

Tiny but powerful

We initiate coverage on Micro-X with a BUY rating and a risked price target of \$0.75 per share. Micro-X is working with its technology partners to commercialise miniaturised X-ray sources for medical and industrial applications. First product launch is expected in Q1 2017. Global partner Carestream Health is planning a disruptive push for market share in the mobile X-ray market with the DRX Revolution Nano, which is manufactured by Micro-X in Adelaide's Tonsley Innovation District. Micro-X also has an exciting R&D pipeline featuring products for military deployment and bomb disposal.

Key points

Introducing Micro-X Limited. This Australian manufacturing company has applied miniaturisation and industrial design technologies to produce ultralight X-ray equipment for medical and industrial applications. Carestream Health (Rochester NY), a global supplier of medical X-ray imaging equipment, plans to start selling Micro-X's first product (DRX Revolution Nano) next year with exclusive global distribution rights.

A motivated global partner. The DRX Revolution Nano will be the first mobile X-ray unit to feature a carbon nanotube (CNT) X-ray source. This new technology has brought down the weight and cost of X-ray equipment by an order of magnitude, while providing full digital capabilities and broad clinical scope. The Nano could enable an aggressive play on market share by Carestream, whose traditional earnings base has come under pressure in recent years. Industry feedback suggests Carestream contemplates a "deep and wide" strategy to increase the penetration of mobile X-ray into both acute and outpatient settings at low cost. Mobile X-ray is the fastest growing modality in radiology as hospitals focus on costs and regulatory compliance obligations.

New product development. Micro-X's higher-powered ROVER mobile X-ray and mobile backscatter imager (MBI) product for "bomb squads" are key drivers of future margin development. Micro-X's technology partner and key supplier XinRay Systems has a defensible leadership position in CNT technology in which Micro-X holds 30% equity. This exposure to other CNT applications via XinRay is an important feature of the investment case.

Forecasts and valuation. We are forecasting first profits in FY19 noting significant R&D investments planned for ROVER and MBI. Our risk-adjusted DCF model implies a \$0.75 target price on a fully diluted basis.

Risks and catalysts

Risks: 1) execution risks; 2) dependency on partner Carestream; 3) major market sales forecasts; 4) FX and margins; 5) R&D outcomes. **Catalysts:** 1) sales growth; 2) margin; 3) new product development; 4) new contract wins.

Earnings forecasts					
Year-end June (AUD)	FY15A	FY16A	FY17F	FY18F	FY19F
NPAT rep (\$m)	-10.2	-10.7	-5.3	-16.3	2.2
NPAT norm (\$m)	-10.2	-10.7	-5.3	-16.3	2.2
Consensus NPAT (\$m)					
EPS norm (cps)	-46.5	-16.8	-4.1	-10.2	1.2
EPS growth (%)	-4574.6	64.0	75.6	-150.0	112.1
P/E norm (x)	-1.1	-3.4	-14.0	-5.6	46.2
EV/EBITDA (x)	-5.0	-7.4	-12.7	-3.8	18.9
FCF yield (%)	-12.3	-26.4	-13.9	-40.2	2.4
DPS (cps)	0.0	0.0	0.0	0.0	0.0
Dividend yield (%)	0.0	0.0	0.0	0.0	0.0
Franking (%)	0	0	0	0	0

Source: Company data, Wilsons estimates, S&P Capital IQ

Wilsons Research

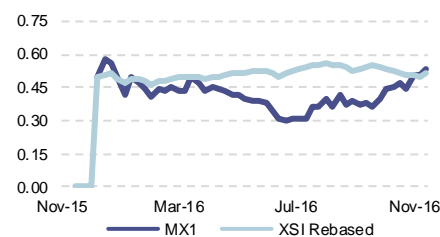
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Recommendation	BUY
12-mth target price (AUD)	\$0.75
Share price @ 28-Nov-16 (AUD)	\$0.57
Forecast 12-mth capital return	31.5%
Forecast 12-mth dividend yield	0.0%
12-mth total shareholder return	31.5%
Market cap	\$68m
Enterprise value	\$59m
Shares on issue	119m
Sold short	
ASX 300 weight	n/a
Median turnover/day	\$0.0m

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12-mth price performance (\$)



	1-mth	6-mth	12-mth
Abs return (%)	13.8	33.7	
Rel return (%)	14.5	36.0	

Key changes			
	Before	After	Var %
NPAT:	FY17F	-5.3	
norm	FY18F	-16.3	
(\$m)	FY19F	2.2	
EPS:	FY17F	-4.1	
norm	FY18F	-10.2	
(cps)	FY19F	1.2	
DPS:	FY17F	0.0	
(cps)	FY18F	0.0	
	FY19F	0.0	
Price target:		0.75	
Rating:		BUY	

Price target	
	Valuation Price target
WACC (%)	12
Terminal growth (%)	4
NPV forecast FCF (\$m)	-7
NPV perpetuity (\$m)	122
Net debt/(cash) (\$m)	10
DCF valuation (\$m)	124
Growth options (\$m)	0.0
MX1 valuation (\$m)	124

DCF valuation (\$/sh) **0.75**
Price target (\$/sh) **0.75**

Interims (\$m)				
Half-year (AUD)	Dec 15	Jun 16	Dec 16	Jun 17
	1HA	2HA	1HE	2HE
Sales revenue	0.0	0.0	0.0	3.5
EBITDA	-2.7	-5.2	2.1	-6.7
EBIT	-2.7	-5.2	2.0	-7.1
Net profit	-5.6	-5.2	1.9	-7.2
Norm EPS	-19.0	-5.2	1.6	-5.2
EBIT/sales (%)				-204.6
Dividend (c)	0.0	0.0	0.0	0.0
Franking (%)	0.0	0.0	0.0	0.0

Financial stability			
Year-end June (AUD)	FY16A	FY17F	FY18F
Net debt	-4.2	-11.9	-6.8
Net debt/equity (%)	<0	<0	<0
Net debt/EV (%)	<0	<0	<0
Current ratio (x)	4.0	4.8	3.7
Interest cover (x)	<0	<0	>99
Adj cash int cover (x)	<0	<0	>99
Debt/cash flow (x)	<0	0.0	<0
Net debt (cash)/share (\$)	<0	<0	<0
NTA/share (\$)	0.3	0.2	0.2
Book value/share (\$)	0.1	0.2	0.2
Payout ratio (%)	0	0	0
Adj payout ratio (%)	0	0	0

EPS reconciliation (\$m)				
	FY16A		FY17F	
	Rep	Norm	Rep	Norm
Sales revenue	0	0	3	3
EBIT	-8.0	-8.0	-5.2	-5.2
Net profit	-10.7	-10.7	-5.3	-5.3
Notional earn	0.0	0.0	0.0	0.0
Pref/conv div	0.0	0.0	0.0	0.0
Profit for EPS	-10.7	-10.7	-5.3	-5.3
Diluted shrs (m)	64	64	129	129
Diluted EPS (c)	-16.8	-16.8	-4.1	-4.1

Returns				
	FY16A	FY17F	FY18F	FY19F
ROE (%)	-270	-23	-60	8
ROIC (%)	-67	-24	-64	7
Incremental ROE	52	29	-261	>999
Incremental ROIC	-8	29	-270	431

Key assumptions								
Year-end June (AUD)	FY15A	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F	FY22F
Revenue growth (%)	-100.0			375.7	73.4	73.3	54.6	21.5
EBIT growth (%)	168.6	4.9	-35.0	216.1	-113.0	119.1	247.9	35.4
NPAT growth (%)	290.2	5.7	-51.0	209.9	-113.3	116.9	246.4	32.2
EPS growth (%)	4,574.6	-64.0	-75.6	150.0	-112.1	113.8	246.4	32.2
EBIT/sales (%)			-148.6	-98.7	7.4	9.4	21.1	23.5
Tax rate (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6
ROA (%)	-96.7	-25.5	-14.0	-41.9	4.5	7.4	21.1	24.4
ROE (%)	98.9	-47.8	-19.6	-57.5	6.2	9.7	27.0	30.2

Profit and loss (\$m)								
Year-end June (AUD)	FY15A	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F	FY22F
Sales revenue	0.0	0.0	3.5	16.6	28.7	49.7	76.9	93.4
EBITDA	-7.6	-7.9	-4.6	-15.4	3.1	5.7	17.3	23.1
Depn & amort	0.0	0.0	0.6	0.9	1.0	1.0	1.1	1.1
EBIT	-7.6	-8.0	-5.2	-16.3	2.1	4.7	16.2	22.0
Net interest expense	2.6	2.8	0.1	0.0	0.0	0.0	0.0	-0.1
Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Minorities/pref divs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Equity accounted NPAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net profit (pre-sig items)	-10.2	-10.7	-5.3	-16.3	2.2	4.7	16.3	21.5
Abns/exts/signif	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reported net profit	-10.2	-10.7	-5.3	-16.3	2.2	4.7	16.3	21.5

Cash flow (\$m)								
Year-end June (AUD)	FY15A	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F	FY22F
EBITDA	-7.6	-7.9	-4.6	-15.4	3.1	5.7	17.3	23.1
Interest & tax	-0.4	0.0	-0.1	0.0	0.0	0.0	0.0	-0.4
Working cap/other	2.1	-4.6	-1.9	-3.7	-2.0	-3.2	-2.2	-3.4
Operating cash flow	-5.8	-12.5	-6.6	-19.1	1.1	2.5	15.2	19.3
Maintenance capex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Free cash flow	-5.8	-12.5	-6.6	-19.1	1.1	2.5	15.2	19.3
Dividends paid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Growth capex	0.0	-0.2	-0.7	-1.0	-1.2	-1.4	-1.7	-2.1
Invest/disposals	0.0	-7.1	0.0	0.0	0.0	0.0	0.0	0.0
Other inv flows	0.0	-1.5	0.0	0.0	0.0	0.0	0.0	0.0
Cash flow pre-financing	-5.8	-21.3	-7.3	-20.1	0.0	1.1	13.5	17.2
Funded by equity	8.2	20.0	15.0	15.0	0.0	0.0	0.0	0.0
Funded by debt	0.2	2.9	2.6	-2.6	0.0	0.0	0.0	0.0
Funded by cash	-2.6	-1.6	-10.3	7.7	0.0	-1.1	-13.5	-17.2

Balance sheet summary (\$m)								
Year-end June (AUD)	FY15A	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F	FY22F
Cash	2.6	4.2	14.5	6.8	6.8	7.9	21.4	38.6
Current receivables	3.3	8.8	10.5	14.0	16.0	17.0	18.7	22.5
Current inventories	0.0	0.0	2.2	4.4	5.4	8.7	12.5	15.0
Net PPE	0.0	0.2	0.5	1.0	1.5	2.3	3.4	4.7
Investments	0.0	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Intangibles/capitalised	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	1.8	1.4	1.0	0.6	0.2	0.0
Total assets	7.8	24.3	38.6	36.7	39.9	45.6	65.3	89.9
Current payables	2.7	6.0	8.0	10.0	11.0	12.0	15.4	18.5
Total debt	15.4	0.0	2.6	0.0	0.0	0.0	0.0	0.0
Other liabilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total liabilities	18.1	6.0	10.6	10.0	11.0	12.0	15.5	18.6
Minorities/convertibles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shareholder equity	-10.3	18.2	28.0	26.7	28.8	33.5	49.8	71.4
Total funds employed	5.1	18.2	30.6	26.7	28.8	33.5	49.8	71.4



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Glossary

Term	Description
Anode	The high voltage charged electrode or target at which electron beams are directed in producing X-rays.
Carbon nanotube	Hollow, multi-walled cylindrical structures made of a lattice of carbon molecules that have useful properties in nanotechnology, electronics, optics and other fields of materials science.
Cathode	The material that is induced to emit electrons which subsequently generate X-rays.
Computed radiography (CR)	A form of X-ray imaging using similar equipment to conventional radiography except that in place of a film to create the image an imaging plate (IP) made of photostimulable phosphor is used to store the image which is then scanned by a laser in a CR reader to produce a digital image.
Computed tomography (CT)	A scanning technique that uses multiple X-ray images to form a detailed three-dimensional picture by computer reconstruction.
Digital radiography (DR)	A form of X-ray imaging where digital X-ray sensors are used instead of traditional photographic film. Advantages include time efficiency through bypassing chemical processing, electronic scanning and the ability to digitally transfer and enhance images.
Microbeam radiotherapy (MRT)	A promising experimental radiotherapy technique that uses finely divided X-rays to destroy tumours without seriously affecting normal tissue.
Tomosynthesis	An advanced type of computer image processing to create three-dimensional images often used in a mammograms.
Thermionic emission	The thermally induced flow of electric charge from a (often metal) surface. The most familiar example is the emission of electrons from a tungsten filament heated to 1,000 degrees or more.
X-ray	A form of electromagnetic radiation emitted when high energy electrons collide with the atoms of a metal target.

Investment view

Investment summary

We initiate coverage of Micro-X Limited with a BUY rating and a 12-month price target of \$0.75 per share

Micro-X Limited is an Australian developer, manufacturer and seller of miniaturised X-ray equipment, based in Adelaide's Tonsley Innovation District, South Australia. The company is combining in-licensed intellectual property with its own in-house R&D and industrial design capabilities to develop ultralight, mobile X-ray equipment for medical and industrial applications. The first product is a mobile X-ray unit called DRX Revolution Nano, which will be marketed worldwide by Carestream Health. To our knowledge this is the first time an X-ray source based on carbon nanotubes (CNTs) will have been made available in an FDA-approved medical device. The DRX Revolution Nano was introduced to radiologists over the weekend at the Radiological Society of North America's annual meeting in Chicago.

Ultralight mobile X-ray unit to be commercialised worldwide by Carestream Health

Micro-X is working towards a series of new product launches over the next two years including a mobile medical X-ray unit for military deployment (ROVER) and its MBI project for the imaging and management of improvised explosive devices (IEDs). Micro-X investors also have exposure to other applications of the CNT technology, via Micro-X's 30% shareholding in US company XinRay Systems.

Follow-on products in both medical and industrial settings

Investment merits

- **Leveraging a leadership position in CNT field emission technology.** Micro-X's technology partner XinRay Systems¹ is among a handful of companies to have brought prototype CNT-based X-ray sources forward for commercial evaluation. Our assessment is that the XinRay intellectual property rights confer certain manufacturing and design advantages that may be difficult for competitors to overcome. Micro-X has Board representation with XinRay and may seek to increase this shareholding.
- **A motivated commercial partner in Carestream².** Carestream is believed to have lifted its market share to ~40% since the commercial launch of its DRX Revolution mobile X-ray unit in 2012 offering facilities a lower priced option to convert to digital radiography (DR). The cost and size of mobile DR units has continued to come down with competitor Shimadzu launching the MX7 in Aug-16 and a lightweight, non-motorised product expected soon from Philips (MobileDiagnost M50). The DRX Revolution Nano could drop the price point of DR-enabled mobile X-ray by another 25% while preserving wide clinical scope. At 90kg the Nano is less than half the weight of its nearest competitor and 85% lighter than Carestream's incumbent market leader.
- **Higher margin opportunities in R&D pipeline.** Micro-X has the option to pursue market access for both the ROVER and MBI development projects and enhance group gross margin.
- **We are also attracted by the shareholding in XinRay Systems which could enhance shareholder value over the next 3-5 years.** Micro-X owns 30% of XinRay and has an option to go to 40% ownership by year's end. Independently of Micro-X, XinRay is developing CNT-based products for digital breast tomosynthesis, micro-CT, microbeam radiation therapy, image guided radiotherapy and security screening applications.

Sustainable technology advantages

Technology achieves up to 85% reduction in weight for mobile X-ray equipment

¹ Based in Morrisville NC. See: <http://xinraysystems.com/>

² Based in Rochester, NY. See: www.carestream.com



What are the risks?

- **Reliance on IP licensing arrangements.** The underlying CNT technology was invented at the University of North Carolina Chapel Hill (UNC-CH) and that entity remains the ultimate owner of the key patents. This intellectual property (IP) is exclusively licensed to XinTek Inc, which has sub-licensed 38 patents to its subsidiary XinRay Systems. XinRay in turn has licensed elements of the IP to Micro-X. Micro-X's rights are limited to access to single emitter CNT X-ray applications in the mobile medical, dental or veterinary fields; and to multi-beam CNT based X-ray systems for any backscatter imaging applications.
- **Carestream's performance as a commercial partner.** Commercialisation by large multinational corporates is not without risk. Common pitfalls include lack of product prioritisation, lack of forward sales visibility and inefficient product feedback from end customers. Micro-X's business will be concentrated in this single customer until the ROVER and MBI products become available.
- **New product validation risks.** DRX Revolution Nano is the first commercially available medical X-ray unit based on CNT technology. Micro-X is therefore dependent on XinRay's own manufacturing controls and quality assurance systems (reliability, compliance).
- **Carestream potentially for sale.** Carestream is owned by private equity firm Onex Corp which bought the business in 2007 from Eastman Kodak for US\$2.35bn. Onex is said to have initiated a trade sale process for Carestream in May-16. A change of ownership at Carestream would likely create short-term uncertainty for Micro-X. DRX Revolution Nano appears to be an important part of the Carestream's strategy to improve profitability.
- **Competitive technology risks.** There is a large commercially based and academic research effort in bringing CNT-based X-ray sources to market. While XinRay is a leader in that field, we cannot rule out competitors catching up and making equivalent technology available to Carestream's competitors.
- **Valuation risk.** Our DCF valuation implies successful development and commercialisation outcomes, all of which are uncertain. Although we are confident that our forecasts are based on realistic estimates of market size and future competitive market dynamics, the adoption of new medical device products is difficult to forecast.
- **Financial risk.** As at 30 September 2016 Micro-X reported \$2.9m in cash. In October the company received \$8.3m in tax rebates under the AusIndustry R&D Tax Incentive scheme. Micro-X will likely require new capital to finance its commercialisation effort with the DRX Revolution Nano and its new product R&D. The ability to raise capital and the issue price of new capital do affect valuations in per share terms. We have made certain allowances for this and present our MX1 valuation on a fully diluted basis.
- **Intellectual property risks.** We have not conducted any analyses of freedom to operate or patent validity for intellectual property owned or licensed by Micro-X.

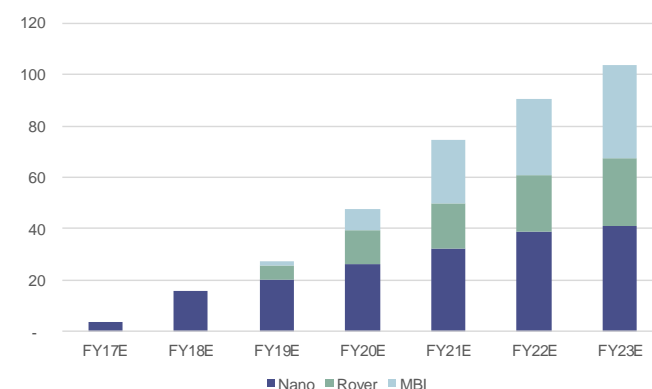
Valuation

Risk-adjusted DCF price target of 75 cps. Our valuation for Micro-X is based on a risk-adjusted discounted cash flow (DCF) methodology as this is best able to capture the expected growth, capital intensity, risks and future optionality. We have developed an explicit forecast for DRX Revolution Nano sales to Carestream, with a projected peak activity of ~1,000 devices per annum consistent with management's guidance (~\$40m annual revenue opportunity). Management is also guiding the business to ~\$50m annually.

Table 1: Revenue model assumptions & forecast summary

	DRX Nano	Rover	MBI
Launch year	FY17	FY18/19	FY20
Peak revenue guidance	\$40m	n/a	\$50m
Target annual volume (Wilson's)	1000	175	125

Figure 1: Revenue model assumptions & forecast summary (\$Am)



Source: Wilson's

Source: Wilson's

Table 2: DCF parameter summary

DCF Parameters			
Discount rate	11.6%	Tax rate	30%
Risk-free rate	3.5%	Tg	3.5%
Risk premium	7.0%	Forecast horizon	FY23
Implied equity beta	1.15		
DCF Valuation			
PV of FCFF (\$m)	(6.7)	Share count (fully diluted)	178.1
PV of Terminal Value (\$m)	121.6		
Value of Operating Assets (\$m)	114.9		
Net cash (debt) (\$m)	9.6		
Equity Value (\$m)	124.5		
+ XinRay interest	9.0		
Equity value of MX1 (\$m)	133.5	DCF value per share	0.75

Source: Wilson's

Table 3: Five-year investment view supports sustained value development if MX1 trades in line with medical device peers (~10x EV/EBITDA and ~15x PER as a guide)

	FY17e	FY18e	FY19e	FY20e	FY21e	FY22e	FY23e
EBITDA (\$m)	(4.6)	(15.4)	3.1	5.7	17.3	22.9	27.7
Valuation at 8.0x EV/EBITDA (\$/sh)			\$ 0.30	\$ 0.82	\$ 1.15	\$ 1.46	\$ 1.86
Valuation at 10.0x EV/EBITDA (\$/sh)			\$ 0.36	\$ 1.02	\$ 1.41	\$ 1.77	\$ 2.25
Valuation at 12.0x EV/EBITDA (\$/sh)			\$ 0.43	\$ 1.21	\$ 1.66	\$ 2.08	\$ 2.64
EPS (cps)	(4.1)	(10.2)	1.2	2.6	9.1	12.1	11.4
Valuation at 12.0x PER (\$/sh)			\$ 0.32	\$ 1.10	\$ 1.45	\$ 1.37	\$ 1.71
Valuation at 15.0x PER (\$/sh)			\$ 0.40	\$ 1.37	\$ 1.81	\$ 1.71	\$ 2.14
Valuation at 20.0x PER (\$/sh)			\$ 0.53	\$ 1.83	\$ 2.42	\$ 2.28	\$ 2.86

Source: Wilson's



Valuation sensitivities

- **Commercial success probability for DRX Revolution Nano.** Holding the discount rate constant and varying the success probability from 0% to 100% yields a linear valuation range of up to \$1.15 per share (~53% upside to target price). Our base case assumption of 65% probability is informed by Carestream's advanced state of pre-marketing preparation. When Carestream announces FDA approval and CE Mark for the DRX Revolution Nano, we will look to adjust our valuation settings, accordingly.
- **Conservatism on market access and sales assumptions.** Our base assumption is that Micro-X and Carestream can complete the validation and approval phase and launch the product in Q1 2017 calendar. We have modelled the product as an "add-on" to the Carestream portfolio, envisaging both direct and "bundled" Nano sales. Our initial market penetration and sales assumptions are consistent with company guidance. However, we model "peak" volume developing over a multi-year period, which may prove to be too conservative. Sales could develop faster than we have modelled if DR-enabled mobile X-ray modality continues to grow at double-digit rates; and if Carestream's gross profit incentive is more pressing than we have allowed for.
- **Cautious assumptions adopted for ROVER and MBI.** The business models for these new products are somewhat less well defined and as such we have kept our forecasts low. The margin benefit from these products could be quite powerful if Micro-X decides to sell them directly. On the other hand a product like MBI could find attractive co-development partners such as Foster-Miller³ to increase the pace and penetration of international market access.
- **Discount rates.** We are using a discount rate of 11.6% to compute the net present value of risk-adjusted free cash flows. Micro-X's formal DCF discount rate is likely to moderate over the next few years if DRX Revolution Nano sales develop clear, hospital-level demand growth. If we were to value Micro-X using a cost of capital more indicative of larger scale medical device businesses (~8.5%) the valuation uplift could reflect target prices up to \$1.50 per share (risked present value).
- **Equity.** If profitability develops faster than we have forecast, then that would lift the valuation through earlier cash flow effects and by protecting shareholders from unnecessary equity dilution.

Valuation catalysts

We expect the Micro-X share price to increase as a function of DRX Revolution Nano sales growth, development progress with ROVER and MBI

- **Quarterly business updates and NANO sales progress.** Micro-X provides quarterly updates and these will be the primary medium through which progress can be monitored.
- **Development progress with ROVER and MBI.** Micro-X may be in a position to report positive demonstration results from these projects over the course of 2017. The firming up of these commercialisation plans should also be well received by the market.
- **US X-ray reimbursement landscape changing to favour digital radiography.** Medicare reimbursement changes in the US from 2017 favour the adoption of digital radiography (DR) which could be a driver of DRX Revolution Nano adoption⁴. The actual impact of the change is still uncertain but this is a key change to monitor in the US radiology market over the next 12-18 months.

³ Foster-Miller is a leading manufacturer of remotely operated military robots.

⁴ Beginning in 2017, US Medicare reimbursement of the technical component under the Physician Fee Schedule and the Hospital Outpatient Prospective Payment System will be reduced by 20% to providers submitting payment claims for film-based X-rays; CR-based X-rays will be reduced by 7% from 2018 to 2022 and then increase to a 10% reduction in 2023. The law applies to outpatient radiology services delivered in hospital outpatient departments, free-standing imaging centres and physician offices. The expectation is that private payers will follow Medicare. Critical access hospitals are unaffected.



Financials

Revenue model

Table 4: Summary of our sales and earnings forecasts FY17-23e

INCOME STATEMENT FORECASTS							
	FY17e	FY18e	FY19e	FY20e	FY21e	FY22e	FY23e
UNIT SALES	90	425	580	793	1,017	1,241	1,342
DRX Revolution Nano	90	410	525	678	827	1,011	1,061
Other devices	-	15	55	115	190	231	281
- unit growth	n/a	372%	36%	37%	28%	22%	8%
PRODUCT REVENUE	3.5	16.6	28.7	49.7	76.9	93.4	106.9
GROSS PROFIT	0.8	4.1	10.2	21.6	36.3	44.1	51.3
- gross margin	6.6%	20.4%	28.8%	43.3%	47.3%	47.2%	48.0%
R&D tax rebates	8.3	3.7	6.8	-	-	-	-
R&D expense	(11.0)	(20.0)	(10.0)	(10.9)	(11.9)	(13.0)	(14.1)
Other opex	(2.7)	(3.3)	(3.8)	(5.0)	(7.1)	(8.2)	(9.5)
EBITDA	(4.6)	(15.4)	3.1	5.7	17.3	22.9	27.7
- margin	n/a	n/a	9%	11%	23%	25%	26%
EBIT	(5.2)	(16.3)	2.1	4.7	16.2	22.0	26.9
- growth	n/a	n/a	n/a	119%	248%	35%	22%
- margin	n/a	n/a	n/a	9%	21%	24%	25%
Net interest	(0.1)	0.0	0.0	0.0	0.0	0.1	0.2
PBT	(5.3)	(16.3)	2.2	4.7	16.3	22.1	27.1
Tax	-	-	-	-	-	(0.6)	(6.8)
Reported NPAT	(5.3)	(16.3)	2.2	4.7	16.3	21.5	20.3
Normalised EPS (cps)	(4.1)	(10.2)	1.2	2.6	9.1	12.1	11.4
- growth				nm	246.4%	32.2%	-5.6%

Source: Wilsons

Commercialisation agreement with Carestream

In Aug-16 Micro-X and Carestream signed definitive agreements under which Micro-X will supply the DRX Revolution Nano to Carestream for exclusive distribution world-wide. The initial term is for five years with an option for annual renewal thereafter. The financial details of the agreement are not disclosed. For simplicity we have modelled a fixed transfer price for units sold by Micro-X to Carestream, denominated in USD. We understand that the agreement places no minimum ordering obligations on Carestream.

Sales assumptions

- **DRX Revolution Nano.** Micro-X management has guided towards ~300 unit sales in its first calendar year (2017). We understand that Carestream currently sells more than 1,000 of its DRX Revolution range of mobile X-ray units per annum. Our medium-term forecast has Micro-X supplying more than 1,000 Nanos to Carestream by FY22 implying a substantial swapping out of the incumbent device.
- **ROVER.** Management estimates another ~10 months of R&D before this product can be made available. We understand that this product will also come under the Carestream agreement and carry a slightly higher average selling price. Independently of Carestream, Micro-X will target the ROVER towards the Australian Defence and associated markets with Micro-X potentially acting as a primary contractor.
- **MBI.** Management estimates another 18 months of R&D before market access can be pursued. Guidance implies an annual market potential of ~\$50m for the MBI which may be pursued independently or via partnership with specialist defence manufacturer.



Gross margins

Gross margin expansion should be a key investment theme for Micro-X over the next five years as its DRX Revolution Nano business achieves scale improvements and potentially higher margin ROVER and MBI are brought through the income statement. Micro-X is benefiting from the “ex-Holden” manufacturing expertise it has employed – already describing and measuring unit manufacturing times in terms of minutes. Our assumptions see group gross margin developing towards 50% over the forecast period.

- **DRX Revolution Nano.** We estimate a manufacturer’s margin of between 20% and 30% for NANO as a piece of capital equipment. Our numbers do describe a scale benefit to margin developing with volume. The Tonsley facility is now equipped to produce up to four units per day if required, on a five-day single-shift roster.
- **ROVER.** Although still at concept stage, Micro-X is contemplating a contracting model for ROVER, covering the X-ray units, detectors, product support and servicing. We are modelling at ~US\$200,000 as the all-in price of a ROVER unit with slightly higher input costs compared to NANO. ROVERs may also be supplied to Carestream under the Nano agreement under fixed transfer pricing.
- **MBI.** Management believes that prices of ~US\$300,000 per unit may be achievable. We are modelling US\$250,000 per device. Margins will depend on whether Micro-X develops its own robotic platform and communications hardware to complement its X-ray sources and detectors. Alternatively, Micro-X could source “off the shelf” robotics from manufacturers such as Icor Technology or Foster-Miller.

Operating and other expenditure

- **Significant R&D investment planned.** Management estimates another \$4m to \$6m is required to bring the ROVER product to market. In addition, another \$10m to \$15m investment may be required to finalise the MBI product. We have these expenditures phased over the FY17-19 period. Afterwards, we estimate a baseload R&D investment growing from ~\$10m per annum to support the existing business and explore other applications of the technology.
- **SG&A.** We estimate the cost of operating the manufacturing site (staff, admin costs) as ~\$2.7m in FY17 and model that growing with the business. The Tonsley site is modular in its design and has plenty of leased space for future expansion. From FY19 we also introduce sales and marketing expenses, at this point assuming independent commercialisation for both ROVER and MBI.
- **Sub-royalties.** We understand that modest flat-rate sub-royalties are payable to XinRay in respect of future MBI net sales revenue.
- **D&A.** Generally, we assume that depreciation runs at ~10% of the prior period capital expenditure. The FY16 accounts record a ~\$2m intangible relating to Carestream’s contributions to the development of NANO. Micro-X expects to amortise this amount over a five-year period from product launch.
- **Interest expense.** Micro-X recently drew down \$2.6m debt funding under an agreement with the SA government. Interest expense is 5.75% pa and we have the debt being repaid in early FY18.
- **Tax.** Micro-X reported \$21m in accumulated net operating losses as at the end of FY16 which may be applied to future assessable pre-tax income. We are forecasting that Micro-X will increase its accumulated net loss to ~\$40m by FY19. Profitability should exhaust the operating losses by the end of FY21. We have assumed a long-term effective tax rate of ~25% from FY22.

Cash flow

A summary of our cash flow forecasts are provided in the table below.

Table 5: Summary of cash flow forecasts FY17-23e

A\$m							
	FY17e	FY18e	FY19e	FY20e	FY21e	FY22e	FY23e
EBITDA	(4.6)	(15.4)	3.1	5.7	17.3	22.9	27.7
Working cap and other items	(1.9)	(3.7)	(2.0)	(3.2)	(2.2)	(3.2)	(2.9)
Net interest paid	(0.1)	0.0	0.0	0.0	0.0	0.1	0.2
Tax	0.0	0.0	0.0	0.0	0.0	(0.6)	(6.8)
Operating cash flow	(6.6)	(19.1)	1.1	2.5	15.2	19.3	18.2
Conversion of EBITDA (post tax)				44%	88%	84%	66%
Dividends paid	-	-	-	-	-	-	-
Cash flow after dividends	(6.6)	(19.1)	1.1	2.5	15.2	19.3	18.2
Capex	(0.7)	(1.0)	(1.2)	(1.4)	(1.7)	(2.1)	(2.5)
Cash flow for growth projects	(7.3)	(20.1)	(0.0)	1.1	13.5	17.2	15.7
Other investing	-	-	-	-	-	-	-
Surplus/(deficit) cash	(7.3)	(20.1)	(0.0)	1.1	13.5	17.2	15.7
Equity issued	15.0	15.0	-	-	-	-	-
Debt issued (repaid)	2.6	(2.6)	-	-	-	-	-
Cash	14.5	6.8	6.8	7.9	21.4	38.6	54.3
DPS (cps)	-	-	-	-	-	-	-
Debt balance	2.6	-	-	-	-	-	-

Source: Wilsons

- **Working capital.** It will take time for Micro-X's working capital profile to take shape but we are allowing for an annual capital investment of ~\$2-4m in supporting the early growth.
- **Capex.** We estimate maintenance capex of between \$750K and \$1m per annum as Tonsley develops and grows over FY17-19. We have allowed for continued expansion at that site to accommodate new products from R&D.

Table 6: Forecast working capital investments supporting sales growth

A\$m								
	FY16	FY17e	FY18e	FY19e	FY20e	FY21e	FY22e	FY23e
Receivables	8.8	10.5	14.0	16.0	17.0	18.7	22.5	25.6
Inventory	0.0	1.1	3.3	4.9	6.3	10.5	13.0	15.0
Payables	(6.0)	(8.0)	(10.0)	(11.0)	(12.0)	(15.4)	(18.5)	(20.8)
Other	0.0	(1.1)	(0.0)	0.6	(1.8)	0.4	(0.1)	(0.1)
Net working capital	2.8	3.6	7.3	9.9	11.3	13.8	17.0	19.8
- yoy growth	n/a	30%	101%	36%	14%	23%	23%	17%
- as % of net revenue	n/a	105%	44%	34%	23%	18%	18%	19%
Cash investment in working capital	(2.8)	(1.9)	(3.7)	(2.0)	(3.2)	(2.2)	(3.2)	(2.9)

Source: Wilsons



Balance sheet and returns

Table 7: Forecast balance sheet development FY17-23

BALANCE SHEET AND RETURNS					
	FY17e	FY18e	FY19e	FY20e	FY21e
ASSETS	38.6	36.7	39.9	45.6	65.3
Cash	14.5	6.8	6.8	7.9	21.4
Other current assets	14.5	19.8	22.5	26.3	31.5
PP&E	0.5	1.0	1.5	2.3	3.4
Intangibles	9.1	9.1	9.1	9.1	9.1
LIABILITIES	10.6	10.0	11.0	12.0	15.5
Debt	2.6	-	-	-	-
Other liabilities	8.0	10.0	11.0	12.0	15.5
EQUITY	28.0	26.7	28.8	33.5	49.8
NPAT	(5.3)	(16.3)	2.2	4.7	16.3
ROA				10.3%	24.9%
ROE				14.0%	32.7%

Source: Wilsons

- **Debt.** In Aug-16 Micro-X executed a loan facility agreement with the South Australian Government Financing Authority. The SA government's commitment is for up to \$3.0m with an agreed interest rate of 5.75% per annum paid monthly in arrears. Micro-X confirmed a \$2.6m draw down which is repayable at the end of FY17.
- **Equity.** Micro-X raised \$20m in its IPO at \$0.50 per share. We assess that the business will need additional equity financing over the next three years to support Carestream's launch and to have more certainty in bringing higher margin products to market.
- **Strategic investment in XinRay.** Following IPO, Micro-X invested a further US\$4.0m (A\$5.7m) to take its ownership of CNT partner from 13.3% to 30.0% valuing XinRay at ~US\$21m. Under the terms of the Subscription Agreement Micro-X holds an option to increase its equity ownership of XinRay to approximately 40.0% by Dec-16. The FY16 accounts record a book value of A\$9.0m for the XinRay shareholding. Xinray's profits and losses will be accounted for using the equity method.
- **Returns.** We assess longer-term ROA and ROE approaching attractive levels (25% and 35% respectively).

Appendix



A.1 Business overview

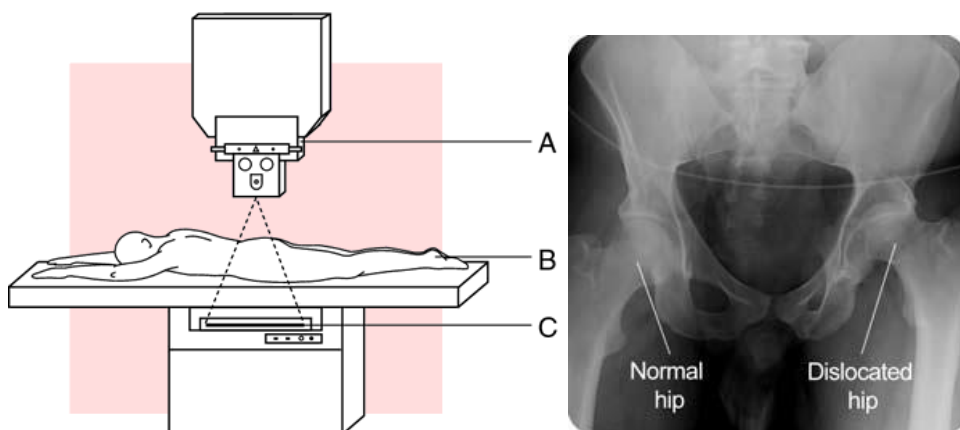
Introduction

Micro-X Limited is an Australian developer, manufacturer and seller of miniaturised X-ray equipment, based South Australia. The company is combining in-licensed intellectual property with its own in-house R&D and industrial design capabilities to develop ultralight, mobile X-ray equipment for medical and security applications. The first product is a mobile X-ray unit called DRX Revolution Nano, which will be marketed worldwide by Carestream Health. To our knowledge this is the first time an X-ray source based on carbon nanotubes (CNTs) has been made commercially available. CNTs are an emerging technology for generating X-rays with lower heat and power requirements.

Technology summary

Since the discovery of X-rays in 1895, the technology behind conventional X-ray sources remains relatively unchanged. Most X-ray sources are based on “thermionic” emission where a filament (cathode) is heated to high temperature in a vacuum tube to generate a flow of electrons. Electrons are accelerated by high voltages towards a tungsten “anode” target to produce X-rays on impact. X-rays are differentially absorbed by soft tissue and bone – thus enabling the visualisation of internal structures.

Figure 2: A source (A) beams X-rays through a patient’s body (B) towards a detector (C). The differential absorption properties of soft tissue and bone enable visualisation of internal structures

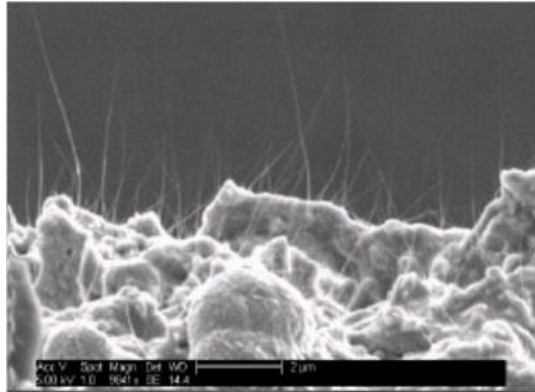
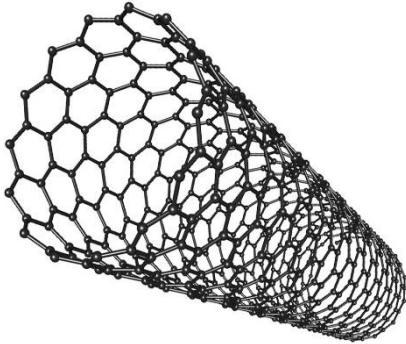


Source: Wilsons

Field electron emission using carbon nanotubes has emerged as a promising alternative means of generating precisely controlled electron beams. The applications of X-rays have continued to increase in terms of specialised medical applications (computed tomography, tomosynthesis, radiotherapy); and sophisticated security inspection equipment. The demand for smaller, lighter, safer and cheaper X-ray sources is high. Thermionic X-ray technology is limited by its slow response times (heating times) and large physical size. Field electron emission is the chief means by which X-ray source production is being miniaturised.

Carbon nanotubes can emit electrons at room temperature, enabling low-power (cold cathode) X-ray sources. Micro-X’s technology partner and investee XinRay Systems leads the field in producing ultralight X-ray sources based on carbon nanotubes (CNTs). Carbon nanotubes are long, hollow cylindrical structures that are among the best performing electron emitters known to science. Where conventional X-ray technology uses heat energy to extract electrons from metal cathodes; CNTs emit electrons when an electric field is applied at room temperature. CNT X-ray sources offer a number of significant benefits. Functionally, this technology provides near-instantaneous emission with very precise control. Practically, they can be operated at lower power, requiring smaller power sources and batteries.

Figure 3: Stylised (LHS) and actual (RHS) depictions of carbon nanotubes



Ideal CNT field emitters are long, hair-like projections

Sharp, whisker-like CNTs emit at significantly lower potentials compared with the same material that has adopted a planar morphology

Source: XinTek, Parmee (2014)⁵

DRX Revolution Nano

A mobile X-ray unit weighing just 90kg. Micro-X's first product is the result of collaborations with XinRay Systems, Carestream and the Alfred Hospital in Melbourne. It is the world's first fully-integrated digital mobile X-ray machine based on CNT field emission, which has enabled a ~25x reduction in the weight of the X-ray source and an 85% reduction in overall unit weight. The core of the unit is an array of vertically positioned CNT structures, whose electron emissions are controlled by an external voltage. No heat source is required.

Figure 4: XinRay X-ray source versus a conventional thermionic emitting X-ray tube. The XinRay unit weighs approx 1kg



Source: Micro-X

⁵ Parmee, R. J. et al. (2014) X-ray generation using carbon nanotubes. Nano Convergence 1:34.

Room temperature current generation explains how the impressive weight reduction has been achieved. The very small X-ray source means that the supporting structures to safely position the unit are both lighter and more flexible. A conventional X-ray tube weighs ~18kg and requires ~6kg of lead shielding. The XinRay source weighs 1kg and needs approximately 300g of shielding. Reduced power consumption has also allowed for a significant reduction in both the weight and size of the on-board power source and batteries. Weight reduction across the design has allowed Micro-X to omit a drive motor, bringing the finished weight down to just under 90kg – an ~85% reduction when compared to Carestream’s flagship product DRX Revolution.

Figure 5: DRX Revolution Nano in field testing at The Alfred Hospital



Source: Micro-X

Functionality. Mobile X-ray units today can be used for as much as 90% of the clinical spectrum and are increasingly popular in acute settings for workflow improvement and patient safety. The features of DRX Revolution Nano are consistent with many of the driving forces behind the broader, double-digit growth in the mobile X-ray equipment market.

- **Obvious ergonomic and work flow advantages.** The weight and size reductions improve manoeuvrability and operator/patient safety.
- **Functional preference for digital radiography (DR) and reimbursement changes.** Digital radiography is associated with better outcomes because it allows standard X-ray images to be acquired and easily distributed, viewed, interpreted and archived. From 2017 the Centres for Medicare and Medicaid Services (CMS) will cut reimbursement for X-ray examinations performed on analogue X-ray systems. From 2018, scans performed using computed radiography (CR) equipment will also see payment reductions.
- **Mobile, integrated DR at a compelling price point.** We understand that Carestream’s go to market strategy with Nano is primarily about increased market share in acute settings. The Nano is likely to cannibalise a portion of Carestream’s DRX Revolution business but at incrementally better gross margin. Increased installed base may have flow on effects for sales of related DR detectors and software.

Table 8: “Tier-one” digital mobile X-ray units compared

Manufacturer	GE	Siemens	Shimadzu	Agfa	Philips	Carestream	Carestream/MX1
Model	Optima XR200	Mobilett Mira	Evolution MX7	DX D100	Opta / M50	DRX Revolution	DRX R Nano
Image							
Estimated price	US\$180,000	US\$200,000	US\$130,000	US\$140,000	US\$120,000	US\$150,000	US\$90,000
Weight	453 kg	375 kg	390 kg	550 kg	195 kg	575 kg	< 90 kg
Dimensions, cm	194 x 56 x 123	157 x 60 x 113	158 x 56 x 122	198 x 67 x 136	no data	195 x 57 x 122	110 x 50 x 90
Drive motor	Y	Y	Y	Y	N	Y	N
Images per battery charge	150	200	200	140	no data	190	190
Battery recharge time	3h	3h	no data	3h	no data	4h	½ h

Source: Manufacturer data sheets

Wilson’s view: Carestream appears to be accessing DRX Revolution Nano at a price that gives it a lot of latitude for exploring pricing and market share. Market feedback suggests there could be initial scepticism that the unit can deliver what it says but that aside, the competitive features look potentially decisive. Our chief concern relates to the novelty of the CNT technology and how that might affect reliability and performance.

ROVER

The Australian Defence Force has contracted Micro-X to produce a concept demonstrator which is essentially another version of the DRX Revolution Nano for military deployment. The size of available first-tier mobile X-ray systems is less appropriate for outdoor handling and tented military medical environments. Yet the clinical scope for deployed instruments must also be as wide as possible given the high probability of encountering traumatic injury.

In delivering the ROVER, Micro-X's R&D projects seek to modify the Nano unit in the following ways:

- Higher powered X-ray source to enable more demanding scans which necessitate a longer path through the body (spinal scans, for example);
- Increase the ground clearance and preserve steady motion over uneven surfaces; and
- Other design modifications allowing stability and preserved image quality on sloping surfaces.

Increasing the X-ray tube power from 8 kW to ~12kW would give ROVER the power to address the full clinical range. Micro-X is also planning for independent commercialisation of ROVER outside Carestream (police, remote healthcare and emergency services operators).

Figure 6: Rover product concept at left, military hospital environment requires a greater clinical range



Source: Micro-X

Wilson's' view: Our forecasts for ROVER are relatively modest and at this stage only consider the military and related environments. One large national radiological procurement group we spoke to believed that mobile X-ray units powered to provide the full clinical scope could ultimately replace the large X-ray equipment currently installed in hospitals. The costs and lead times on room installations are increasingly difficult to justify; as are the base costs of engineering and support. Large animal veterinary application is another niche that ROVER could explore. Small analogue devices are currently popular with veterinarians but are limited to scanning the extremities.

MBI

X-ray imaging is also useful in acquiring information on objects suspected of being improvised explosive devices (IEDs). “Backscatter” X-rays are typically lower energy than those used in medical imaging. The X-rays are not powerful enough to pass through the object; and instead, are “scattered” and can be detected to constitute an image. Detectors therefore do not need to be placed behind the object, as is the case for conventional medical X-ray imaging. This new configuration is highly desirable for managing IEDs, which may be “booby-trapped” with mercury tilt switches or microswitches that cause detonation if the IED is moved in any way.

The product concept for MBI is for a “stand-off” backscatter X-ray imaging device that can be mounted on an explosive ordnance disposal (EOD) robot, which can be remotely guided to within a metre of the object. Once in place, the X-ray equipment can be controlled over the robot communications link or via wireless communication.

Figure 7: MBI product concept



The XinRay X-ray emitter is mounted on its vertical axis with two large-area detectors either side. This sub-assembly is mounted on a turntable to enable x-axis direction scanning. The X-ray power supply, receiver amplifiers and image transmission electronics will be co-mounted to form an integral unit which can be mounted to a suitable robotic platform.

Source: Micro-X

The Department of Defence paid Micro-X in 2013 to develop the product concept and prepare a project proposal, and subsequently a \$1.9m contract was awarded and signed in September 2015. We understand that Micro-X is planning its first prototype demonstration for the first half of 2017. We see this project as a key link between Micro-X and its partner XinRay. Separately, the specific emitter that forms part of MBI is also used in XinRay’s baggage imager (already in advanced development for application within security checkpoint screening throughout US airports).

Wilson’s view: We look forward to Micro-X’s first demonstrations of this product next year. While miniaturising the backscatter technology is a big step forward, a number of design challenges remain. It will be important to show that the equipment has sufficient dynamic range to examine fine wiring and circuitry detail and that it has the ability to zoom in and select particular regions of the image for more detailed investigation. Looking ahead, we see potential for this multi-beam, sweeping scanner to even detect buried objects.

Regulatory

Medical device pathway for DRX Revolution Nano and Rover. Mobile X-ray units are classified as Class II medical devices and are most often brought to market via the US FDA's 510(k) "premarket notification" regulatory pathway. Carestream Health will be responsible for filing this 510(k) application, seeking approval to market the DRX Revolution Nano in the USA. We expect the filing to occur at or around the RSNA meeting at the end of November. Similarly in Europe, Carestream's regulatory affairs team will take the product through the EU Medical Device Directive's Declaration of Conformity process and attain CE Marking. Micro-X is supporting these regulatory processes by supplying pre-market units and validation data.

Carestream will offer alongside sale of the DRX Revolution Nano its proprietary, FDA-approved portfolio of digital imaging capture detector plates and digital imaging software.

Manufacturing

Micro-X relies on outsourced suppliers for most of its sub-assembly components. The X-ray tubes are manufactured by XinRay in its facility in Raleigh (NC) but Micro-X will have the option to source them from NuRay, a manufacturing joint venture company (30% owned by XinRay) in Jintan once this facility comes on-line.

Most other sub-assemblies are sourced in Australia. DRX Revolution Nano units are assembled and tested at Micro-X's Tonsley facility, which is on-track to achieve ISO13485 accreditation early in 2017. Accreditation to ISO 9001, relevant to the MBI product, is planned in for 2018.

Competition and market characteristics

XinTek the leading exponent of CNT-based field emitters. Examining the peer reviewed academic and patent literature on CNT development reveals much competitive research in this space. More than 1,200 US patent applications have been filed on nanomaterial-based X-ray sources over the past five years. Despite the large amount of research, very few devices have made it to market⁶. XinTek's advantage appears to reside in their ability to manufacture "high aspect ratio" CNT devices – emitters featuring the long, thin upright structures that shed electrons at relatively low potentials. The ability to manufacture these with a uniform density and distribution appears to be unique. Cambridge X-ray Systems is another group that has demonstrated highly aligned, sub-micron patterned emitters. These units look likely to lead to nanoscale multi-source devices in the future but Cambridge appears to lag XinTech in terms of fabrication and scale.

Mobile X-ray market. We estimate that the installed base of mobile X-ray units in the USA to be between 12,500 and 13,000 units with a skew towards high acuity facilities. Assuming a turnover cycle of 7-10 years we estimate the annual replenishment market is up to 1,800 units per annum in USA. We expect annual sales to be higher than this, given that growth rates in mobile X-ray are twice that seen for conventional equipment. We are comfortable extrapolating the US estimate to understand a global replenishment market of ~2,500 to 2,750 per annum. Given that Carestream is understood to hold 40% market share, our long-term forecast of ~1,000 DRX Revolution Nano units per annum feels well supported.

Mobile X-ray pricing has been coming down through competition. Carestream is thought to have been a "price aggressor" in the mobile X-ray market since the DRX Revolution's FDA approval in 2012. On features, little separates the top-tier equipment supplied by GE, Siemens, Shimadzu or Carestream. New offerings from Shimadzu (Evolution MX7) and Philips (M50) may bring pricing another step down, perhaps to a point where other manufacturers may find it difficult to compete profitably. The economics of DRX Revolution Nano are very favourable towards Carestream, who shares in manufacturing cost savings brought about by Micro-X's optimisation and scale benefits. Carestream could cut industry pricing by 25% and still enjoy a higher gross margin on Nano than that earned elsewhere in their business⁷.

⁶ The CNT field has seen only limited involvement from large multinationals. Thales and Thales Electron Devices have been active for just over a decade, without any obvious success. Siemens showed substantial interest and was involved in the formation of XinRay Systems in 2007. Most of their interest resided in fast-scan airport inspection systems and they withdrew in 2011.

⁷ In 2015 Carestream recorded US\$2.1bn revenue and approximately 40% gross margin across the business.

A.2 Board and management

Board

Patrick O'Brien | Non-Executive Chairman

Mr O'Brien is managing director of Patrick O'Brien & Associates and a director of Red Rock Leisure, The Water & Carbon Group and O'Brien Capital. Mr O'Brien has more than 25 years' business experience including as an executive director with Macquarie Group where he led teams in corporate finance (Melbourne 1996-2005) and private equity (London 2005-2009). Prior to Macquarie, Mr O'Brien was a strategy consultant with McKinsey & Company and a lawyer with Minter Ellison.

Peter Rowland | Managing Director

Please see next section.

Dr Alexander Gosling | Non-Executive Director

Dr Alexander has been working in the field of process and product development and related research and development for 40 years. A founding director of Invetech and was part of the management team that led Invetech to a public listing (as Vision Systems) and then to its acquisition by Danaher Corp for \$800m. He works for Capstone Partners, a strategy consultancy specialising in technology commercialisation and the development of start-up companies.

David Symons | Non-Executive Director

Mr Symons has more than 15 years' experience in corporate strategy communications, private equity, investment banking and corporate management. He has previously held executive roles at ABN AMRO Capital, Macquarie Bank, Merrill Lynch and Promina Group. He is a non-executive director of ASX-listed Genera Biosystems Limited.

Richard Hannebery | Executive Director

Mr Hannebery has extensive experience in strategy development and its implementation, as well as commercialisation, including direct negotiation of key sales and distribution agreements in various markets with large multinational medtech and technology companies. He is a board member and the part-time chief executive of ASX-listed Genera Biosystems Limited and a non-executive director of Australian Continence Solutions Pty Ltd and its operating company Nurturecare (Aust) Pty Ltd.

Management

Peter Rowland | Chief Executive Officer

Mr Rowland worked in the engineering design, development and project management of innovative, high-technology military and scientific equipment in his early career in Scotland. In Australia, he ran an engineering design consultancy group, was director of business development at BAE Systems and then was managing director of ASX-listed Ellex Medical Lasers which designed and manufactured ophthalmic laser equipment.

Georgina Carpendale | Chief Financial Officer

Ms Carpendale has nine years' experience in the accounting profession, with three years' experience in a medical technology company. She joins Micro-X from Signostics Limited, where she most recently held the positions of Financial Controller and Company Secretary. Ms Carpendale is a Chartered Accountant with a First Class Honours Degree in Business specialising in Accounting. She started her career in Ireland before relocating to Australia where she worked as an auditor with BDO (previously PKF). Her experience includes capital raising, company re-structure, set up of international subsidiaries and shareholder relations.

Adam Williams | Production Manager

Mr Williams has 19 years of global best-practice manufacturing experience with the last 10 years being in leadership and management roles. With a background in automotive manufacturing he most recently held leadership positions with GM Holden Limited as production manager and industrial engineering manager. He has extensive experience in lean manufacturing and advanced manufacturing technologies. He has qualifications in both mechanical engineering and management to compliment his strong knowledge of manufacturing systems. His previous experience includes roles in quality and safety leadership and new model integration program management.

Anthony Skeats | GM – Program Manager (Nano)

Mr Skeats has 17 years' experience in global high technology product development across multiple sectors including telco, medtech, defence, fast moving consumer goods, consumer durables and industrial products. In his early career as an engineer in the UK he worked for Lucent Technologies, BlueArc and BOC Edwards. In Australia as a senior consultant and program manager for Invetech, he led the successful commercial delivery of several notable products including the award-winning Coca-Cola Freestyle™ and Philips VisaPure™. In his current role as program director for Hydrix, he specialises in regulated medical technology development strategy and leading multidiscipline development teams.

Alexander Blackburn | Quality and Supply Chain

Mr Blackburn worked in supply chain and quality engineering in the automotive manufacturing industry for seven years. He has held multiple positions with General Motors in both Australia and China in packaging engineering, supplier quality engineering and most recently was inbound supply chain manager for GM Holden Limited's vehicle plant in South Australia. He has experience managing large complex volumes of work, as supplier quality program lead for multiple vehicle programs including Holden's US Export program. Mr Blackburn is an engineer with an Honours degree from RMIT University and is currently studying part-time for an MBA with Australian Graduate School of Management.

Richie Bower | GM – Product Support

Mr Bower has 20 years' experience as biomedical engineer working on fixed and mobile X-ray and CT imagers. After studying Medical Imaging at Royal College of Medical Science in Shrivenham, Wilts, Mr Bower was lead engineer and project manager of the Royal Navy's state of the art amphibious sea hospital, consultant medical engineer to the Ministry of Defence for the Tri Service Joint Casualty Treatment Ship Project, GE Healthcare UK customer support manager for radiology picture archiving and communication systems and radiographic information systems, and radiology systems engineer for Carestream Health Australia.



Micro-X (MX1)

Business description

Micro-X Limited (MX1) is a developer, manufacturer and marketer of mobile X-ray equipment. Together with its technology partner XinRay, Micro-X has developed a novel, miniaturised X-ray tube based on carbon nanotubes (CNTs) allowing a 20-fold reduction in weight compared to conventional cathode X-ray tubes. Their lead product is a mobile X-ray unit called DRX Revolution Nano, which is expected to be commercialised from next year with international partner Carestream Inc. Follow-on products include medical and non-medical products for military and security-related deployments.

Investment thesis

With DRX Revolution Nano, Micro-X's partner Carestream appears to have both price and feature leverage over its competitors. We assess a substantial incremental gross profit incentive tied to the "Nano" which could become the flagship product in the mobile X-ray category. Outside the Carestream arrangement we are interested in the opportunity to leverage the CNT technology and industrial design capabilities into adjacent verticals.

Revenue drivers

- Demand for mobile, digital X-ray capabilities
- Growth in production capacity
- Commercialisation of new products

Margin drivers

- Average selling prices
- Yield and cost-out to gross margins
- R&D investment

Key issues/catalysts

- Sales traction in offshore markets with partner Carestream
- Domestic sales (co-marketing)
- Contract wins in the military and law enforcement verticals (MBI product)

Risk to view

- Carestream's performance as international partner
- Production and service variability during early stages of medical device launch
- Regulatory risks and marketing clearances

Balance sheet

- Q1FY17 net cash: \$2.9m excluding an \$8.3m R&D tax credit received in Nov-16

Board

- Patrick O'Brien
- Peter Rowland
- Dr Alexander Gosling
- David Symons
- Richard Hannebery

Management

- Peter Rowland – CEO
- Georgina Carpendale – CFO
- Adam Williams – Production Manager
- Anthony Skeats – GM Hydrix SA

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Disclaimers and disclosures

Recommendation structure and other definitions

Definitions at wilsonsadvisory.com.au/Disclosures.

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