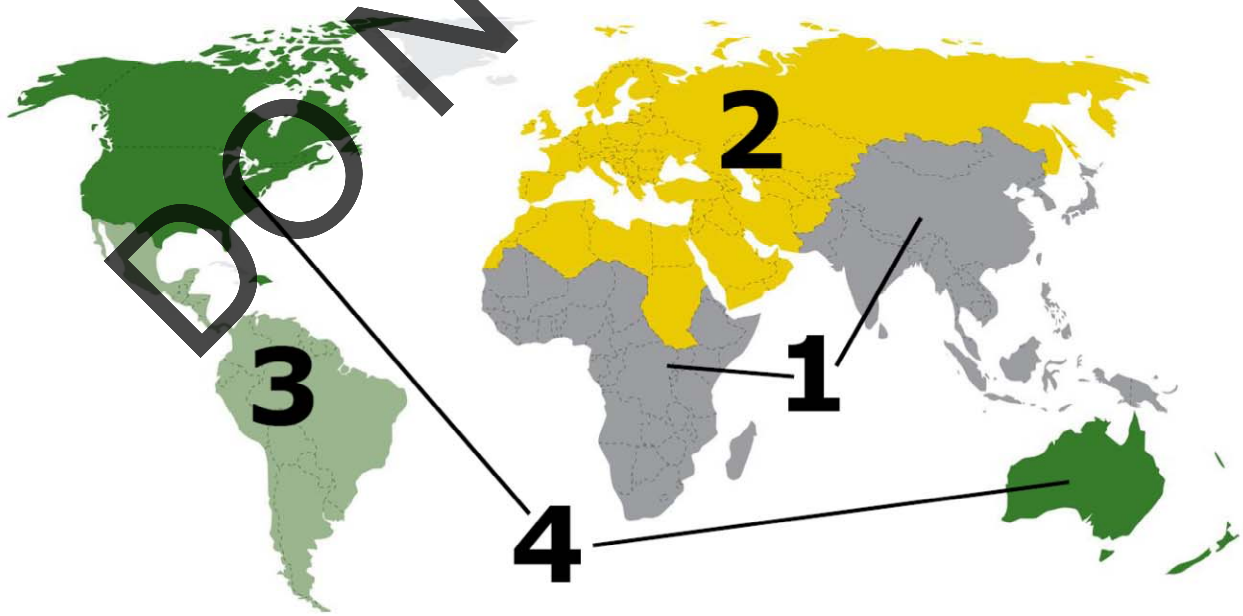

Exhibit 5: Platform Services Organization Chart

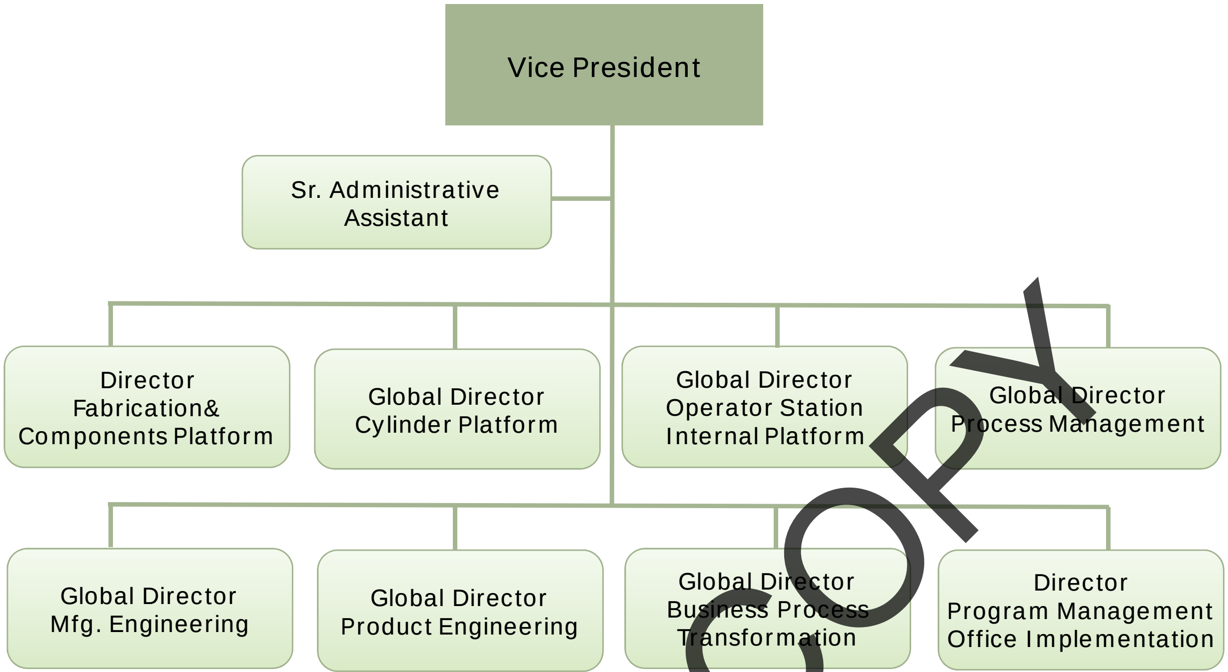

Exhibit 6: Operator Station Design and Manufacturing Global Footprint

Exhibit 7: Interior Views of the Worldwide Harvester Cab

Exhibit 8: Exterior View of the Worldwide Harvester Cab

Exhibit 9: Two Views of Tractor Cab Assembly Line in Bruchsal