impact vision

A New Standard for
Food Quality and Safety

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Our mission is to build a more transparent and secure global food system, using hyperspectral technology

- **1/3 of all food produced globally is wasted = 1.3 billion tonnes annually**

- **Food fraud costs the global economy upwards of $40bn**

- **The global food industry is yet to benefit from the explosion in digital technologies**

- **For food producers and retailers, quality control involves manual, time consuming, and destructive processes**

- **Waste in the fish sector could be as high as 4% of turnover, arising from filleting of finfish, secondary processing and rejection of products**

ImpactVision's Unique Value: Hyperspectral Software

Hyperspectral image + ImpactVision's classification software = **Actionable insights:** Reduced cost, Reduced risk, Reduced waste, Increased revenue

How ImpactVision's System Works

- Hyperspectral sensors look at objects using a vast portion of the electromagnetic spectrum

- Certain objects leave unique spectral signatures or 'fingerprints' in the electromagnetic spectrum

- The 'fingerprints' enable identification of chemical information related to the scanned food materials (fish)

- ImpactVision works with suppliers to match the 'fingerprints' with specific quality parameters, for example fish freshness

- ImpactVision then uses machine learning tools to identify, classify and understand the 'fingerprints' of food products and associates them with established quality parameters in a real-time and non-invasive way

- This removes subjectivity and provides 100% coverage with consistent results that provides actionable information
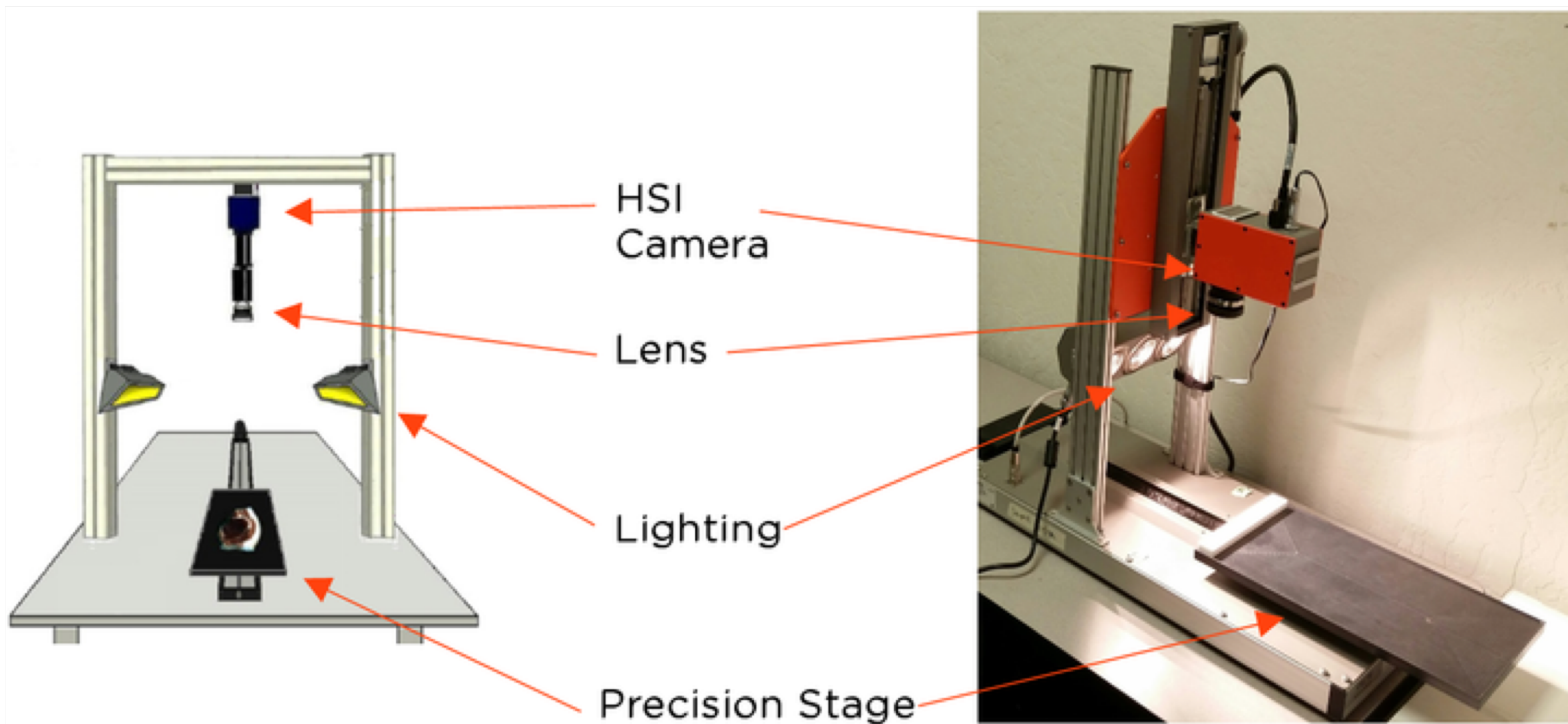
Selected for the first cohort, to pilot ImpactVision's technology in Vigo, Spain with industry partners.

**Initial pilot will be a calibration study:**

200 – 300 fish samples + Defined parameters

3 weeks time required to build training set of data

Report outlining accuracy (R2) of algorithms

Process for commercializing one system

- **Fish freshness** is one of the most important attributes for assessing the quality of fish, either for direct consumption or as raw materials

- This critical index of freshness influences safety, nutrition, availability and edibility which result from physical, chemical, biochemical and microbiological processes

- Hyperspectral imaging can differentiate fresh fish from previously frozen-thawed fish in the region of 400 – 1000nm + chemometric data-mining methods

- Integration of this technology has great potential for on-line detection, and development of a multispectral imaging system, which uses the seven or eight optimal relevant wavelengths is also feasible and cost-effective
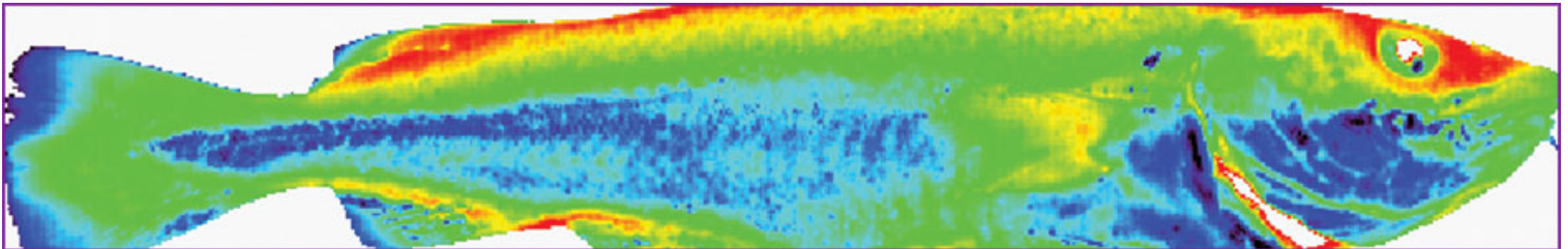
A hyperspectral image of a fish, highlighting areas of blood oxidization
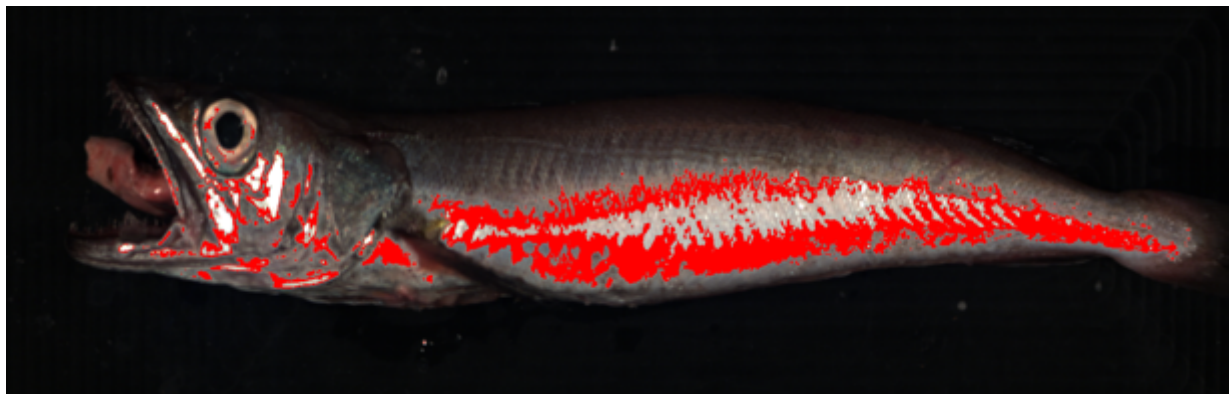
The colored areas on the fish indicate where spectral data has been collected, which is then used to classify the freshness category to which the fish (hake) belong i.e. Extra, A or B
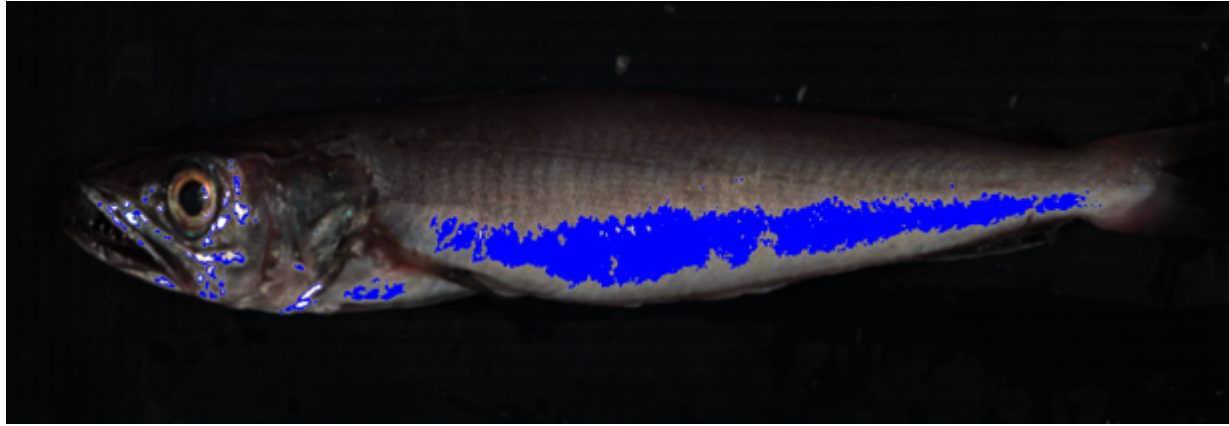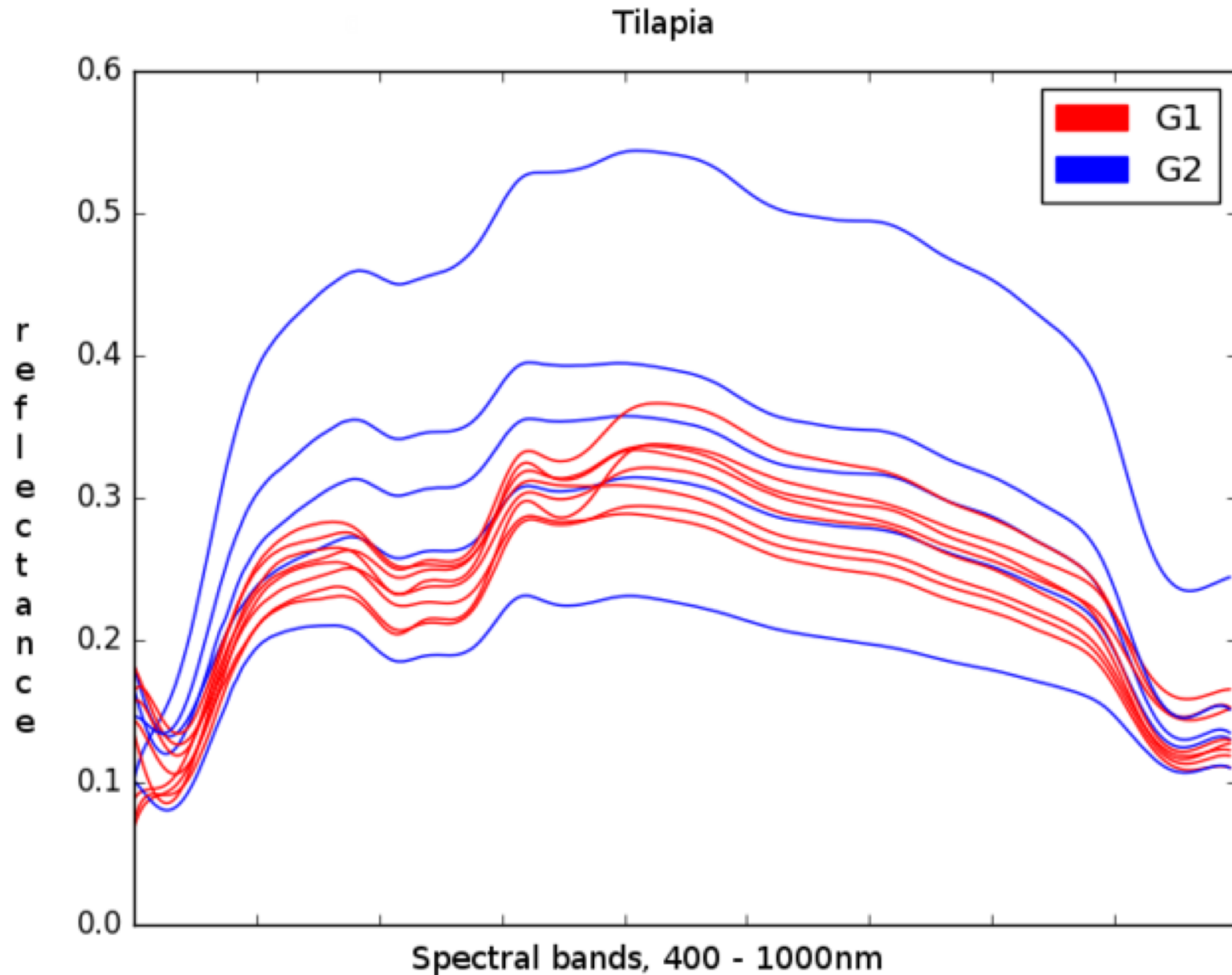

EXTRA
Most fresh fish

A
2nd most fresh

B
3rd most fresh

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Tilapia

- **Results:** mean spectra from pixels in the center of each piece were extracted

- **G1** = mean spectra from fresh fillets
- **G2** = mean spectra from frozen-thawed fillets

- **The graph shows that the fresh fillets absorb more light on average than the frozen-thawed fillets, allowing for non-invasive classification between these categories**

A University of North Carolina Study in 2004, found that at least **60% of fish sold as red snapper** in markets across the U.S. were mislabeled and were other species

In 2013, ocean conservation society Oceana found that **93% of fish labeled as red snapper** were species other than Lutjanus campechanus, the FDA's legally designated name for red snapper

Spectroscopy has been successfully used to discriminate different species of freshwater fish samples, and academic studies have been successful in **using hyperspectral image data of marine and freshwater fish to identify both species and quality.**

Today, red snapper could be one of at least 28 different species, including much less desirable fish such as tilapia or pollock

Key benefits

- **Eliminate product recalls**

- **Increased food safety > higher quality product**

- **Increased credibility and reputation**

- **Competitive advantage > quality guarantee**

- **Reduced labour at production lines**

- **Multiple contaminants from one system**

Our Vision: Hyperspectral Cloud Services

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