



Business Plan

Raising the Standard of Medical Imaging

Jason Chen & Esther Lee

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Executive Summary

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Industry

Healthcare: Medical Imaging
Computed Tomography (CT)

Year founded

2010

Location

Duke University
Durham, NC

Funding Opportunity

\$6,249,000

OUR MISSION

The upright ScanUp CT scanner is set to reshape the market for advanced diagnostic imaging by responding to the unmet demand of thousands of healthcare clinics that cannot afford traditional scanners. Our patented product flips the paradigm of horizontal CT imaging to create a new breed of upright machines that offers cutting-edge imaging at half of the current market price. These new ideas will allow us to capture market share in a rapidly growing CT market looking to purchase in uncertain economic times¹ as well as create entirely new demand for affordable CT scanners.

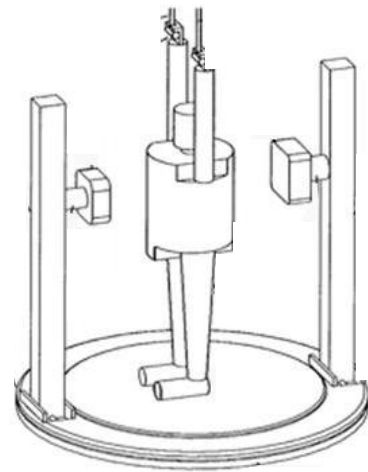


Fig. 1 Upright CT scanner
(Courtesy of J. Chen)

PROBLEM

Cardiovascular disease (CVD) remains the leading cause of death in the developed world, in part due to insufficient diagnostic infrastructure. The American Heart Association estimates that in 2006, CVD afflicted more than 81 million Americans, claiming over 800,000 lives². The current leading diagnostic technologies, including catheter angiography, are inpatient procedures characterized by high cost and invasiveness. Furthermore, the state of the economy has reduced the number of elective procedures due to the increase in the uninsured and lowered disposable income of patients. Reduction of cost barriers associated with CT technology will bring many people access to the ScanUp CT scanner.

SOLUTION

The advent of new detector technologies has given rise to specialized imaging machines that retain high resolution while significantly reducing cost and physical footprint, yet the industry is trapped within a physical design concept that is forty years old. By rethinking the fundamental structure of CT, ScanUp is capable of fully exploiting the advantages of current innovations in medical imaging with a safer, less-invasive and cheaper product. ScanUp's efficient machine, which can be purchased for half the price of conventional 64-slice CT scanners, will expand the market to include more screening procedures, private practices, and rural communities. Traditional catheter angiography procedures require a hefty \$3000-\$4000³. A current CT angiography (CTA) scan has a price tag of \$800-\$1000. Estimates for a ScanUp CTA scan place the price at \$200-\$300. At significantly lower prices, CTA is poised to become a procedure as routine as mammography.

¹"Medical Imaging Products." *Freedonia Group Inc.* (2009)

²"Medical Imaging Products." *Freedonia Group Inc.* (2009)

³Berenson, Alex. "Weighing the Costs of a CT Scan's Look Inside the Heart ." *New York Times* 28 06 2008,

MARKET

The market for CT scanners has experienced high growth in the last ten years and is projected to continue at 11.7% annually. By 2013, when ScanUp expects to launch its product, the market will have grown from its current \$2.9 billion value to \$4.2 billion.⁴ Cardiology is a particularly ripe specialty for introduction of our technology. A staggering 69.1% of U.S. cardiologists order CTA on at least a monthly basis. The intense interest in these machines is justified, as imaging accounts for a vast proportion of the revenue; fees for these diagnostic services are estimated to provide more than half of an average cardiologist's income. Even though the scans are currently limited by price and availability, an estimated 150,000 people in the United States received CTA studies in 2007 at a combined cost of over \$100 million.⁵

STRATEGY

No other companies presently market an upright CT scanner like ours. Once ScanUp establishes itself as an efficient diagnostic angiography, our strong intellectual property, high switching costs in the CT market, and continuing innovation to expand into other diagnostic areas will ensure our sustainability.

ScanUp's business strategy will proceed in two phases. First the company will develop a prototype and prepare for FDA approval via the 510(k) path by completing clinical testing requirements. ScanUp expects to complete this phase by 2013, and projects a need for \$6,249,000 of funding using pro forma financial models.

The next phase involves marketing and sales of the machine. Of the 20,000 cardiologists⁶ in the United States, we expect a ballpark 0.1% per year to purchase our machine in the introductory phase. The total cost of building a ScanUp CT scanner is \$190,000. A value-based pricing scheme places the price to the consumer at \$500,000, enabling a very high profit margin. Thus, expected gross margin in first year of sales is estimated at \$7,440,000, and it is expected to increase as the technology becomes more mainstream.

THE TEAM

ScanUp's management, based at Duke University in Durham, North Carolina, is composed of intrepid undergraduates with a multidisciplinary background in biomedical engineering, medical physics, and innovation.

Jason Chen, *Founder*, is recipient of the Mathematical Association of America Award and the JA Jones Scholarship, and has worked in the Advanced Research Department of Siemens Medical Solutions as well as laboratories in the Department of Biomedical Engineering. He developed the concept behind the upright CT scanner as a side project in high school, and looks forward to innovating as a medical student in the upcoming academic year.

Esther Lee, *Chief Operations Officer*, conducts research in the lab of Dr. Lori Setton at Duke University as a Pratt Fellow. She has a good understanding of finance and management as well as engineering. Her past organizational experiences include starting a children's program at the Emergency Housing Consortium and collaborating with diverse teams on service trips to Honduras, Taiwan, and Louisiana.

⁴ "Medical Imaging Products." *Freedonia Group Inc.* (2009)

⁵ "Medical Imaging Products." *Freedonia Group Inc.* (2009)

⁶ Wachter, Robert. "Hospitalists in the United States — Mission Accomplished or Work in Progress?." *New England Journal of Medicine*. 350.19 (2004): 1935-1936.

Company Overview

ScanUp is a nascent company based at Duke University, whose mission is to provide low-cost, space-efficient medical imaging solutions without compromising quality of resolution. Through the expertise of our management team, we will cater to the currently unmet needs of thousands of hospitals and private practices that cannot afford conventional CT technology due to its tremendous cost. We seek to offer our clients the best diagnostic healthcare possible at a fraction of market price. ScanUp's debut product is an innovative upright CT scanner, which accommodates a diverse range of patients and encourages flexibility in position. While the primary area of focus remains on angiography, ScanUp intends to branch out to other realms of CT technology in the future.

Strengths

ScanUp's primary strength is the revolutionary cost-cutting technology of its product. The upright ScanUp CT scanner offers high-quality imaging competitive with state-of-the-art technology in the field, at a price point that is up to 70% below current market prices. Our capacity to produce this technology at an unprecedented, widely affordable price sets us apart from established and emerging competitors in the CT angiography industry.

Another significant strength is the fact that ScanUp will be the first widely distributed upright CT scanner on the market. The novelty of the product will help it achieve instant brand recognition, as it stands so markedly separate from the mostly undifferentiated competition currently vying for the CT-angiography market. The conceptual individuality of this product is a prime asset speaking to our opportunity to market ScanUp as a brand name in the field of medical imaging.

Beyond our ability to enter the market with a distinct model and unparalleled price, the structure of our scanner gives us the capability to produce diagnoses that traditional CT scanners might miss as a result of the patient's supine position in the machine. Field research and experience has revealed that the supine position compresses internal organs in a manner that obstructs subtler diagnosis, especially within CT angiography.⁷ By scanning patients in the upright position, their organs will not be displaced in a way that clouds the diagnosis, and will allow for a higher frequency of precise diagnoses.

The upright structure of the CT scanner also presents itself as a key strength in granting access to niche markets that are beyond the reach of traditional supine CT scanners. The first demographic excluded by products that are currently on the market are people that suffer from severe obesity, as many of the closed, supine scanners are too small to accommodate large-bodied individuals. Given that obesity is one of leading causes of cardiovascular disease, a considerable proportion of patients receiving CT angiography scans are obese and will be more comfortable in the open, upright structure of the ScanUp CT scanner.⁸ The second significant excluded demographic are people suffering from claustrophobia. It is estimated that around 5% of the U.S. population currently suffers from severe claustrophobia, but research has shown that 65% of patients who undergo an MRI scan – a procedure that is comparably constrictive to the supine CT scan – suffer dysphoric psychological reactions (sudden high levels of anxiety).^{9,10}

⁷ Katharina M. Bertschinger et al. Dynamic MR Imaging of the Pelvic Floor Performed with Patient Sitting in an Open-Magnet Unit versus with Patient Supine in a Closed-Magnet Unit. *Radiology*: 2002

⁸ Paul Poirier et al. Obesity and Cardiovascular Disease: Pathophysiology, Evaluation, and Effect of Weight Loss. *American Heart Association*: 2006

⁹ Phobias a Handbook of Theory, Research, and Treatment. Chichester; New York: Wiley, 1997.

¹⁰ Peggy Woodward. MRI for Technologists. New York, McGraw-Hill Professional, 2000.

Once again, the wall-less ScanUp solution will be far more attractive to these people, and will make a stressful procedure feel routine.

A final product-related strength is that all of the advantages of our upright scanner – cost-reduction, marketability, diagnostic capacity, and demographic inclusiveness – are protected by a patent that ScanUp holds for our innovative upright CT scanner. Our patent, issued in 2006, will serve to ensure that ScanUp is capable of capitalizing on all of its pronounced strengths, building market share without the threat of imitation.

Market Opportunity

The market for CT scanners has demonstrated tremendously attractive prospects as an investment opportunity, experiencing the fastest growth of any other product group within the \$17.8 billion diagnostic imaging market.¹¹ The demand for CT scans, measured at \$2.4 billion in 2008, is expected to grow to \$4.2 billion by 2013.¹² The number of CT scans performed on an annual basis, currently around 62 million, will nearly double in that time span.¹³

Within this booming market, ScanUp will initially focus on angiography and oncology CT scans, because the added value of the upright CT technology is particularly suited for these applications. Within this target market, ScanUp has determined two specific customer segments for which the upright CT will be particularly attractive: smaller rural hospitals and private practitioners.

The first segment of our target market, smaller rural hospitals, is attractive because these hospitals are currently excluded from the CT market. New CT scanners on the market have prices in excess of \$2.5 million, which is out of range of smaller hospitals with lower relative patient volumes. Developing a range of low-cost scanners will tap into this new market of rural clinics that have traditionally been forced to refer their patients to larger institutions or perform less sophisticated procedures instead. ScanUp's upright CT scanner will enter the market as a significantly more affordable option in the range of medical imaging products and will cater to hospitals that were previously left on the periphery of the elite CT-scanner market.

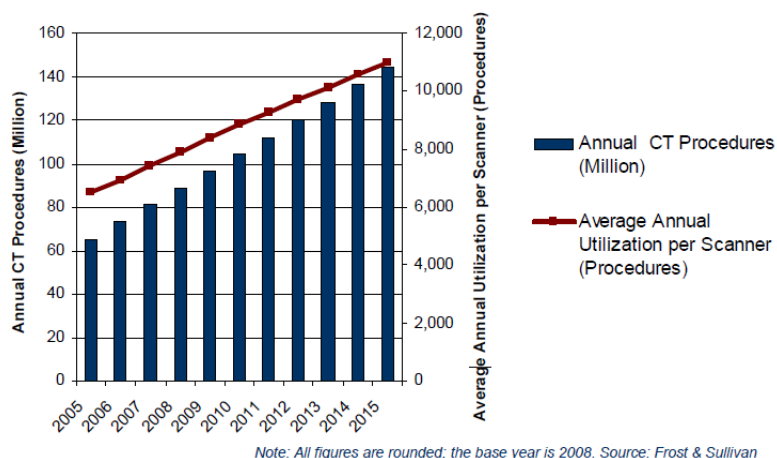
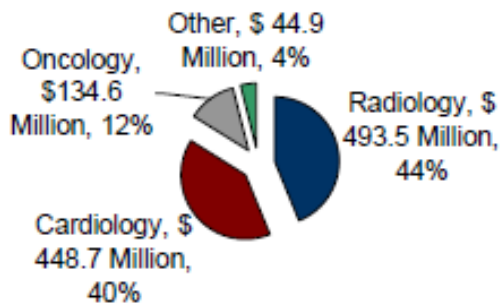


Fig. 2 Rapid growth of CT use promises a strong base for demand of our product.

¹¹ "Medical Imaging Products." *Freedonia Group Inc.* (2009)

¹² *ibid.*

¹³ Brenner, David and Hall, Eric. "Computed Tomography — An Increasing Source of Radiation Exposure" *The New England Journal of Medicine.* (2007)



Note: All figures are rounded; the base year is 2008. Source: Frost & Sullivan

Fig. 3 Cardiology and oncology are major segments of the CT imaging market.

lower prices, and doctors take in a larger share of the profit. Rather than trying to sell this product to doctors at large hospitals, to whom CT scan procedures are not particularly lucrative and where reimbursement is highly regulated, we will enter the underdeveloped private practice CT market. To private practices that do not currently own CT scanners, the ScanUp price point, scanner portability and imaging profit margins will be an attractive selling point.

Industry Analysis

The healthcare system is witnessing an increasing trend in patient-directed utilization of medical services. Some examples that illustrate this phenomenon are increasingly popular Consumer Directed Health Plans, and the overall observed trend in patients taking an active interest in exploring medical treatments and procedures in discussions with providers. Especially for cardiac imaging, with which is the field ScanUp intends to introduce its technology into the market, there is a marked benefit to the level of patient comfort. CT angiography is a less invasive and more patient-friendly procedure than the alternative procedure of catheter angiography, which requires placing a catheter (plastic tube) into a vessel or chamber of the heart. The CTA method of screening for arterial diseases causes less discomfort as the contrast material used is injected into an arm vein compared to a catheter angiography procedure where the injection takes place in a large artery in the groin.

Barriers to Entry

There is a large upfront cost for bringing our device to market. CT scanners are expensive in terms of raw materials and parts, labor, and software; the technical ability required for manufacture only adds to this expense. Strong intellectual property, FDA approval, and clinical testing also require a large amount of funding in the early development stage, a point at which we currently have limited assets. While this risk is balanced by the potential promise of high profits and lifesaving diagnostic capabilities in the long term, the management team plans to develop a strategy to mitigate this shortcoming by expanding to new products in other medical disciplines.

The design of our CT scanner product also addresses a different market than traditional medical imaging. Common scans, such as for diagnosis of traumatic brain injuries, may have

¹⁴ Dr. James Jollis, Duke University, Personal Interview. February 27, 2010.

logistic difficulty for adoption of our technology. The upright CT scan direction requires more patient cooperation and can result in discomfort for patients with specific injuries. Rather than aiming toward the CT market in general, ScanUp plans to move into a niche of consumers valuing low cost yet requiring high image quality. Using this strategy, the company will be able to attract consumers without as much competition and to defend our market position in the future.

Competition

ScanUp will be facing substantial competition in three broad categories: 1) expensive and established CT scanners based on image quality, 2) C-arm CT scanners based on conserving cost and space, and 3) used CT scanners based on cost savings.

Premium CT scanners have recently driven most of the growth in the market. As a result, most vendors have focused their marketing and research efforts in this direction. However, due to the economic downturn, the product mix has evolved to include less expensive scanners in 2007 and 2008. Additionally, CT scanners are usually frequently upgraded, resulting in a turnover cycle of about 6 years. Premium scanners rely on physician training and referral base in their business model; however, our value scanner promises a more robust business model and thus better ROI. Current 10-slice and under scanners hold a steady share of the market, while 64-slice standard scanners are projected to be phased out rapidly. The ScanUp CT scanner, with the cost of a 10-slice scanner but performance on par with 64-slice or higher, can expect a steady market that withstands the competition’s constantly updated “latest and greatest” products.

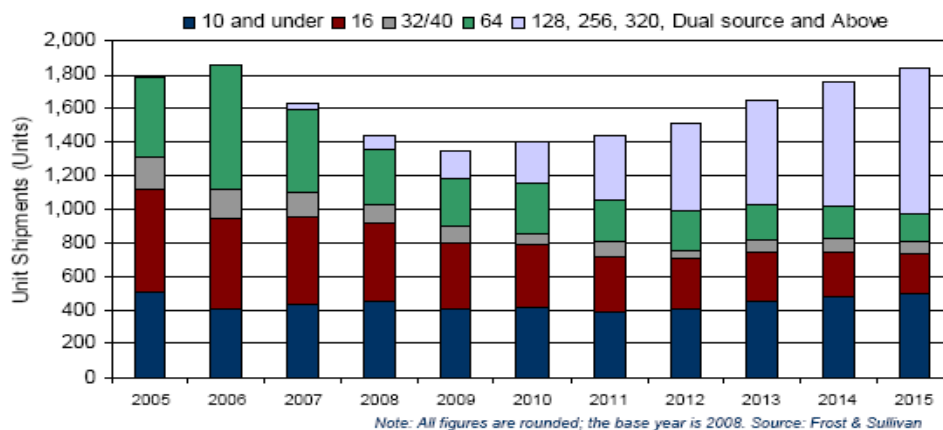


Fig. 4 Demand for value CT is very stable compared to projections for the current (64-slice) standard.

Direct competitors include large companies, such as General Electric Medical Systems, Toshiba Healthcare, Siemens Medical Solutions, and Philips Healthcare, which currently dominate the US medical imaging industry. The typical 16- and 32-slice models found in many hospitals and private practices now seem obsolete, as 128 and 256-slice machines have been unveiled. Because the medical imaging market is projected to become even more lucrative in the years to come, major companies have continued to expand their repertoire of CT scanners. Despite the state-of-the-art technology available, they necessitate a large sum of money that is often not within reasonable hospital and private practices’ budget limits.

Xoran’s Mini-CAT CT scanner is the only known upright model currently available for purchase. However, it is limited to the sinuses, skull and temporal bones. In addition to this,

the company also produces the xCAT ENT, which is specifically designed for both pre and post-operative imaging procedures. Though a small company, Xoran has done well in the realm of marketing. Its products have attracted hospitals and clinics around the US, as evident from the appreciable number of testimonials posted on their website.

We will also face strong indirect competition from the market for used CT scanners, as used scanners will fall into the price-range and hence the market segments that ScanUp is looking to occupy. There is a consensus on the fact that the quality of CT scanners deteriorates with use, however, so ScanUp's unused products will have a significant advantage over similarly priced used CT models. Furthermore, the use of the flat-panel detector is expected to enable image quality (in terms of spatial & temporal resolution and sensitivity) on the order of current 64-slice technology, a vast improvement over obsolete used scanners.

Our marketing strategy addresses the competition by promoting a superior product, unprecedented service and very attractive pricing. Our strategy identifies market segments which are beyond the reach of our current competitors, as ScanUp will create new markets for high quality medical imaging. As of yet, no other major company has exhibited plans to develop a full body upright CT scanner. Since the product can be easily integrated into current industry standards, the resistance to adopting new technology will be minimal. As a consequence, there is ample opportunity for a nascent company to move ahead and fill that niche. ScanUp has the technology and the to-market strategy to take advantage of that opportunity.

Strong Intellectual Property

The primary basis of our current intellectual property is US Patent 7,003,070, Upright CT Scanner, filed August 03, 2004, and issued February 21, 2006.

The patent seems capable of excluding others from infringing on the basic concept of our idea. Claim 1 outlines the general principles of upright CT scanning which fundamentally underlies our product. Dependent claims 2-7 further protects the upright rotation mechanism that is key to the innovative upright design. Claims 8 -14 strongly protect the unique method of using the invention that solves the problems associated with an upright design.

While novel and non-obvious, the patent's strength lies in its generality. The patent precludes potential infringement in all disciplines of medicine, and not just in any particular application. The claims of the patent capture the unique idea of ScanUp without adding claims that are too specific and easily worked around. Thus, the patent has a wide breadth of coverage easily trespassed by any attempt to make a similar device.

However, due to the broadness of the patent, it may be difficult to defend in potential litigation. A scanner that is not generally upright, for example, but infringing on the other claims in our patent, may also be cost-saving and remain competitive with our product. In order to combat this possibility, we propose research and development of specific components of the scanner, followed by intellectual property protection. These additional patents will help to build an easily defensible position against attempts to use any aspect of our technology.

Several personal interviews with expert end-users of CT scanners indicate that their primary concern regarding the function of the device lay in the patient restraint mechanism.¹⁵ While the upright CT idea has many attractive points, the main issue in its application is the ability to keep a patient still in an upright position, and provide a place for arm placement away from the scan volume. One of the primary necessities to developing a competing upright CT scanner lies in the chair and handlebar system for patient restraint.

¹⁵ Donna Parker, Chief CT Technologist, Duke University, Personal Interview, March 03, 2010.

The key benefit of the upright CT is the cost savings. This is primarily accomplished through the restructuring of the gantry to include a cheaper rotation mechanism and electronics. Thus, preventing infringement of this novel mechanism will exclude competitors from the key competitive advantage of our company, even if they manage to create an upright CT that avoids some of the features of our original patent. Additionally, aside from the novelty of the upright CT paradigm, the mechanism for shifting the rotation axis as described by claim 7 and the reconstruction algorithm for processing this data as described by claim 11 could also potentially have significant value. This use, while currently limited to upright CT scanners, could potentially become embodied in an array of diagnostic imaging systems. Thus, a patent on the mathematical reconstruction methods could block competitors from a useful addition to the CT scanner as well as potentially generate revenue from licensing opportunities for conventional scanners that are not in direct competition with ScanUp's product line.

Our patent was filed less than a month prior to the Stand-Up CT scanner (US 7224764) by Xoran Technologies, so it is unclear who the "first to invent" would be on potentially infringing claims; however, extensive record-keeping was maintained regarding the development of our invention since May 2002. Furthermore, analysis of the claims reveals that this machine is different than ours and its technology strikes at an alternative competitive value. Our invention is described for use with a flat-panel detector and pyramidal x-ray beam, which complements the design goals of our product for cost and performance. The Xoran machine uses a 2D x-ray beam and helical data acquisition, which is contrary to our invention and cannot achieve the same price point or perform within the constraints of our patent.

The Team

The team is composed of undergraduate students at Duke University, each of whom brings a tremendous amount of commitment and a diverse set of experiences to ScanUp. Most importantly, however, we have a vision of a future with lifesaving diagnostic imaging available for anyone who would benefit from it, no matter their income level or health challenges.

Jason Chen, *Founder*, is recipient of the Mathematical Association of America Award and the JA Jones Scholarship, and has worked in the Advanced Research Department of Siemens Medical Solutions as well as laboratories in the Department of Biomedical Engineering and the Brain Imaging and Analysis Center. He developed the concept of the upright CT, and obtained a patent for his invention in 2006. Beyond bringing technical expertise to the table, Mr. Chen also contributes to the financial and managerial direction of the company. He will be attending medical school as an MD/PhD candidate starting Summer 2010.

Esther Lee conducts research in a tissue engineering lab as a Pratt Fellow. She brings a strong combination of laboratory and operational experience to the company, as she has a successful resume in various organizations and biomedical-related endeavors. She is responsible for many of the organizational, scientific, and management tasks of ScanUp.

Business Model

Strategy

Year 1 – 2010

- ❖ Develop trademarks and logos
- ❖ Build feedback relationships with cardiology/oncology practices in RTP area
- ❖ Recruit two physicians (cardiologist and radiologist) as Development Advisors
- ❖ Begin constructing a prototype
- ❖ Work on research and intellectual property

ScanUp's initial strategy is centered on taking full advantage of the opportunities presented by our physical environment, using all of the resources available at Duke University and the Research Triangle Park. Throughout prototyping and clinical trial phases, ScanUp will actively seek feedback from local doctors in the Research Triangle Park area. Building on the relationships that ScanUp has already developed in RTP will prevent potentially averse impressions of the upright CT scanner since these physicians have contributed to making the product optimal for market, and understand the details of how the product works. ScanUp also has strong ties with Duke University Medical Center, which serves as another reason for initial regional focus. The company has contacts with physicians and the radiology department's purchasing decisions manager. By understanding how product selection works within the hospital and what features are expected, ScanUp can better tailor its upright CT scanner to meet expressed needs.

In order to assist with understanding physician needs & market trends and build rapport with the medical community, we will hire a cardiologist and a radiologist as Development Advisors. These key consultants will guide our marketing efforts and potentially affect the design of the prototype. Because of our location in the Research Triangle area, we will have ample opportunity to recruit renowned physicians from the Duke Health System, the University of North Carolina Hospitals, or WakeMed.

The development of such relationships with medical professionals also opens up a potential market for the upright CT scanner, as ScanUp will gain leverage from RTP's reputability in the realms of technology and medicine. If an appreciable number of local physicians endorse the product and use it in their clinics, then doctors elsewhere may be more inclined to the idea of an upright CT scanner.

The ultimate goal of the first year is to create a strong base for future success. This includes generating data on the safety and efficacy of the machine, protecting key aspects of its function with intellectual property claims, and recruiting experienced people to help with our future plans.

Year 2 – 2011

- ❖ Finish Prototype
- ❖ ScanUp "Giveaway Strategy" for clinical testing of safety and efficacy
- ❖ Strengthen intellectual property position
- ❖ Preparation of FDA 510(k) Premarket Submission
- ❖ Generate publicity at medical imaging trade shows

During 2011 we plan to complete a prototype which can be used for abbreviated clinical testing of safety and efficacy. We plan to accomplish this by providing a free ScanUp scanner to

the Duke or Wake Forest clinic for testing in order establish a firm relationship, collect data, add credibility, and determine how we will be able to tweak our product to further develop it. This strategy will substantially boost our marketing efforts, as an influential institution will help accelerate the process of gaining acceptance as an industry standard and grant visibility to our start-up. In particular, the opportunity to use the same CT scanner as a large hospital will be appealing to the price-sensitive markets that we are targeting. Furthermore, we will put an R&D team in place at this location to develop patentable innovations and methods relating to the upright CT scanner. The primary goals behind this research effort are to build a strong base of intellectual property to prevent entrance into our market, and to expand the uses and capabilities of our product.

Data from this work will be used to support an application for an FDA 510(k) Premarket Submission, and will be unveiled at a medical imaging trade show (e.g., the annual meeting of the Radiological Society of North America). The trade show will provide an opportunity to generate publicity, garner feedback from medical professionals, and hire technical experts for further research and development.

Year 3 – 2012	
❖	FDA Approval
❖	Continued collection of clinical testing data for marketing material
❖	Full launch of marketing campaign
❖	Production of ScanUp CT scanners begins

In 2012, we will continue to gather data from our “ScanUp Giveaway” scanner at the Duke or Wake Forest clinic in order to strengthen the scientific case for the scanner. After receiving final FDA approval for the scanner, we will begin an intense preparation for the launch in 2013. To ensure that we maintain momentum in our 2013 launch, there will be a production push in order to ensure that we have machines available for purchase, and a full launch of our marketing campaign. In addition to leveraging existing contacts and continuing to present the product at medical imaging trade shows, ScanUp plans to distribute informational pamphlets at hospitals, clinics, general practitioners offices, and imaging centers. This strategy will publicize our product to a large population of potential customers, from the early majority adopters to the conservative adopters. Due to the combination of low cost and high imaging quality, we expect these professionals to be interested in our product. These brochures will highlight the benefits and convenience of upright CT scans, and prompt patients to contact their doctors to learn more about it. In conjunction, ScanUp will offer workshops on its product and CT technology to physicians and radiology technicians to inform them of this patient-friendly, easy-to-use innovation and alleviate any concerns regarding this cutting-edge technology.

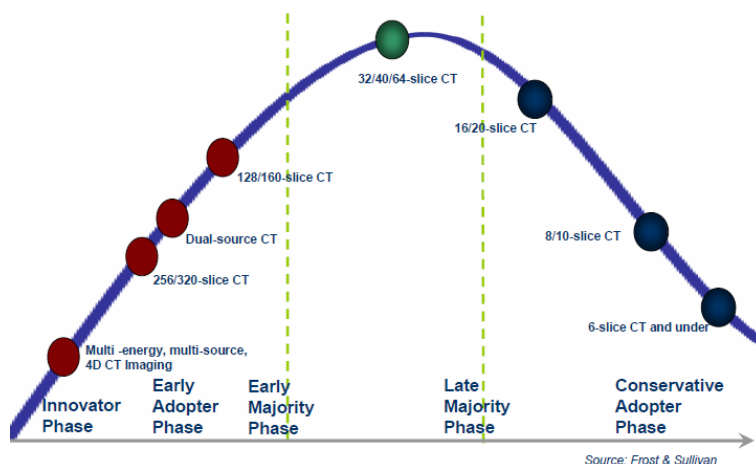


Fig. 5 ScanUp’s consumer base spans from early majority to conservative adopters.

Year 4 – 2013

- ❖ Sales Force implementation
- ❖ Sale of 12 units
- ❖ Analysis of Buyer Segmentation
- ❖ Distribution Channel Contracting

In order build up its brand, ScanUp will expand its contacts significantly by hiring a marketing and sales team, initially from management and company staff. Our sales team will target its efforts by researching eligibility for a Certificate of Need (CON). Depending on the final cost of our product, we might also be able to offer our product at a price lower than the minimum cost of purchase for which a CON is required. This will be a great advantage as we will be able to market to those customers that don't hold CONs, a market segment underserved by the competition. We will buy access to physician and medical societies' mailing lists with the similar objective increasing the effectiveness and scope of the sales team's efforts of building contacts. Marketing material such as flyers will be prepared and sent to physician's offices, and the sales team will make contacts through cold calls and lunch sessions. Over the years, hospital purchasing power has gradually shifted into the hands of hospital and clinic administrators. ScanUp must also cater to these individuals because their decisions carry substantial weight. The team would establish close relationships with potential customers and act as a source of technical information about the upright CT scanner. The objective is to sell 12 scanners in this first year of sales. Our sales force will gather detailed data about how and to whom we have sold ScanUp machines, in order to determine patterns and even further segment our market to sell our product successfully.

ScanUp is poised to launch as a high-margin, low-volume product. The implication of this is that a very simple distribution plan will suffice in order to complete our sales. We will physically deliver the scanners by contracting a professional transportation company, and will arrange specific details with our clients on a case-by-case basis.

Year 5 – 2014

- ❖ Adaptation based on sales data
- ❖ Sale of 24 units
- ❖ Personalized service introduction
- ❖ Brand establishment

The data generated by the sales will pinpoint the most valuable segments and guide our future marketing efforts. Once a customer base has been established, we will attempt to build our brand through personalized service, specialized for private practices and rural hospitals. This service will aid in building the ScanUp brand, as we will set ourselves apart from the vast majority of other CT scan producers, which offer a product without service and repair opportunities. This approach, along with word-of-mouth from previous sales, should allow us to double the number of units sold from the previous year, creating a net profit of nearly six million dollars.

The efficacy of this concept will be demonstrated through brand equity surveys distributed to a large number of clinical practices and community hospitals. Due to our strong connection with the Research Triangle, we aim to show at least 25% brand awareness and a strongly positive brand image in the Raleigh-Durham area. Customers will also be asked to

rate their satisfaction with the product and services. The results will be used to gauge customer loyalty and retention.

Finances

Table 1 Cost-based Pricing Model

Detector	\$50,000
X-ray Tube	\$10,000
Gantry	\$20,000
Seat Apparatus	\$10,000
Housing	\$20,000
Computer & Electronics	\$50,000
Software	\$30,000
Raw Materials:	\$190,000
Markup	35%
Cost-based Price:	\$292,000

Pricing Scheme

The cost of raw materials and software for each scanner is estimated at \$190,000.¹⁶ Using an industry-estimated 35% markup¹⁷ for labor and profit, this cost-based model yields a conservative estimated price of \$300,000. This number is competitive with current used CT scanners, which retail anywhere between \$300,000 and \$1,500,000.¹⁸ Furthermore, it

brings the cost of the scanner under the threshold of the CON requirement of many states, making it extremely easy for physicians to purchase.¹⁹

However, ScanUp plans to use a value-based pricing scheme. We believe that our device could outperform older scanners, and has many advantages, including newer technology, and smaller physical size. Additionally, as a start-up company, a larger gross margin would give us capital to invest in further R&D and marketing. A typical Certificate of Need (CON), a state-issued certification that authorizes healthcare providers to purchase sophisticated medical technology like CT scanners, specifies that at least 3000 CT angiography studies be performed each year. Assuming our customer charges \$500 per CT scan, earns \$45 profit on this transaction, and replaces the machine once every 4 years, (very conservative estimates based on Duke University Health System),²⁰ his net income will be \$135,000 per year. If this is taken as the prorated value of the scanner, the scanner will generate more \$500,000 of profit over four years. Because these estimates are extremely conservative, this is set to be a minimum bound for the perceived value to the customer and a realistic price point for the scanner.

Table 2 Value-based Pricing Model

Minimum no. of studies	3000
Profit per study	\$45
Net profit (annual):	\$135,000
Replacement time of scanner	4 Years
Scanner Value	\$540,000

The statistics do not include the profit that the hospital receives from each scan or the extra funding (e.g., from charities and endowments) the hospital uses to replace scanners. In reality, physicians, especially those in private practice, will be able to charge more, earn a larger share of the fee, and replace the scanner less frequently, all resulting in increased value to the customer. This value-based price of \$500,000 is still extremely competitive with new machines and high-end used machines.

¹⁶ Data from Dr. Douglas Wagenaar, Gamma Medica-Ideas, Inc. Personal Communication with JAC

¹⁷ Dr. Sharon Wang, Philips Healthcare, Personal Communication with JAC

¹⁸ Dr. Fred Saleeby, Duke University, Personal Interview, February 26, 2010

¹⁹ Eric Eyre, Doctors' offices to be allowed to buy CT scanners, Charleston Gazette (WV), July 12, 2007. Accessed 03/02/2010

²⁰ Dr. James Jollis. Duke University Dept. of Cardiology, Personal Interview. February 27, 2010

Marketing Expenses

ScanUp plans to make important hires in the sales department during the fourth year, when the scanner will be available for sale. A sales employee in the medical imaging field makes an average salary of \$80,000 annually. We hope to hire five employees to sell 24 and 48 units in years 4-5, respectively, at a salary cost of \$400,000. Including travel reimbursements, advertising, and sales materials, we expect the marketing expense to be approximately \$500,000 annually.

General & Administrative

ScanUp's General and Administrative costs include the salary of founder Jason Chen, at \$100,000, COO Esther Lee, estimated at \$100,000, and legal representation, estimated at \$100,000. An additional \$100,000 is required for general supplies and miscellaneous expenses.

Other Expenses

In the first year, we expect to create the three patents previously described, at an approximate cost of \$15,000 each for filing fees and patent attorneys. The two part-time physician consultants are expected to cost \$100,000 each, for a total of \$200,000. The prototype is expected to cost \$500,000, without a set design and economies of scale that will lower the price to its final reduced cost. Construction of the prototype is expected to require four technicians, at an industry average salary of \$75,000 each. A team of researchers and design experts will also be required to complete the design of the medical and ergonomic features of the machine. Along with the expertise of the management team, two additional researchers at a salary of \$250,000 each will be added during the first year. Finally, expenses for clinical trials are expected to total \$1,000,000. (Total: \$2,515,000) During the second year, FDA fees are expected to total \$10,000. The staff from the first year will be retained, and the cost for the prototype raw materials will be put to further improvement and a possible second prototype. Furthermore, the majority of the clinical trial should be paid for, thus resulting in a total expense of \$1,525,000. In the third year, the basic development is expected to be completed. The FDA fees are expected to drop to \$5,000. The physician consultants will no longer be needed, saving \$200,000. The prototype(s) will also be completed, and thus no raw material costs are incurred. The total expense will thus be on the order of \$820,000. During the fourth and fifth years, accounting for 15% growth and inflation, the estimated expenses will be approximately \$943,000 and \$1,084,000, respectively.

Sales Estimates

Inquiry to Xoran reveals that the company sells close to 100 CT scanners per year to various practices across the United States. Thus, the introductory phase of our business plan is expected to sell 24 machines, with increased marketing efforts and word-of-mouth increasing sales to 48 units by the fifth year (second year of sales). Sales and expense estimates are shown in the *Assumptions* table.

Financial Model

Our cash flow statement indicates that our cash need (rock bottom balance achieved in Year 3) is \$6,249,000. Please refer to the financial model reports for further details.

Income Statement Assumptions	Year 1	Year 2	Year 3	Year 4	Year 5
Unit Sales Forecast	0 units	0 units	0 units	24 units	48 units
Price per unit	\$500,000				
Cost per unit	\$190,000				
Sales Revenues	\$0	\$0	\$0	\$12,000,000	\$24,000,000
COGS	\$0	\$0	\$0	\$4,560,000	\$9,120,000
<i>check: sales % growth</i>		<i>nm</i>	<i>nm</i>	<i>nm</i>	<i>100%</i>
<i>check: COGS % growth</i>		<i>nm</i>	<i>nm</i>	<i>nm</i>	<i>100%</i>
Sales commission	0%				
Other fixed sales costs	\$0	\$0	\$0	\$500,000	\$525,000
Selling expenses	\$0	\$0	\$0	\$500,000	\$525,000
Annual Growth in G&A	15%				
G&A	\$300,000	\$345,000	\$396,750	\$456,263	\$524,702
Depreciation horizon	10 years				
Depreciation	\$0	\$0	\$0	\$0	\$0
Annual Growth in Other Op. Expenses	15%				
Other operating Expenses	\$100,000	\$115,000	\$132,250	\$152,088	\$174,901
Total Operating Expenses	\$400,000	\$460,000	\$529,000	\$1,108,350	\$1,224,603
<i>check: total op. expenses % growth</i>		<i>15%</i>	<i>15%</i>	<i>110%</i>	<i>10%</i>
Other income (gain in property sale)	\$0	\$0	\$0	\$0	\$0
Other expenses	\$2,515,000	\$1,525,000	\$820,000	\$943,000	\$1,084,000
Interest rate on financial debt	5%				
Interest expense	\$0	\$0	\$0	\$0	\$0
Interest income	\$0	\$0	\$0	\$0	\$0
<i>check: Interest income rate</i>	<i>nm</i>	<i>nm</i>	<i>nm</i>	<i>nm</i>	<i>nm</i>
Tax rate	35%				
Tax	\$0	\$0	\$0	\$1,886,028	\$4,399,989
Attributable losses rate	40%				
Attributable losses	(\$1,166,000)	(\$794,000)	(\$539,600)	\$0	\$0
Loss applied	\$0	\$0	\$0	(\$1,886,028)	\$0
Net tax liability	\$0	\$0	\$0	\$0	\$4,399,989
Income Statement	Year 1	Year 2	Year 3	Year 4	Year 5
Sales Revenue	\$0	\$0	\$0	\$12,000,000	\$24,000,000
Less: Cost of Goods Sold (COGS)	\$0	\$0	\$0	\$4,560,000	\$9,120,000
Gross Margin	\$0	\$0	\$0	\$7,440,000	\$14,880,000
Less: Selling Expenses	\$0	\$0	\$0	\$500,000	\$525,000
General and Administrative Expenses (G&A)	\$300,000	\$345,000	\$396,750	\$456,263	\$524,702
Other Operating expenses	\$100,000	\$115,000	\$132,250	\$152,088	\$174,901
Total Operating expenses	\$400,000	\$460,000	\$529,000	\$1,108,350	\$1,224,603
Income from Operations	-\$400,000	-\$460,000	-\$529,000	\$6,331,650	\$13,655,398
Less: Other expenses (e.g. indemnifications)	\$2,515,000	\$1,525,000	\$820,000	\$943,000	\$1,084,000
Earnings Before Interest and Taxes (EBIT)	-\$2,915,000	-\$1,985,000	-\$1,349,000	\$5,388,650	\$12,571,398
Pre-tax income	-\$2,915,000	-\$1,985,000	-\$1,349,000	\$5,388,650	\$12,571,398
Less: Income Tax	\$0	\$0	\$0	\$0	\$4,399,989
Net income	-\$2,915,000	-\$1,985,000	-\$1,349,000	\$5,388,650	\$8,171,408

Cash Flow Statement	Year 1	Year 2	Year 3	Year 4	Year 5
Net income	-\$2,915,000	-\$1,985,000	-\$1,349,000	\$5,388,650	\$8,171,408
Plus: Depreciation	\$0	\$0	\$0	\$0	\$0
Plus: Increase in Accounts Payables	\$0	\$0	\$0	\$93,699	\$131,178
Less: Increase in Accounts Receivables	\$0	\$0	\$0	\$246,575	\$345,205
Increase in Inventory	\$0	\$0	\$0	\$456,000	\$456,000
Gain in property sale	\$0	\$0	\$0	\$0	\$0
Net cash provided by operations	-\$2,915,000	-\$1,985,000	-\$1,349,000	\$4,779,773	\$7,501,381
Change in Cash	-\$2,915,000	-\$1,985,000	-\$1,349,000	\$4,779,773	\$7,501,381
Plus: Beginning Cash Balance	\$0	-\$2,915,000	-\$4,900,000	-\$6,249,000	-\$1,469,227
Ending Cash Balance	-\$2,915,000	-\$4,900,000	-\$6,249,000	-\$1,469,227	\$6,032,154
Balance Sheet					
Cash and equivalents	-\$2,915,000	-\$4,900,000	-\$6,249,000	-\$1,469,227	\$6,032,154
Accounts receivable	\$0	\$0	\$0	\$246,575	\$591,781
Inventories	\$0	\$0	\$0	\$456,000	\$912,000
Current Assets	-\$2,915,000	-\$4,900,000	-\$6,249,000	-\$766,651	\$7,535,935
Fixed assets	\$0	\$0	\$0	\$0	\$0
Net Fixed Assets	\$0	\$0	\$0	\$0	\$0
Total Assets	-\$2,915,000	-\$4,900,000	-\$6,249,000	-\$766,651	\$7,535,935
Accounts payable	\$0	\$0	\$0	\$93,699	\$224,877
Current Portion of long-term debt	\$0	\$0	\$0	\$0	\$0
Current Liabilities	\$0	\$0	\$0	\$93,699	\$224,877
Long-term debt	\$0	\$0	\$0	\$0	\$0
Total Liabilities	\$0	\$0	\$0	\$93,699	\$224,877
Stock	\$0	\$0	\$0	\$0	\$0
Retained earnings	-\$2,915,000	-\$4,900,000	-\$6,249,000	-\$860,350	\$7,311,058
Total equity	-\$2,915,000	-\$4,900,000	-\$6,249,000	-\$860,350	\$7,311,058
Total liabilities and equity	-\$2,915,000	-\$4,900,000	-\$6,249,000	-\$766,651	\$7,535,935
Analysis	Year 1	Year 2	Year 3	Year 4	Year 5
Profitability Analysis					
Net Profit Margin (ROS)	nm	nm	nm	45%	34%
Total Asset Turnover	0.0%	0.0%	0.0%	-1565.2%	318.5%
ROA	nm	nm	nm	-703%	108%
Financial Leverage	1.0	1.0	1.0	0.9	1.0
ROE	nm	nm	nm	-626%	112%
Operating Management Analysis					
Gross Profit Margin	nm	nm	nm	62%	62%
Operating Profit Margin	nm	nm	nm	53%	57%
Net profit margin	nm	nm	nm	45%	34%
Liquidity					
Current ratio	nm	nm	nm	-8.2	33.5
Quick ratio	nm	nm	nm	-13.0	29.5