

## Quest Diagnostics (A): Improving Performance at the Call Centers

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*We were caught in a negative feedback loop. We were so focused on productivity and getting the next call answered instead of thinking about how I can better assist this caller so it decreases the amount of calls. There wasn't time to think about if there was a better way.*

— Jeremiah Kvas, Supervisor, National Customer Service, Lenexa, Kansas

MaryAnn Camacho's first day at Quest Diagnostics (Quest), the leading provider of diagnostic services and solutions in the United States, was the first Monday in July 2015 and it was a whirlwind. As she walked through the front door of the company's Lenexa, Kansas, call center, she was struck by all the people milling about. They were clearly waiting for something and most seemed nervous. She soon learned that they were brand new customer service representatives (reps)—over 50 of them—there for their first day of training. She was puzzled. This location only had 400 employees—and 50 were brand new?

Camacho had been hired as the Executive Director of Quest's National Customer Service (NCS) organization. She would be overseeing two locations—one in Tampa, Florida, and one in Lenexa—plus roughly 250 reps working remotely from home. Camacho's position was new to Quest. The company's customer service function had been consolidated in 2013 when its 20 regional customer service centers were pared down to two.

The consolidation process had been difficult and Quest's leadership, most notably Jim Davis, Executive Vice President of General Diagnostics, and Scott Jeffers, Vice President of Lab Operations and

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Operational Excellence, knew that the NCS had to perform better. Labor costs were too high and employees—especially reps—were not staying on the job for long. Even worse, perhaps, customers were waiting over two minutes on the phone just for someone to answer, reps were often unable to give the right information in one call, and the company was losing key customers. “When patients have a bad experience,” explained Davis, “they complain to their doctors and then the doctors, if they hear five patients who had a bad experience at Quest, they’re going to flip their labs to the other guy.”

Camacho understood the challenges she faced. She knew Quest needed to transform its operations at the NCS. The question was: where to start?

### Company Background

Quest Diagnostics was founded in 1967 as the Metropolitan Pathology Laboratory in New York City. It was renamed Quest Diagnostics in 1996, the year it went public.

Between 1996 and 2012, Quest grew considerably through more than a dozen acquisitions across the United States. Acquired labs continued to operate autonomously, purchasing their own equipment, following their own operational practices, and serving customers through their own call centers. Several of the acquisitions were outside of Quest’s core laboratory business.

Quest enjoyed top-line growth as a result of its acquisitions and, starting in 2000, its stock began an upward trajectory (**Exhibit 1**). But by 2008, its core laboratory business began to falter. Quest began losing business to its top competitor, Laboratory Corporation (LabCorp), most notably when LabCorp won over one of Quest’s key customers, UnitedHealthcare Insurance.

A new CEO, Steve Rusckowski, was hired in 2012 to direct a turnaround. An MIT Sloan graduate, Rusckowski had served as CEO of Philips Healthcare, where revenue grew 50% during his six-year tenure. At Quest, Rusckowski helped articulate the firm’s vision, goals, and strategy. The vision was to empower better health with diagnostic insights. The three goals were (a) helping create a healthier world, (b) building value, and (c) creating an inspiring workplace. The five-point strategy was to:

- Refocus on diagnostic information services;
- Drive operational excellence;
- Restore growth;
- Simplify the organization to drive growth and productivity; and
- Deliver disciplined capital deployment and strategically aligned accretive acquisitions.

The new strategy emphasized “Everyday Excellence”; that is, what we do everyday matters (**Exhibit 2**). The importance of the work Quest did was not lost on Rusckowski. As he told one journalist, “While

the diagnostic industry represents a mere 2% of healthcare costs, it provides information for how 70% of healthcare decisions are made.”<sup>1</sup>

### Quest in 2015

With sales of \$7.4 billion in 2014, Quest was the largest diagnostic-testing company by revenue in the United States (**Exhibit 3**). Its services annually touched 50% of the physicians and 50% of the hospitals in the US, as well as 30% of adult Americans. Roughly 20% of the revenues came from patients, whose share had only been 5% in the mid-2000s.<sup>2</sup> The remaining came from physician offices, hospitals, insurance companies, employers, and other clients. Having contracts with Medicare, Medicaid, and large insurance companies was crucial. If a patient had Aetna insurance and Quest had a contract with Aetna, the patient’s doctor would likely send him or her to Quest for lab work.

Quest offered over 3,000 diagnostic tests, ranging from simple blood tests to gene-based and molecular testing, in its large network of regional and esoteric labs<sup>3</sup> and in over 2,000 patient service centers (**Exhibit 4**). It also offered a number of healthcare solutions for employers, including drug testing, employee wellness services, and risk assessment services for the life insurance industry. It employed 43,000 people, 74% of whom were frontline workers (**Exhibit 5**).

### Competition

Quest’s largest commercial competitor was LabCorp, with 36,000 employees, 39 labs, and 1,750 patient service centers operating in 60 countries and with \$6 billion in revenue and \$910 million in operating income. Quest also competed with small regional and local esoteric laboratories. Increasingly, however, it competed with hospital-affiliated and physician-office laboratories. Despite the added cost, more and more medical establishments were bringing testing inhouse to have more control over specimen samples and quality of patient care.

### Value Proposition

Quest offered a one-stop shop for diagnostic tests at prices that were lower than what hospitals charged for inhouse testing. Low prices and transparency in pricing had become more important since patients were increasingly paying out of pocket for tests (due to high deductibles or because some tests were not covered by insurance) and were getting smarter about their options. The company’s extensive network also made it convenient to collect and deliver specimens across the US.

Quest’s IT solutions made doing business with it seamless for both medical professionals and patients. Physicians could use Care360, Quest’s electronic medical record portal, to order tests and access the

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<sup>1</sup> Priyanka Dayal McCluskey, “Five Things You Should Know about Steve Ruscowski,” *Boston Globe*, April 5, 2015.

<sup>2</sup> Patients were a relatively new customer group for Quest, resulting from a 2014 ruling granting them the right to access medical test results. <https://www.federalregister.gov/documents/2014/02/06/2014-02280/clia-program-and-hipaa-privacy-rule-patients-access-to-test-reports>.

<sup>3</sup> An *esoteric lab* analyzes rare substances and molecules outside the purview of routine clinical lab tests.

results and to access information about patient history that enabled them to make better decisions about what tests to order. Physicians who needed access to the results of tests they had not themselves ordered could use QuestConnect. Through MyQuest, the patient portal, patients could access their own tests results.

### **Specimen Lifecycle**

The process for diagnostic tests began with physician-ordered specimen collection (**Exhibit 5**). Depending on the medical establishment and a patient's insurance, patients either had specimens collected at the physician's office or at a Quest patient service center. Approximately half of all specimen samples were taken at patient service centers and half in physician offices or hospitals. Each specimen was kept in a bar-coded glass tube (**Exhibit 6**).

Quest's logistics operation, which included 3,400 vehicles and 26 planes, was responsible for collecting samples from physicians' offices, hospitals, and Quest patient service centers and delivering them to the company labs where they were tested. Quest's lab operations team included 650 medical doctors and PhDs. Once testing was complete, the diagnostic team uploaded the results to the patient and physician portals.

Completed work orders were sent to Quest's revenue services group, which was responsible for billing the medical office clients, insurance companies and for billing patients for whatever was not covered. This group processed 210 million bills annually, of which 50 million were sent to patients. About 30% of the time, patients did not pay their bills at all.

Quest's two National Customer Service centers (NCS) communicated with physicians, known internally as "clients," and with patients throughout the specimen life cycle. Major services offered through the centers included lab results, available online, via fax, and by phone; personal notification of lab results with priority; lab test additions online, via fax, and by phone; Care360, QuestConnect, and MyQuest features and live help; complaint initiation, escalation, and resolution; receiving and routing employee kudos; and routing to other departments such as billing.

The NCS organizations were open 24x7x365 and averaged 55,000 calls a day, or 20 million calls a year. Seventy percent were inbound requests for test results. This worried Davis: "We segment our calls and the largest number are still what we call results-only calls. Those are the ones we're really, really trying to eliminate. Because my own belief is that if the customer has to pick up the phone—I call it a failure on our part. It's a defect. If the customer has to call us to get results, it's a defect."

Outbound calls were limited to communicating critically important, time-sensitive test results—known as critical values—to physicians.

## **An Obstacle to Operational Excellence: Employee Turnover**

To drive operational excellence, Quest developed the Quest Management System (QMS), which included the company's own approaches to process management, project management, change management, and continuous improvement. QMS included modules for various operational approaches such as process mapping and standardization, root-cause problem solving, and frontline-driven process improvement.

In 2013, Rusckowski hired Jim Davis to lead Quest's operations. Davis had spent more than a decade in GE's aircraft engine and medical device divisions. A graduate of MIT Sloan, Davis also had an applied math degree from MIT and an aeronautical engineering degree from the University of Michigan. At MIT Sloan, where Davis had been exposed to lean production systems, he internalized the importance of standardizing and improving processes to improve quality, speed, and costs. Under his leadership, Quest centralized procurement and began standardizing patient services, specimen processing, and logistics.

One of the problems Davis identified as a key to improvement was high employee turnover across the network, particularly in the customer-facing groups: "We had high employee turnover in our patient services centers. We also had it in logistics, which, by the way, is customer-facing... Our logistics people go to doctor's offices, pick up specimens, and they see the staff. They build relationships and those relationships matter." Turnover was especially problematic for the NCS.

Davis's team found that taking into account the cost of recruiting, onboarding, training, and time to full productivity, turnover was costing Quest between \$7,000 and \$10,000 per departing employee. With thousands of people leaving every year, that was a \$50-70 million annual loss. Not only that, but the constant churn was undermining customer service. Once Davis's team quantified the cost of the problem, Davis noted "It didn't take a lot to get Steve's and the head of HR's attention on this."

## **Spring 2015: Improve National Customer Service (NCS) Performance Now!**

In the spring of 2015, Davis hired Scott Jeffers as VP of Lab Operations and Operational Excellence. Jeffers recalled his first week: "Jim said 'Welcome to Quest. Your number-one priority is to fix our call centers, so get after it.'"

In 2013, the call centers had been consolidated from 20 regional customer service centers—which had been co-located with Quest labs—into two: one in Lenexa, Kansas, and one in Tampa, Florida. The NCS suffered from high labor costs, largely due to the low productivity of inexperienced reps. Sixty percent of reps left in their first year, costing Quest up to \$10.5 million a year. Every day, Davis received calls from members of his sales team who were furious that they had lost a customer because the customer couldn't get anyone at the NCS to answer the phone or, when they did, the representative couldn't answer the question and transferred them to someone else. (In fact, some clients would

immediately ask to speak to a supervisor, assuming that the rep would not be able to get them the information they needed quickly.)

The NCS had been operating without a leader in place for six months. The head of logistics had been serving as an interim head. To fill the position, Davis and Jeffers recruited MaryAnn Camacho, whom they both knew from their days at GE Healthcare. (See **Exhibit 7** for bios.) The first thing Davis wanted from Camacho was to have the phones answered *quickly* and *by the right people*.

### **Nationalizing Customer Service in 2013**

The Lenexa and Tampa locations were chosen primarily for their low cost of living and the fact that each had an established call center industry. Tampa already had a Quest regional call center. Apart from reducing costs, the consolidation would enable Quest to invest in systems to improve call center performance. The regional call center reps had been using a system called the Quest Laboratory System (QLS), which was a system for the lab but which had a module—though not a user-friendly one—for client services. But each regional location had made its own modifications to QLS: there was a Great Lakes QLS and a California QLS, for example, and they did not speak to one another.

Quest encouraged the reps in the 20 regional centers to move to either Tampa or Lenexa; turnover at the regional call centers had only been in the low teens, so many of the reps were highly experienced. Because customer service centers were co-located with the labs, these reps felt themselves to be part of the labs' work culture. In fact, some of them had come from the lab side so they already had the technical background. However, most chose not to move. Moreover, when they found out that Quest was planning to consolidate, they began looking for new jobs, which only increased the haste with which Quest had to consolidate the increasingly understaffed regional centers. The rush to consolidate also left the company without enough time to create one simple system for all the reps to use when answering calls.

Lenexa would eventually employ 400 call reps and 25 supervisors and serve the West, Midwest, and North regions. Tampa had 200 call reps and 14 supervisors serving the East, South, and Southwest regions. Each supervisor led a team of up to 15 reps. Those teams were known internally as "pods." Each pod served either clients or patients. Client pods served a specific region whereas patient pods served the entire United States. In addition, there were approximately 250 highly experienced reps and 10 supervisors who worked remotely from home. The average tenure of that group was 14 years and during the consolidation process, it was they who kept the customer service operation "above water."

### **Building the NCS Workforce**

**Hiring** In 2014, with consolidation underway, the NCS was under pressure to hire a full complement of reps in Lenexa. At Tampa, 50% of the reps and supervisors came from the regional call center there. Supervisors, who did most of the hiring, looked for people comfortable with answering over 100 calls per shift, multitasking with different screens, using systems to find information, and reading and

communicating policies and procedures—in other words, people with call center experience. They hired many of the new reps from the call centers of other companies, such as MCI and AT&T. A few of the supervisors had come from the former regional call centers, but most were new to the company.

**Training** New reps spent six weeks in the classroom learning medical terminology, how to find information on the various diagnostic tests that Quest provided, how to navigate the company's technology system, and how to handle inbound and outbound calls from physicians, hospitals, and patients. They were also trained on the specific processes and technology systems used in their particular region; not all regions used QLS and many lab processes were not standardized.

After the classroom training, each new rep was supposed to “nest” with an experienced colleague to get hands-on coaching in customer service. One week each was devoted to inbound and outbound calls. But if the call center was understaffed, the nesting didn't always happen. Reps had to pass a test at the end of their training to demonstrate their mastery of regulation required competencies and were re-tested after six months on the job to ensure that the training had stuck. Reps who did not pass had to do a remedial training. On average, it took a rep 90 days after training to become productive.

Roughly 80% of the company's training hours were spent onboarding new reps. The rest were spent uptraining; that is, giving reps additional knowledge so that they could complete any call without having to transfer it to someone else.

**Compensation and performance management** Starting pay was \$13/hour, slightly higher than what other call centers paid. After their first year, reps who performed well received a 2.5% raise. They were measured on “speed to answer”—the average amount of time a caller had to wait on hold—and on calls completed per hour. Attendance was also important. A rep with too many “occurrences”—that is, an absence of up to five consecutive days—was fired. Supervisors were salaried employees and were measured on the productivity of their team.

### **Working at the NCS**

Reps sat with their pods, forming a square around their supervisor and a technical rep, who both had a 360-degree view. A typical day included answering up to 150 calls. For those working on the client side (hospitals and physicians' offices), the average call lasted three and a half to four minutes and was typically about obtaining test results, which were also accessible online through Care360. Many calls demanded technical knowledge and precision, requiring the rep to know how blood should be drawn, which tubes should be used (some had serum in them, some were coated so that light didn't get through), the temperature at which a specimen should be stored, or how it should be transported. Upon receiving a particular test result, nurses or physicians could ask the rep what other tests should be ordered.

The client pods were organized regionally because localization was important. Under the regional customer service model, hospitals and physician offices had become used to receiving their information in a particular way, often from a rep with whom they had built a relationship. “The same client may call us 10 times a day,” said Bruce Hoyle, who had recently moved from the client side to oversee the team taking calls from patients. “They like to get the same people they call into all the time.” One rep admitted spending two hours a day filling out information requested from a particular physician’s office, a practice she continued after she moved to the consolidated organization. Even at the consolidated NSC, regions stuck to their old ways of doing things, dictated in large part by the modified QLS system they continued to use. The result, as one rep stated, was “a lot of conflicting information. If you had a question about something specific, one supervisor would answer you one way and another supervisor would give a completely different answer.”

On the patient side, Quest saw no need to organize pods regionally because the interactions were more limited. The average call lasted a bit more than three minutes, though the questions asked and the information requested varied greatly. “You never know what you’re going to get,” noted one rep. A patient might want to know how to schedule an appointment, get to the patient services center, or whether it took walk-ins. She might want to know whether she needed to fast before a test, the test results, or what the bill she had just received meant. Roughly 4,000 (20%) of patients preferred to request test results by phone each day although the results were available electronically through MyQuest or could be obtained through their clinician. There were many calls about bills from patients whose doctors had sent their labs out to Quest without the patient knowing who or what Quest was. All billing calls had to be transferred to the billing department.

A rep’s job could be stressful. Jennifer Conley, Senior HR Business Partner who had worked for Quest for over a decade, pointed out that “a lot of the employees have to answer questions that could potentially impact somebody’s life... it’s just scary for them.” For those new to the job, either on the client or patient side, many calls ended up being forwarded to someone more experienced, typically a supervisor or a work-at-home rep or, if necessary, the billing department.

## **Managing the Reps**

**Staffing** Quest’s workforce management team used a workforce-planning tool to forecast call volume for each region and determine the number of people needed for each shift in each region. Supervisors then used this information to schedule the reps in their pods. Most reps worked full time. To change a rep’s schedule, a supervisor had to request approval by email from the workforce management team, which typically took a day to reply.

Up until 10:00pm on weekdays, the workforce management group watched the call queues and ensured that inbound calls were routed to an appropriately trained rep. Between 10:00pm and 7:00am and during weekends, this task was carried out by pod supervisors. While some reps were trained to handle calls in more than one region, routing calls between different regions was not easy because of regional



differences in processes and systems. If a region had an unexpectedly high call volume, reps would have to physically move to a pod for that region, a process that itself took 15 minutes.

**Supervisors** Supervisors, who reported to a regional manager, began their day assessing how many people from their team hadn't shown up and determining how to fill in for those and other vacancies. Unplanned absenteeism was 12.4%. Supervisors spent a good part of the day on the phone, de-escalating calls that reps had forwarded to them because the rep couldn't answer the client's question or couldn't understand it in the first place.

One supervisor said, "There would be many days when I wouldn't sit down. I would literally go from desk to desk to desk because I had 16 brand new people . . . all at one time who didn't get that nesting period." Supervisors also de-escalated tensions, either for employees or customers. An employee might be fed up because he still hasn't been taught how to do his job and he's getting ready to quit. Or one of the patient service centers was angry about results not being called in to a physician's office sooner. One supervisor noted that he spent so much of his time troubleshooting that he felt like saying, "Pick a number and wait your turn. There's only one of me." Supervisors often worked 14-hour days. As Maryann Camacho herself noted, "When your operations aren't stable, your escalations are usually very high and that was the case."

When supervisors had questions, they often went to their regional managers. DeiDra Heath, manager of the Midwest region, commented, "Supervisors would come to me about policies such as what do I do if [a rep] is using excessive personal time or going over on their breaks? Does that fall under performance? Does that fall under attendance? What's the threshold?" Many of the policies were not yet standardized, but because she had been told that consistency across regions was important, Heath often discussed such questions with her peers before getting back to the supervisor (**Exhibit 8**).

### **Where to Start?**

During his first month on the job, Jeffers flew to Lenexa to see the operations, along with Michelle Ricardo, Senior HR Director. "It wasn't clear what the need was when we went there," Jeffers recalled. "We just knew that the costs were out of control and the metrics were not heading in the right direction. Attrition was clearly not good. We knew we didn't have the employees to get the job done right, but it still wasn't clear what we *did* need."

Before their visit, they asked the call center managers, the HR staff, and the directors of both NCS locations to list what they needed to improve performance. When that group listed close to 40 items during the welcome meeting, Jeffers challenged them to identify the top issues that had to be solved immediately:

Well, I think we all recognize that this is a very difficult situation. We're all in this together as a team and we all recognize that we want to get better. So, with that, I really need to go dual-jack on

the calls so I can learn more about the operations. So I'm going to go spend a couple hours listening to phone calls. And I'd like this team to work through what are the top three things we're going to do within the next month that will move the needle.

Ricardo facilitated a dialogue that helped the group narrow the list down to four issues.

1. **Implement step-based pay** to recognize people's growing skills and knowledge. Pay was a big reason why people left Quest. A common phrase heard from those who left was, "I can do this a lot easier someplace else where they don't ask as much from us."
2. **Create a career-path strategy** to motivate people to keep improving their skills.
3. **Develop supervisors** to address problems in how they treat employees and how they handle workforce planning, hiring, and their reps' career paths.
4. **Develop a workforce planning strategy**, as some regions were overstaffed and others understaffed.

When Camacho joined in July 2015, work on each of the four issues was already underway. To understand the problems, she spent her first days walking the floor. She interviewed reps, supervisors, and managers and watched the reps doing their jobs, including double-jacking in so she could listen in on their calls. Heath recalled Camacho's first week, "She made herself visible on the floor, walked around, and introduced herself. Within the first few days, she's plugging in with our frontline employees, which can be very intimidating. But she did it in such a non-threatening way. She connected to the frontline employees and that made her relatable."

Camacho knew that achieving the operational excellence Davis was after would take considerably more than solving those four issues. With so many calls coming in, the average time to answer had to drop, first-call resolution had to improve, and the NCS had to become a more inspiring place to work. Still other operational changes would be required to create better outcomes for clients, patients, and employees. The question was where to start. Should she devote her attention to operations, staffing problems, and the work that the reps did? Was it better to focus first on addressing the reps' issues, such as step-based pay and career paths? Or was it better to tackle several issues at once?

**Exhibit 1 Quest Diagnostics Stock Price 2000-2012\***



\*2/1 Stock split, June 1, 2001 and July 21, 2005.

Source: Yahoo Finance.

**Exhibit 2 Everyday Excellence at Quest Diagnostics**



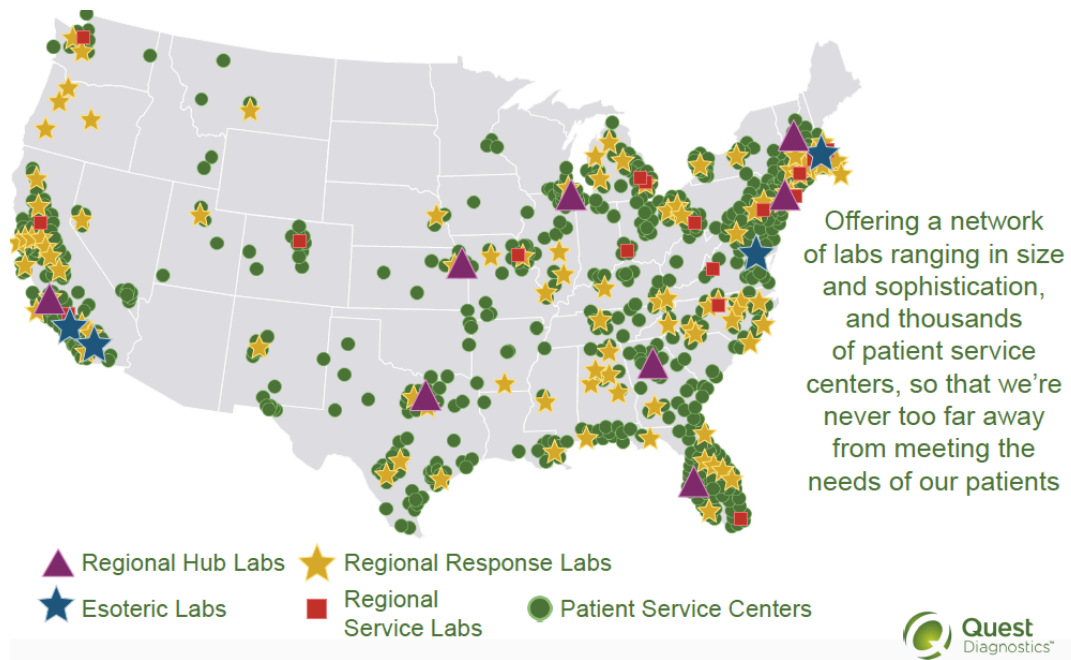
Source: Quest Diagnostics.

**Exhibit 3 Quest Diagnostics Select Financial Data**

	Year Ended December 31,				
	2014	2013	2012	2011	2010
	(dollars in millions, except per share data)				
	(a) (b)	(c) (d)	(e) (f)	(g) (h)	(i)
<b>Operations Data:</b>					
Net revenues	\$ 7,435	\$ 7,146	\$ 7,383	\$ 7,392	\$ 7,260
Operating income	983	1,475	1,201	987	1,284
Income from continuing operations	587	848	666	494	745
Income (loss) from discontinued operations, net of taxes	5	35	(74)	12	12
Net income	592	883	592	506	757
Less: Net income attributable to noncontrolling interests	36	34	36	35	36
Net income attributable to Quest Diagnostics	\$ 556	\$ 849	\$ 556	\$ 471	\$ 721
<b>Amounts attributable to Quest Diagnostics' stockholders:</b>					
Income from continuing operations	\$ 551	\$ 814	\$ 630	\$ 459	\$ 709
Income (loss) from discontinued operations, net of taxes	5	35	(74)	12	12
Net income	\$ 556	\$ 849	\$ 556	\$ 471	\$ 721
<b>Earnings per share attributable to Quest Diagnostics' common stockholders - basic:</b>					
Income from continuing operations	\$ 3.80	\$ 5.35	\$ 3.96	\$ 2.88	\$ 4.01
Income (loss) from discontinued operations	0.03	0.23	(0.47)	0.07	0.07
Net income	\$ 3.83	\$ 5.58	\$ 3.49	\$ 2.95	\$ 4.08
<b>Earnings per share attributable to Quest Diagnostics' common stockholders - diluted:</b>					
Income from continuing operations	\$ 3.78	\$ 5.31	\$ 3.92	\$ 2.85	\$ 3.98
Income (loss) from discontinued operations	0.03	0.23	(0.46)	0.07	0.07
Net income	\$ 3.81	\$ 5.54	\$ 3.46	\$ 2.92	\$ 4.05
Dividends per common share	\$ 1.32	\$ 1.20	\$ 0.81	\$ 0.47	\$ 0.40

Source: Quest Diagnostics Annual Report, 2015.

#### Exhibit 4 Quest Diagnostics Network



Source: Quest Diagnostics.

#### Exhibit 5 Processes at Quest

	Patient Services	Logistic Operations	Lab Operations	Diagnostic Insights	Revenue Services	Customer Services	Total
	Collect	Transport	Test	Result	Bill	Communicate	
Headcount FTEs   %	11,000 FTEs 35%	3,500 FTEs 11%	13,000 FTEs 41%	350 FTEs 1%	2,400 FTEs 7%	1,500 FTEs 5%	31,750 FTEs
Functional Costs \$   %	\$920 M 22%	\$320 M 8%	\$2,300 M 54%	\$120 M 3%	\$500 M 12%	\$100 M 2%	\$4.26 B
Customer Touch Points	# of Patients Served Annually 51 M	# of Logistics Pickups Annually 21 M	# of Requisitions Tested Annually 140 M	# of Connectivity Contacts Annually 500 k	# of Bills Processed Annually 200 M	# of Client & Patient Encounters Annually 20 M	O2C Customer Touch Points Annually 425 M

Source: Quest Diagnostics.











**Exhibit 6 Specimen Collection Tubes**

# Specimen Collection Tubes





## BLOOD SPECIMENS

Always refer to tube label to confirm tube type – never rely on the stopper color alone.

Stopper/Label Color	Laboratory Use	Additives/Inversions at Collection
1  Culture Bottles	For detection of microbial growth from blood specimens.	• Soybean-casein digest broth <b>8 – 10 gentle inversions</b> unless otherwise noted
2  Light Blue	For coagulation determinations. <b>Note:</b> Certain tests may require chilled specimens. Follow recommended procedures for collection and transport. Inversions prevent clotting.	• 0.105 M sodium citrate (3.2%) <b>3 – 4 inversions</b>
3  Gold	Serum Separator Tube (SST®) for serum determinations in chemistry and serology. Contains separator gel and should not be used for toxicology or drug testing. Inversions ensure mixing of clot activator with blood. Blood clotting time 30 minutes.	• Clot activator and gel for serum separation <b>5 inversions</b>
4  Red	For serum determinations in chemistry and serology, and for toxicology and drug testing. Glass serum tubes are recommended for blood banking. Plastic tubes contain clot activator and are <b>not</b> recommended for blood banking. Inversions ensure mixing of clot activator with blood and clotting within 30-60 minutes.	• Clot activator <b>5 inversions (plastic)</b> <b>None (glass)</b>
5/6  Green or Tan	For plasma determinations in chemistry. Inversions prevent clotting. Use <b>only</b> sodium heparin green-top tubes for all cytogenetic testing.	• Sodium heparin • Lithium heparin <b>8 – 10 gentle inversions</b>
5/6  Lavender	For lead determinations. This tube is certified to contain less than 0.01 µg/mL (ppm) lead. Inversions prevent clotting.	• Sodium heparin (glass) • K <sub>2</sub> EDTA (plastic) <b>8 – 10 gentle inversions</b>
5/6  Royal Blue	K <sub>2</sub> EDTA for whole blood hematology determinations and immunohematology testing (ABO grouping, Rh typing, antibody screening). Inversions prevent clotting.	• Spray-dried K <sub>2</sub> EDTA <b>8 – 10 gentle inversions</b>
7  Gray and white label	For trace-element, toxicology and nutritional-chemistry determinations. Special stopper formulation provides low levels of trace elements.	• Sodium heparin • Na <sub>2</sub> EDTA • None (serum tube) <b>8 – 10 gentle inversions</b>
8  Yellow and white label	For glucose determinations. Oxalate and EDTA anticoagulants will give plasma samples. Sodium fluoride is the antiglycolytic agent. Inversions ensure proper mixing of additive and blood.	• Potassium oxalate/sodium fluoride • Sodium fluoride/Na <sub>2</sub> EDTA <b>8 – 10 gentle inversions</b>
9  Gray	Glass tube with liquid ACD for use in blood bank studies, HLA phenotyping, DNA, paternity testing, etc.	• Acid Citrate Dextrose (ACD) solutions A/B additives – Trisodium citrate 22.0/13.2, citric acid 8.0/4.8 and dextrose 24.5/14.7 (in g/L) <b>8 – 10 gentle inversions</b>

**Note:** The Quantiferon-TB Gold collection tube set includes lavender, gray and purple capped tubes that are not listed or indicated on this chart

## URINE SPECIMENS

Stopper/Label Color	Laboratory Use	Additives/Inversions at Collection
 Gray and yellow label	For culture and sensitivity (C&S) urine testing. <b>Minimum urine volume is 4 mL.</b> For lower volumes, submit refrigerated urine in a sterile container without preservatives.	• Boric acid, sodium formate <b>Shake vigorously</b>
 Yellow plastic and yellow label	For urinalysis testing. Inversions ensure preservative is properly mixed. <b>Note the fill lines. Do not under fill (&lt;2 mL) or over fill (&gt;10 mL).</b>	• Preservative <b>8 – 10 gentle inversions</b>

For questions regarding specimen collection tubes not shown here, contact Client Services or your Sales Representative.

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Source: Quest Diagnostics.

**Exhibit 7 Bios, as of 2015**

**Stephen Rusckowski, Chairman, President, and Chief Executive Officer of Quest Diagnostics.** Since joining Quest Diagnostics as President and Chief Executive Officer in May 2012, Mr. Rusckowski has focused on transforming the company, based on its compelling vision of “empowering better health with diagnostic insights.” Under his leadership, the company has refocused on its core diagnostic information services business, sold non-core assets, delivered disciplined deployment, including share repurchases and acquisitions, and simplified its organizational structure to better serve customers by removing complexity, speeding decision making, and empowering employees. He was elected Chairman of the Board in December 2016.

Prior to joining Quest Diagnostics, Mr. Rusckowski was CEO of Philips Healthcare, which became the largest unit of Royal Philips Electronics under his leadership. He joined Philips in 2001 when it acquired the Healthcare Solutions Group he was leading at Hewlett-Packard/Agilent Technologies. Mr. Rusckowski is a member of the Board of Directors of Xerox, a global business services, technology, and document management company, and Project Hope, a global health education and humanitarian assistance organization. He is also currently the Chairman of the American Clinical Laboratory Association.

Mr. Rusckowski earned a Bachelor of Science degree in Mechanical Engineering from Worcester Polytechnic Institute and a Master of Science degree in Management from the Massachusetts Institute of Technology’s Sloan School of Management.

**James Davis, Executive Vice President, General Diagnostics.** Before joining Quest Diagnostics, he served as CEO of InSightec, Inc., a medical device company that designs and develops ultrasound ablation devices that are guided by magnetic resonance imaging (MRI) systems. Prior to that, he held Vice President and General Manager roles at GE’s MRI, diagnostics imaging, and healthcare information technology businesses, where he established a record for achieving growth and operational improvement. Prior to GE, Mr. Davis led the development of strategic and operating initiatives for clients of McKinsey.

Mr. Davis holds master’s degrees in management and science from the Massachusetts Institute of Technology and a bachelor’s degree in aeronautical engineering from the University of Michigan.

**Scott Jeffers, Vice President of Lab Operations and Operational Excellence.** Prior to joining Quest, he was Senior Vice President, Global Supply Chain at Hill-Rom, a global manufacturer and provider of medical technologies. Mr. Jeffers joined Hill-Rom in 2010 from GE Healthcare, where he served in a number of positions over 11 years, including General Manager for Global Lean Enterprise, General

Manager of Global Operations for the Life Support Solutions business, and General Manager of Global Sourcing and Lean Initiatives for the Clinical Systems division.

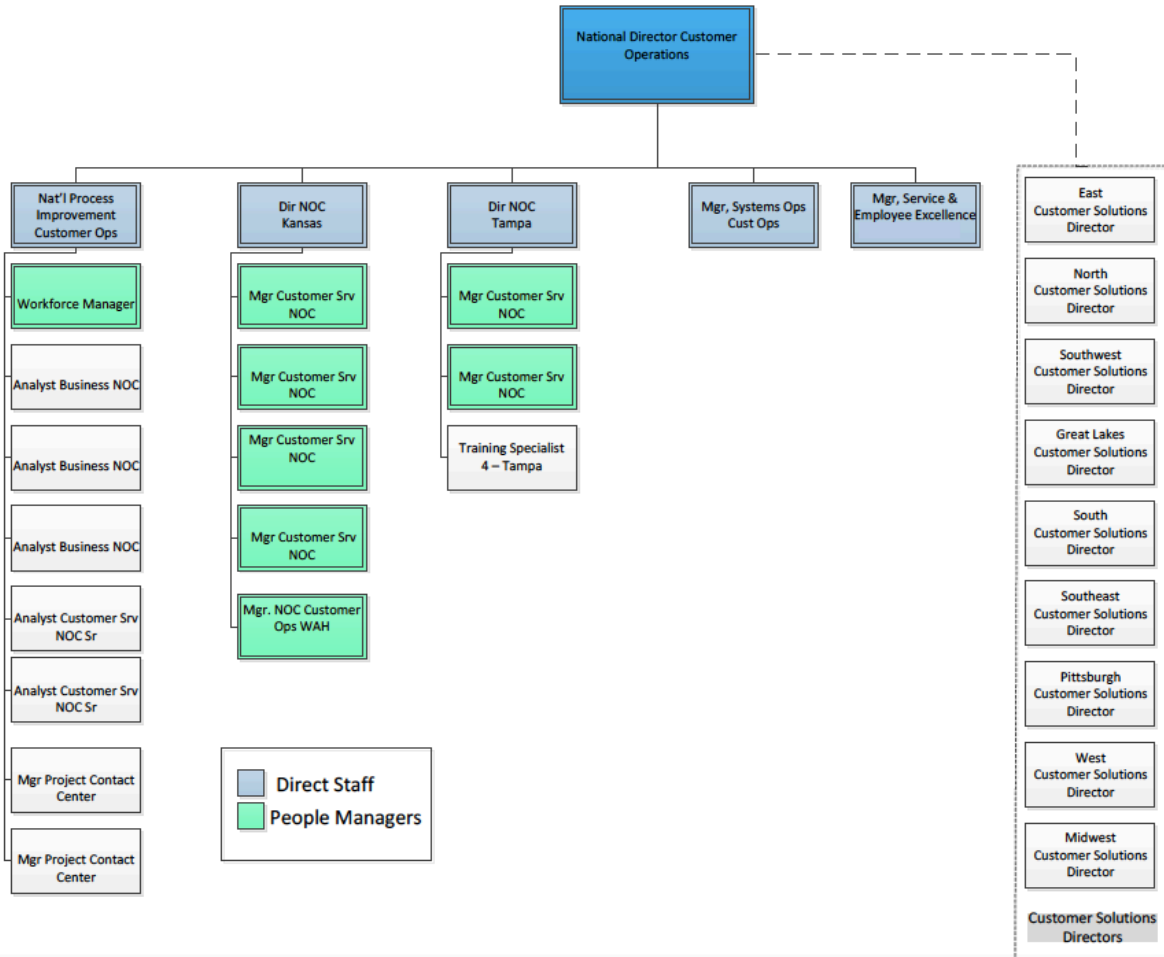
Mr. Jeffers was an officer in the United States Air Force, where he served in research and systems acquisition roles and as a project manager for advanced energy systems with NASA and the Department of Energy.

**MaryAnn Camacho, *Executive Director, National Customer Service*.** Prior to joining Quest, she worked for 25 years at GE Healthcare, holding global roles in Field Service, Product Engineering, Sourcing, Manufacturing and Lean Six Sigma. Ms. Camacho held General Manager roles in Commercial Operations, Customer Experience, and Service Operations for GE Healthcare's \$2.2 billion service business in the US and Canada.

Ms. Camacho holds an MBA from Marquette University and a B.S. in Electronic Engineering from DeVry University. She is a certified Lean and Six Sigma Black Belt.



**Exhibit 8 NCS Organizational Structure, 2015**



Source: Quest Diagnostics.