Progressive EQUITY RESEARCH

THRUVISION

TECHNOLOGY

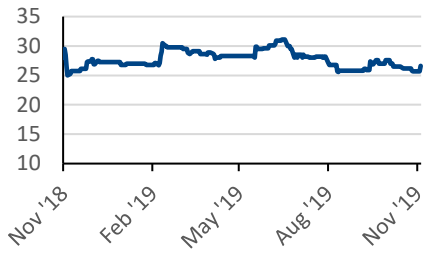
11 November 2019

THRU.L

26.6p

Market Cap: £38.7m

SHARE PRICE (p)



12m high/low 31p/24p

Source: LSE Data

KEY DATA

Net (Debt)/Cash	£9.4m
Enterprise value	£29.3m
Index/market	AIM
Next news	Interims Nov 2019
Shares in Issue (m)	145.5
Chairman	Tom Black
Chief Executive	Colin Evans
Finance Director	Adrian Crockett

COMPANY DESCRIPTION

Thruvision develops, manufactures and sells people screening technology to the global security market

www.thruvision.com

THRUVISION IS A RESEARCH CLIENT OF PROGRESSIVE

ANALYSTS

Gareth Evans

+44 (0) 20 7781 5301

gevans@progressive-research.com

Concept now proven!

Thruvision's ultra-sensitive 'body-heat' cameras can detect hidden items (guns, drugs, money or stolen goods) without intrusive or time-consuming searches, and without revealing personal anatomical details. The products are gaining acceptance in a range of key markets, and the group's financial performance is beginning to show the fruits of this labour. This note summarises the product, its advantages, and goes on to describe the markets which appear to hold most promise, and the growing evidence of success.

- **The product** Thruvision has developed a range of exceptional cameras which rely on minute differences in body heat to betray the presence of something other than clothing on the individual. The technology is capable of detecting relatively small objects hidden deep under clothing and the company is starting to expand its product range.
- **Advantages** The devices are able to detect both metallic and non-metallic items, without the need for the removal of clothing, and showing no personal body features to the camera operator. The subject can be moving, and does not need to be positioned in a "scanning zone" – the camera can simply monitor a stream of people as they walk past. These features combine to allow flexible and low-impact deployment and high throughput of search subjects.
- **Markets** Thruvision is working in a number of markets – in addition to the relatively obvious roles in Mass Transit, Aviation and Event/Location Entrance protection, the group is seeing significant success in Customs screening and Loss Prevention (checking staff members working in proximity to high value items). We describe some key attributes of these very different use cases and customer groups, and detail some of the evidence of recent success.

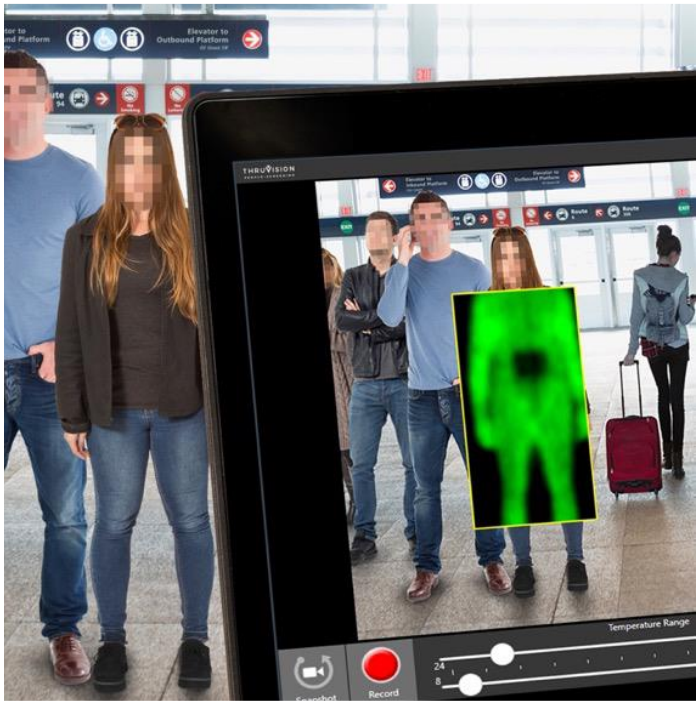
Thruvision is now, after many years of product development and sales channel maturation, seeing a significant level of demand arising in a number of geographies and markets. The product continues to evolve, reference sites are becoming more widespread, and the need for the solution is sadly as pervasive as ever. We await further developments in due course and expect to introduce financial estimates following Interim results towards the end of the calendar year.

Thruvision's product – how it works

The group specialises in a highly specialist type of 'body heat' camera, which is simply pointed at the person being screened. Human bodies naturally emit heat, and at the frequency Thruvision operates, clothing is transparent. Hidden objects, however, block this emitted heat, and it is this effect that the Thruvision camera uses to reveal the presence of a concealed object.

The cameras are entirely "passive" – they simply receive naturally-emitted body heat. Advanced sensor algorithms are employed in real-time to display any concealed item in an image super-imposed over the person being screened, allowing the camera operator to determine whether additional searching is warranted.

Visualising the threat



Source: Company information

The product is demonstrably safe (since it emits no particles/beams – it simply "looks at" the subject), it is relatively low power and portable, allowing it to be deployed rapidly and flexibly in different locations, or for temporary requirements.

Product range expansion represents a significant opportunity

As we note elsewhere, the flexibility of deployment is a key attribute of the Group's products and Thruvision is actively developing new products tailored to specific markets. For example, under contract to the TSA, it has developed a new product which is suitable for deployment at an outdoor military checkpoint. We understand that further new cameras are in development for other end-uses.

Thruvision's product – underlying technology

Terahertz energy comprises electromagnetic waves within the ITU-designated band of frequencies from 0.1 to 30 Terahertz (THz) and occupies a middle ground between microwaves and infrared light. Thruvision operates at 0.25 THz, a frequency selected for superior imaging performance as the wavelength at this frequency, 1.2mm, is long enough to enable it to pass through clothing without being blocked.

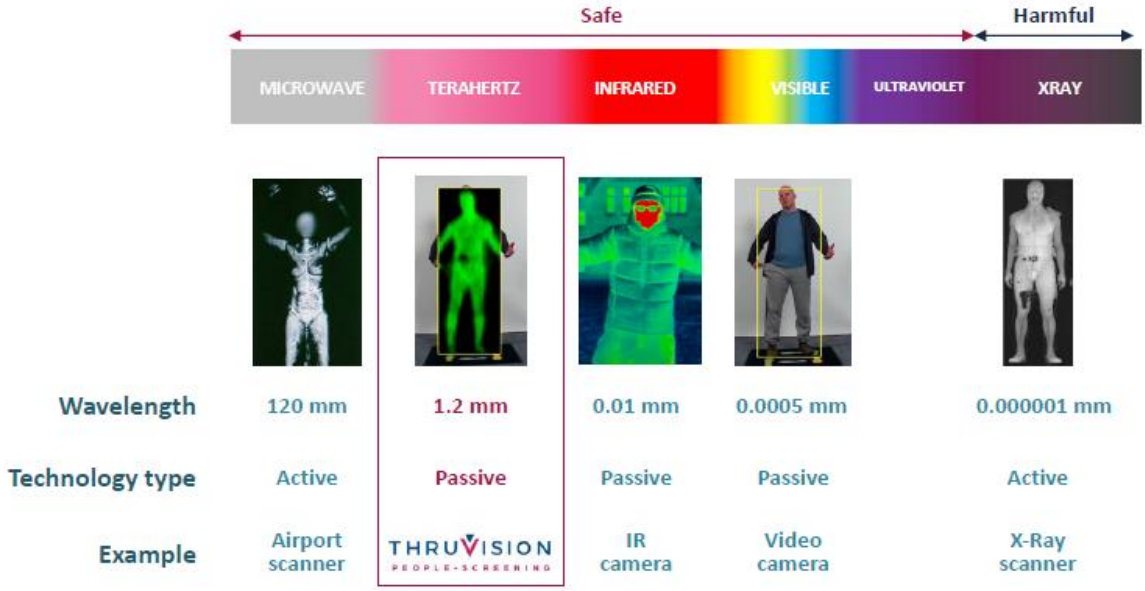
There are two key factors which allow Thruvision's Terahertz-based product to succeed where other systems struggle :

1) **The human body emits reasonably uniform levels of Terahertz energy from all areas of skin**

2) **This Terahertz energy can penetrate thin layers of materials (such as clothing) but is blocked by thicker objects (such as metal, plastic or folded paper).**

Therefore, by accurately sensing the relative levels of Terahertz energy coming from each part of a person's body, the presence (or more-often) absence of Terahertz emissions allows the algorithms to 'see' the presence of some unknown substance effectively blocking or altering the Terahertz emissions. The chart below shows how passive terahertz technology fits into the spectrum of other scanning technology.

Passive Terahertz Technology



Source: Company information

Patent protection

Thruvision's underlying technology was originally developed at the British Government's prestigious Rutherford Appleton Laboratory near Oxford. The company was spun-out with exclusive world-wide licences over British Government and European Space Agency patents, and these licences remain in place today.

Thruvision's product – advantages

The Thruvision camera range has a number of specific advantages over other technologies or scientific approaches. Some of these are "use-case specific" and are most relevant to particular market applications, and those are explained within each end-market section below. There are, however, a number of technical and logistical benefits of the system which are helpful across a wide range of scenarios, and we have listed a number of these features below:

- **100% safe to both operators and subjects** – because the system is in reality just a very advanced camera, it does not emit any particles or "irradiate" the subject in any way. The technology is known as "passive" and can cause no harm to the subject of the scan.
- **Totally respectful of privacy** – the system does not reveal anatomical details; hidden objects appear in certain colours – black or pink – but body features are completely indistinguishable; neither the camera operator nor anyone else involved is able to see intimate body parts. Some competing scanning technologies do reveal detailed body images, and laws are now in place that force manufacturers to use a privacy mask that stops this raw imagery being viewed but which introduces false alarms. Thruvision's cameras cause no such concern among customers.
- **Capable of scanning people on the move** – because the platform operates in real time, the camera operator sees a moving image, with hidden objects highlighted by colour. This is the case for both static subjects (in a "search" situation") and for subjects simply walking past (at an event, on public transport or in any high-footfall location).
- **Able to detect metallic and non-metallic items** - the system relies on minute variations in body heat emission. Both metallic and non-metallic concealed items can be detected - for example, metal guns or knives or non-metallic drugs, bank notes, ceramic knives or plastic explosive.
- **No requirement for removal of any clothing** – search subjects are not required to remove ANY clothing – the camera can sense hidden objects even through relatively thick layers of clothing, so coats and other heavy items cause no problem – again especially useful when scanning large numbers of people as they move past a fixed location.
- **Already approved for use** – one of the biggest barriers to adoption is normally approval by relevant safety and other regulators. Thruvision has been "vetted and approved" by the US Government's Transportation Security Administration (TSA) for surface transportation use following a successful two-year test and evaluation programme that finished in August 2018.
- **Already live in multiple customer settings** – Thruvision is in operational use in 20 countries. In the UK, household names like Next, JD Sports and Matalan use Thruvision for security screening staff leaving their warehouses at the end of a shift. International Customs Agencies including the US and Hong Kong use Thruvision for checking visitors for concealed contraband. Farnborough International Airshow used Thruvision at the 2018 Airshow to speed up security.

Market dynamics

Thruvision's products can be used in a number of end markets. We assess five of the main markets on the following pages, describing some of the relevant aspects of each, and giving a summary of what the group has achieved. These segments are:

- Aviation
- Customs
- Loss Prevention
- Mass Transit
- Entrances

Routes to market

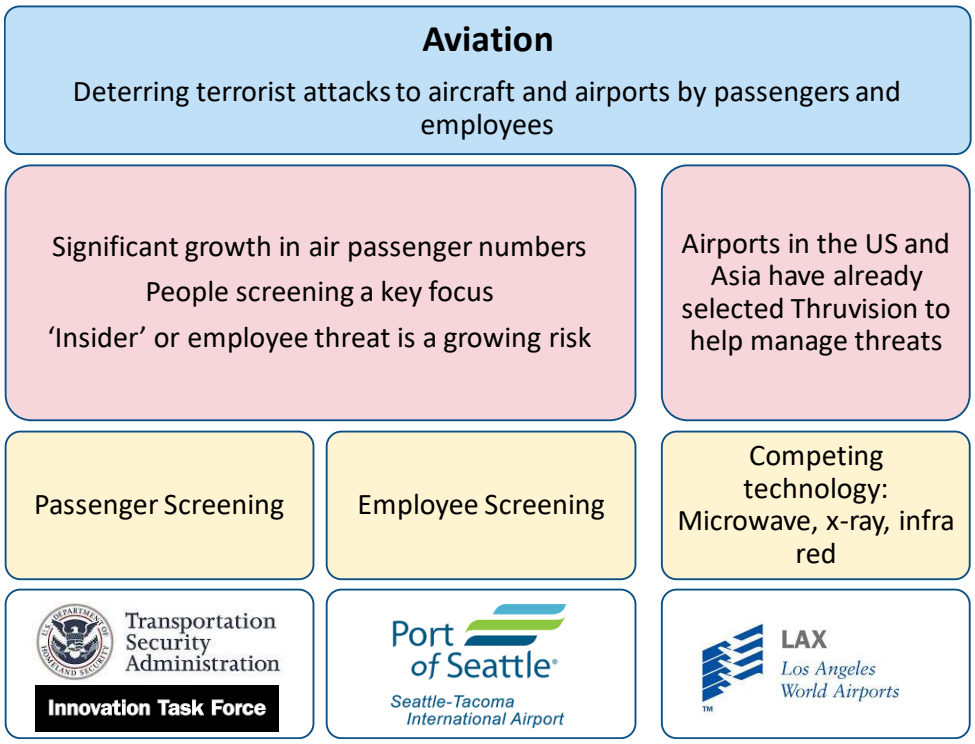
The product is relatively standalone, requiring little (if any) integration with other IT platforms. The main work is to optimise the surrounding area for best screening results, to install and commission the equipment, and train the operators. For this reason, Thruvision is capable of selling direct to end customers where this is the logical approach – currently the USA, UK and Australian markets are targeted on a direct basis. In other geographies (Middle East and Asia Pacific) the group works with reseller partners, paying away a modest margin as is commonplace across many industries.

Manufacture

The group manufactures the product in the UK (in Abingdon) and relies on a small number of highly specialist suppliers for some of the most complex components. Production capacity is up to 20 units per month at present, and a US partner has been contracted to ensure compliance with that market's preference for "Made in America" technology. This capacity seems adequate in the short term, given 2019 revenues of £6m were achieved on sales of 109 units (around 10 per month), but presumably the US partner adds to this capacity, and further expansion could be achieved at relatively low cost as demand hopefully grows in future periods.

Pricing

Different specifications and types of product carry different price points, but we understand that average price point across the product range is in the £50-60k (excluding sales taxes) range per unit, including accessories. Clearly, high-end versions with enhanced scanning capabilities will demand higher pricing, and bulk purchases of the entry models may attract bulk discounts.

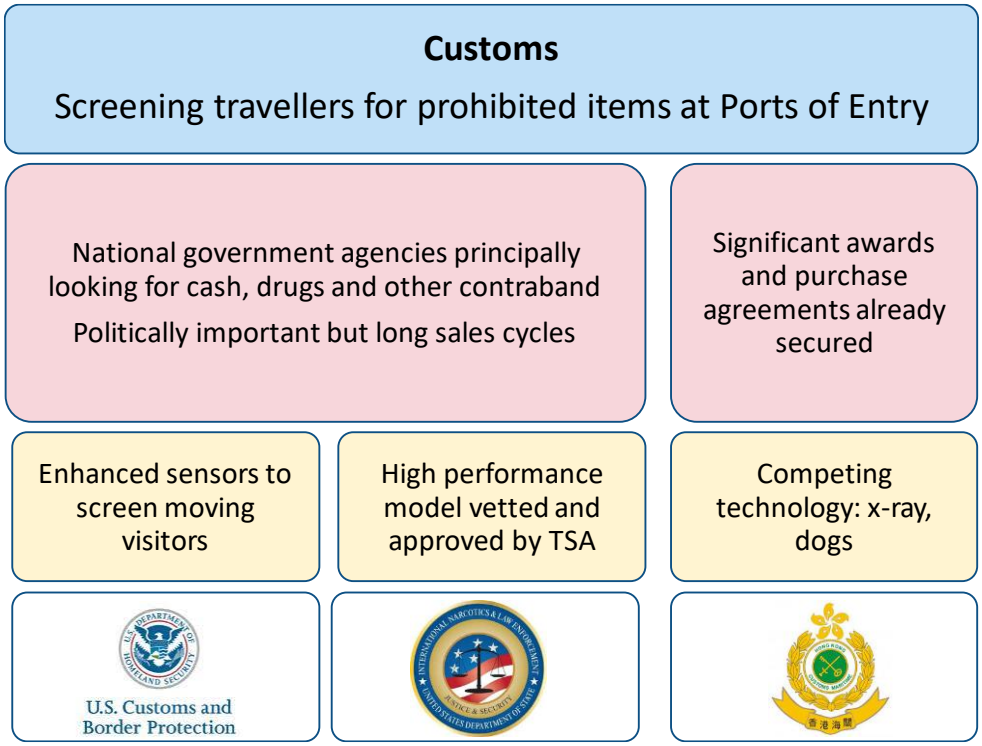


This is a well-established market and one which is a key focus for Thruvision. The company has had success here. Its current TSA approval allows it to be used to screen airport employees and it is currently working under contract to TSA to extend this approval to include screening air passengers. There are 400 airports in the US alone and the markets for passenger and employee screenings are significant.

The majority of travellers are infrequent users of airports and therefore require significant screening – generally by passing through an active millimetre wave body scanner. Employees necessitate high levels of regular screening as well. This must be balanced with operational requirements so the ability to screen employees efficiently is a crucial attribute for Thruvision's products.

The two most widely deployed technologies at airports are walk-through metal detectors and active millimetre wave body scanners. They do not address the full range of screening requirements that passive terahertz technology is able to supply. Walk-through metal detectors cannot detect non-metallic threats. They also require travellers to remove metallic items from their person prior to using the detector. This can result in false alarms and a subsequent physical, intrusive pat down. While Active Millimetre Wave Body Scanners can detect a wide range of concealed items, including non-metallics, they can have high false alarm rates, requiring extensive divestment procedures and secondary searches. They can therefore be slow with a maximum throughput of about 200 persons per hour. Further, they raise privacy and safety concerns because they use ionizing radiation. Both these forms of security screening are immobile, have a significant physical footprint, and require fixed power infrastructure for deployment.

Thruvision's technology can facilitate "virtual" pat downs for special needs travellers, improve security in the public, "pre-checkpoint" areas and screen employees. Crucially, it also facilitates high-throughput or "segmented" passenger screening to maintain a good flow of travellers through the various parts of the airport where security checks operate.



Thruvision is also well-established in this Ports of Entry Protection market. Its products are effective at checking travellers for concealed drugs or currency at Customs checkpoints. Its 'safe and respectful' screening technology is currently in service with eight Customs agencies around the world. Although sales cycles can be quite lengthy, as increasing numbers of clients sign up it becomes easier to market to potential new clients.

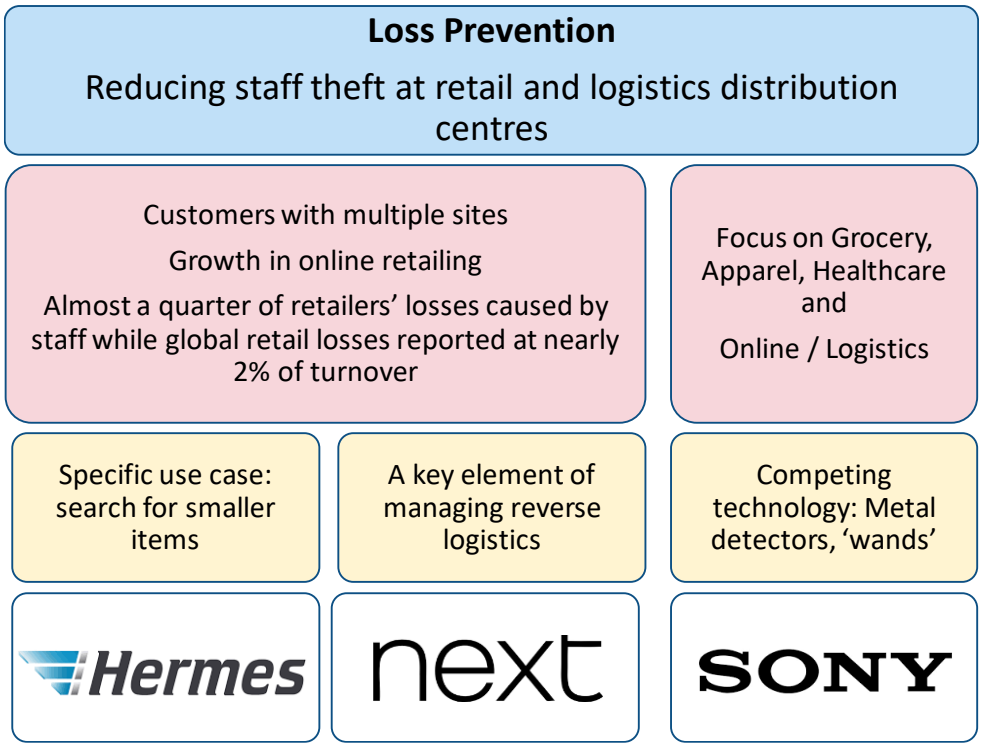
Thruvision's technology can detect all types of material that is hidden under clothing and passengers can be screened both inbound and outbound for contraband. It can also screen people for weapons, even detecting 3D-printed guns.

The flexibility of deployment of Thruvision's cameras is a key operational benefit to its clients.

Clients can use purpose-built concealments for Thruvision cameras which are generally used in fixed infrastructure environments with remote monitoring. For instance, it may be covertly deployed at Customs desks to screen travellers who are passing through the control point.

Alternatively, it may deployed overtly to screen passengers embarking or disembarking from an aircraft or ship. The Thruvision Tactical Deployment System is a high visibility system which is used for rapid, manned mobile screening operations and incorporates full battery power.

Thruvision cameras are also covertly deployed in baggage claim halls to screen passengers waiting for their bags. They are remotely monitored and are therefore often used in tandem with other security staff on the ground such as dog handlers. The above example may be concealed on a temporary basis in certain locations and can be housed in concealments which are specifically tailored to locations and operational requirements – for instance, in temporary airport signage.

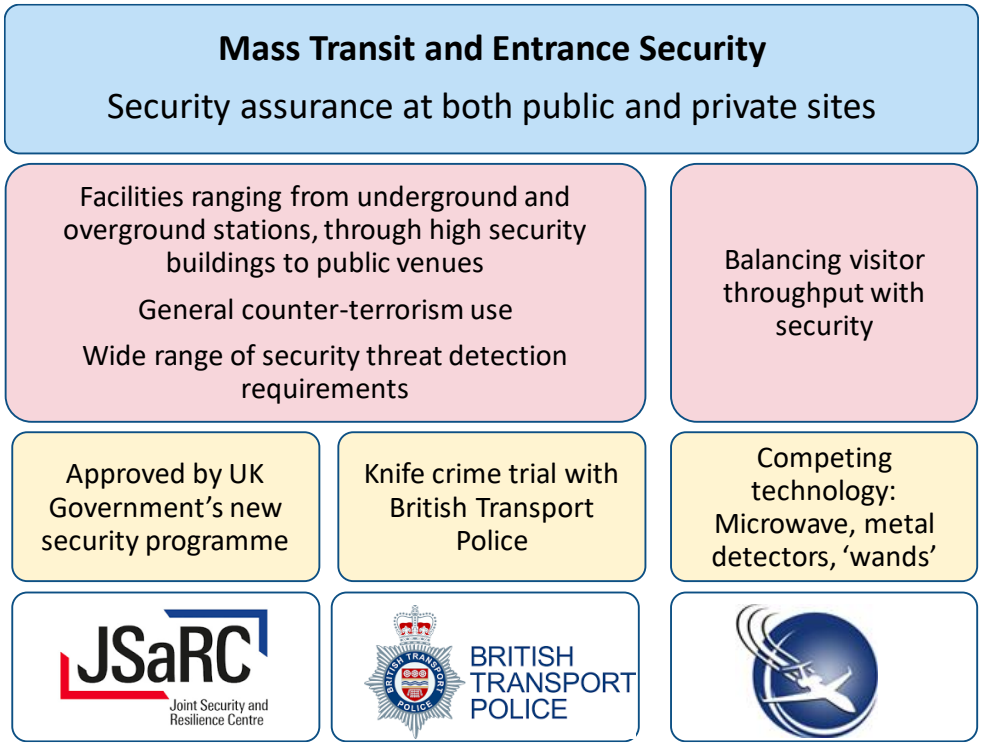


The Loss Prevention market has a different dynamic to the first two that we have outlined. As we note in the graphic above, losses suffered by retailers can represent a substantial cost and a significant proportion are caused by staff. For Thruvision, this particular market is represented by a focus on distribution centres – an area which has grown strongly with online purchasing.

There are, obviously, existing employee screening technology solutions that address this problem. However, there are many elements that have to be taken into account when screening employees with walk-through metal detectors or wands – not least the speed with which this can be done and the level of wand use which is deemed appropriate. There is clearly a balance that has to be struck between profit protection, employee management concerns, and day-to-day sales and operations.

Current employee security screening practices in distribution centres vary considerably depending on the type of business. Some may require full employee checks and divestment on entering and leaving the centre. Others may adopt more random approaches to detection of concealed items. The obvious flaw with using metal detectors is that they cannot detect non-metallic items and often operate at a reduced level of sensitivity to reduce false alarms and improve throughput.

Thruvision's technology can improve the ability of a distribution centre to prevent theft by employees. The sensitivity of its more recent cameras can detect smaller items where this is required. Its current experience is that scanning between 1 in 4 and 1 in 5 people seems to have sufficient deterrent to dramatically reduce "shrinkage" of stock. This can be achieved by random selection of employees to be screened. Wooden boxes may be used for employees to stand in to eliminate any significant levels of background Terahertz.



With terrorist attacks on transportation systems and public venues, the requirement to augment existing entry-point security systems is an increasing requirement. This essentially reflects a need to detect threats away from the more traditional security checkpoints. Thruvision is looking to implement solutions that are fast, safe and effective which balance the need to screen for concealed threats with the privacy and safety of those being screened.

As in the other markets discussed, Thruvision's detection products display a number of attributes that lend themselves fulfilling the requirements:

- They can detect non-metallic as well as metallic threats.
- They provide real time threat visualisation at a distance of up to 8 metres to allow security personnel to make decisions quickly in public venues or surface transportation.
- Reduces false alarms and provides the shape, size and location of the threat.
- High throughput: Thruvision can screen up to 2,000 people per hour
- Thruvision is lightweight and compact and does not require special power or fixed infrastructure.
- Thruvision has a significantly lower total cost of ownership than either airport body scanners or K-9 dog teams.

The effectiveness of the deployment of new technology to institute stand-off threat detection depends on how much a City or local authority is willing to invest. Currently, Asian countries are making more such investment than those in the west. Consequently, the region represents the most fruitful ground for Thruvision's systems at the moment – although it has done some work with the British Transport Police and is approved by the UK Government's new security programme.

Risks and challenges

Risk	Impact	Management action/comments
Failure to execute international expansion	Failure to develop relationships with customers and partners, failure to maintain appropriate governance and controls and failure to obtain export licenses and retain compliance with appropriate export control legislation. Increased working capital requirements.	The Group has a robust recruitment process in place. It has an international sales operation, retaining directly employed sales management in key territories and targeting key geographies and partners. The sales pipeline is monitored on a weekly to rectify any problems. Managers have responsibility for project delivery, cash collections. Governance and compliance is in place throughout the Group.
Dependence on Intellectual Property	It may be possible for third parties to obtain and use the Group's intellectual property without the Group's authorisation causing the Group to become involved in litigation which could be costly and time consuming. Claims by third parties.	The Group relies upon various intellectual property protections, including patents, copyright, trademarks, trade secrets and contractual provisions. Enhanced patent protection operates in key geographies. Where appropriate the Group will robustly defend third party claims if appropriate.
Competition	New products and services that better meet industry needs. Competitors respond more quickly to client requirements. Competitors with greater financial or technical resources.	Thruvision maintains a watching brief on competitors to enable the Group to react quickly to any change in circumstance or technical developments. The group works closely with its clients to ensure that existing products are being developed and utilised in new and innovative ways to meet client needs and achieve differentiation.
Availability of capital and cash flow	There is no assurance that additional capital will be available to the Company. The availability of long or short-term bank debt will depend on the Company's progress with stated strategy and trading prospects.	At 31 March 2019, cash of £9.4 million was available to the Group from its own resources. Management expected that the cash available would be sufficient to fulfil the short to medium term needs of the Group and that the Group is expected to become cash generative in the medium term.
Key personnel	Inability to attract and/or retain directors and senior management with the necessary skills.	The Group has a competitive remuneration policy which is aligned with Group objectives. A robust recruitment process seeks to ensure that the necessary skills are always available to the business.
Manufacturing capability	Loss of the facility or a significant increase in demand.	Where possible, subsystems are outsourced to third parties and a number of different manufacturing partners have been engaged. Additional manufacturing partners will be sought. The ability to manufacture ahead of planned levels was successfully tested in FY19.
Delivery	Failure to deliver to clients could damage the Group's reputation and affect future profitability.	All potential contracts are subject to risk assessment and a project plan is formulated to ensure that the Group is able to deliver the project in accordance with the contract terms.
Foreign business, political and economic risks	The successful penetration of overseas markets by the Group may take longer than the Directors currently expect. In addition, the Group is exposed to foreign business, political and economic (such as currency and interest rate) risks.	Prior to the acceptance of an overseas contract, a detailed review is undertaken to ensure the risks are identified and mitigated where possible. Translation movements are not formally hedged but the Group's policy intends to naturally hedge material transactions in foreign currencies.
Government spending	Continued pressures on Government spending within certain territories may materially and adversely affect the Group's business, operating results or financial condition. Longer sales cycles of some governments could adversely impact forecast sales in any given period.	It is the strategy of the Group to widen the client base, on a global basis, to diversify Group revenue whilst maintaining appropriate relationships with central government both within the UK and in other territories.
System failures and breach of security	The Group's computer, communication and information technology systems are vulnerable to damage, breakdown or interruption from events which are beyond the Group's control.	All systems are backed up on a regular basis and appropriate investment is made in the infrastructure of systems within the Group to maintain appropriate standards of integrity and security.

Source: Company information

Directors

Tom Black, Executive Chairman

Tom was appointed a Director on 8 February 2010 and is the Executive Chairman of Thruvision Group plc. Prior to joining the company, Tom spent over 20 years with Detica Group plc, where he led the management buyout in 1997 and the Group's flotation on the London Stock Exchange in April 2002. He then oversaw the acquisition of Detica by BAE Systems in 2008 for £538 million. He is currently a Non-Executive Director of Adept 4 plc, and Herald Investment Trust plc and a trustee of the Black Family Charitable Trust. Tom is a member of the Remuneration, Nomination and Audit Committees of Thruvision Group plc.

Colin Evans, Chief Executive Officer

Colin was appointed a Director on 8 February 2010 and leads the engineering, operations and sales teams at Thruvision. Colin has 22 years' experience working in the defence and homeland security industry, delivering complex technology systems, managing relationships with other technology partners and system integrators, and optimising internal delivery processes. Prior to joining Thruvision, Colin spent 15 years with Detica Group plc, where he was Group Chief Operating Officer

Adrian Crockett Finance Director

Adrian was appointed a director on 1st May 2019. Prior to joining Thruvision, he was CFO at Venture Life an AIM listed consumer healthcare company. Before this he held senior financial management roles at Abbott Diabetes Care Ltd, a division of the US Healthcare company, Abbott, GSK, Novartis and Chiron corporation (prior to acquisition by Novartis), and Powderject pharmaceuticals (prior to acquisition by Chiron). Adrian has a BAcc honours degree in accountancy from The University of Dundee and is a Chartered Management Accountant.

John Woollhead, Company Secretary

John was appointed Company Secretary on 13 April 2010 and is responsible for not only the core Governance and Company Secretarial function within the Group but also manages the HR, Insurance, property and a number of other functions. John qualified as a Chartered Secretary in 1987 and has previously acted as Company Secretary to Eve Group plc, Peterhouse Group plc and Detica Group plc. John is Secretary to the Board and acts as Secretary to the Board Committees.

Paul Taylor, Non-Executive Director

Paul was appointed a Non-Executive Director on 1 April 2012. He is a qualified Certified Accountant who started his career at Price Bailey Partners in 1986 and has subsequently served in a number of senior finance roles. Paul has spent most of his career at AVEVA Group plc and served as Group Finance Director from March 2001 to December 2010. During this period, revenues increased from £28 million to £164 million, resulting in pre-tax profit of £63 million and a market capitalisation of over £1 billion. He is currently Non-Executive Chairman and Chairman of the Audit Committee of IQGEO Group plc, Non-Executive Director and Audit Chairman of Frontier Smart Technologies Group Limited, and a Trustee of the CAD Centre Pension Fund. Paul is Chairman of the Audit Remuneration and Nomination Committees of Thruvision Group plc.

Summary and conclusion

Thruvision has a world-leading technology which allows customers to search subjects simply by observing body heat, through clothing and at distance.

The product range offers major advantages over other methods of scanning or searching, notably:

- Providing high throughput scanning, using totally safe technology and without detailing personal anatomical features
- Detecting both metallic and non-metallic objects, allowing users to scan for items ranging from firearms and knives through plastic and other explosives and to drugs, large amounts of cash etc.
- Relatively small physical size of the camera and operator units, allowing deployment in compact locations, and/or easy movement to a specific event or high-risk location

For these reasons, the group is beginning to see a steady build in the number of products sold, and the level of referenceable client sites. Progress with the US Government's TSA and Customs and Border Protection is particularly relevant, and bodes well for additional uptake in these geographies and beyond.

Thruvision markets the platform directly in the USA, UK and Australian markets, and largely through partners and resellers in Asia-Pacific and the Middle East. The average revenue per unit is in the £50-60k range, including accessories often bundled with the sale, although specific use cases or configurations can take the ticket price significantly higher (for example to provide additional detail within images, or to expand the field of scan).

Clearly, H1 figures due in late November will provide additional detail on the rate and style of progress being achieved, and we expect to produce formal estimates and forecasts at that time. For now, we continue to watch the performance of the business and await further newsflow in terms of both customers/partners and reference sites to demonstrate ongoing traction and delivery.

Progressive EQUITY RESEARCH

11 November 2019

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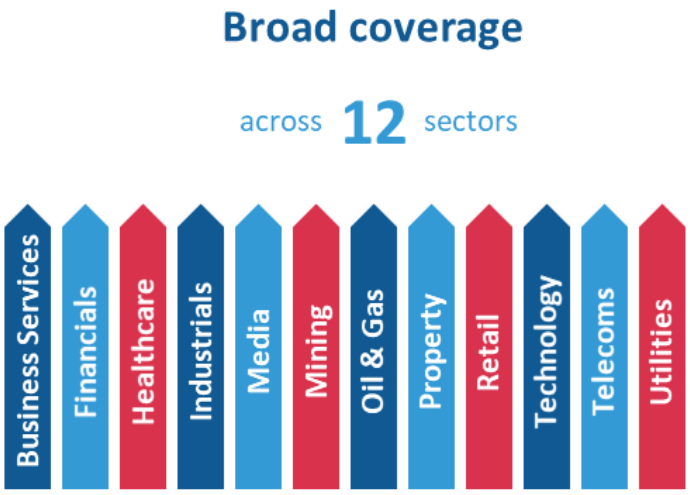

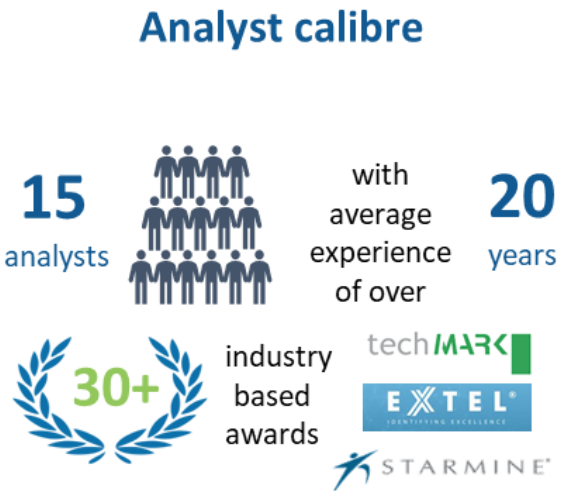

To arrange a meeting with the management team, or for further information about Progressive, please contact:
Emily Ritchie
+44 (0) 20 7781 5311
eritchie@progressive-research.com