

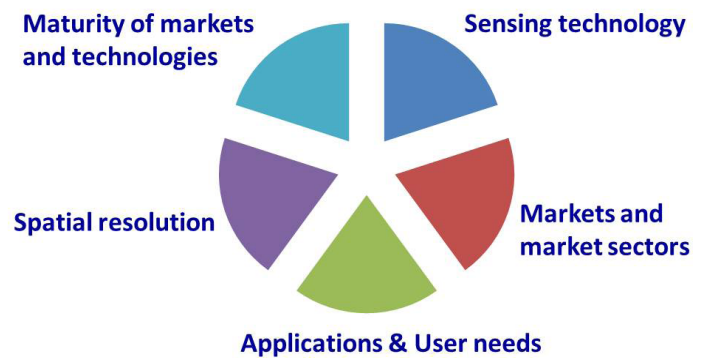
Qi3 Insight: From Sensor to Answer ‘How the Winds of Change are reshaping the Instrumentation Sector



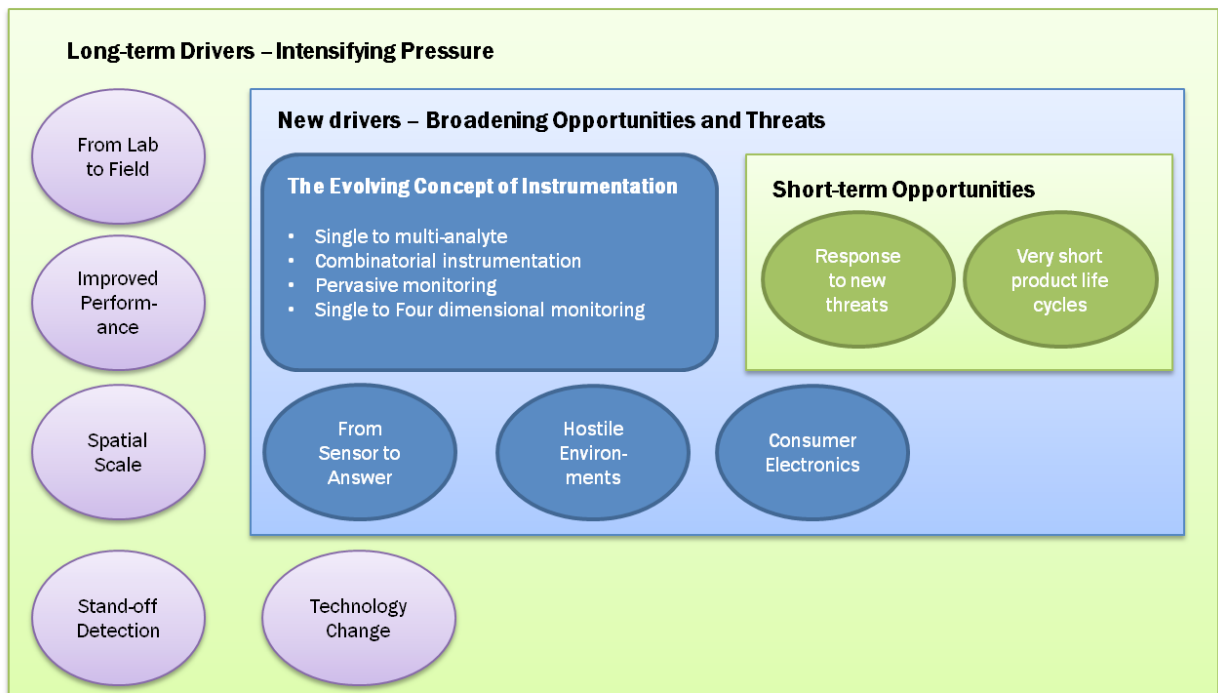
Instrumentation underpins a wide range of industrial activity and is a key enabling technology for successful economic growth. 50% of revenues of Fortune Global 500 companies (sales of £1500bn) and 70% of the revenues of FTSE 100 companies (sales of £120bn) are in sectors that are highly dependent on instrumentation. This wide diversity of markets and applications underpinned by instrumentation has led to the fragmentation of the sector along several axes. These include:

As a result, the diversity and variety of sensors and instruments for analysis is breath-taking. This high level of fragmentation, diversity of technologies, and variety of market niches makes it very difficult for instrumentation companies to see the large scale forces that are reshaping the sector.

A series of projects over the last few years looking at innovation and change in different instrumentation market segments has enabled Qi3 to pull together a high level picture of these forces and drivers. They fall into three categories – Long-term, New, and Short-term.



Winds of Change – Drivers Reshaping the Instrumentation Sector



Source: Qi3 Ltd

These drivers are creating new opportunities across the sector; markets segments as diverse as environment, offshore, polar, aerospace, defence, space, marine, oil & gas, automotive, agriculture, and nuclear sectors are now seeking innovative and disruptive analytical technologies, products, and services to meet their needs. Emerging instrumentation opportunities include:

- **Field instrumentation, especially networks of sensors, and for hazardous environments**
- **Multi-analyte & speciation sensors**
- **Combinatorial instrumentation modalities (e.g., EO and soil based instruments) to provide novel solutions to new applications and markets**
- **Value added services through fusion, synthesis and transformation of data from instruments to provide relevant knowledge and answers to users. This may be integrated into the instrument or may require innovative partnerships**

Innovation is required in a wide range of areas to enable the instrumentation sector to capitalise on these emerging opportunities and to meet changing user needs in traditional applications.

Improved Performance – while the diversity of instrumentation applications makes it difficult to identify common underlying needs, the security & defence sector has articulated its requirements and these provide a good guide to general requirements:

- **False alarm rates (selectivity)**
- **Collection and sampling**
- **Range of materials that can be detected**
- **Suitability for mobile use**
- **Speed of response (inc. speed of recovery)**
- **Limit of detection / sensitivity**
- **Specificity**
- **Sample pre-processing (Mainly Biological)**

Deployment from Lab to Field - key innovation needs for deployment of instrumentation systems from the lab to the field include a number of enabling technologies:

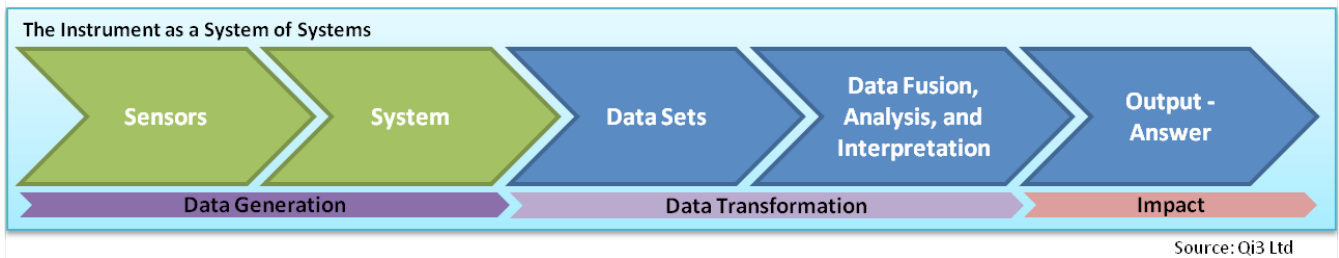
- **Sensors & detectors**
- **Optics**
- **Novel power systems**
- **Data logging**
- **Metrology**
- **Field deployability**
- **Ruggedness**
- **Miniaturisation**
- **Communications and Telemetry**
- **Data Platforms**
- **Data fusion, synthesis and transformation**

Cost - Reducing costs to fit with budget availability is a key factor in market adoption rates.

Technology Change - Innovative nano-sensors, new instruments for space exploration, new analytical techniques, and the migration of technologies from one sector to another (e.g., from space to urban environment) all continue to drive change in the sector by enabling new applications. A more pervasive trend is the convergence of sensors with IT and communications technologies. New sensor network systems require a broad range of new enabling technologies and this is blurring the boundaries of the three. This will result in new opportunities, partnerships, and competitors for instrumentation companies.

Emerging opportunities and changing market needs are bringing new types of user, with profound implications for instrument design. It is no longer an analytical chemist who is operating the instrument and / or interpreting the data, but environmentalists, engineers, insurance specialists, planners, operations specialists, etc. This new type of user does not want, for example, a spectral output, but needs the relevant answer. To enable this to happen, expert systems (incorporating data management and data transformation) need to be embedded in the instrument, removing the need for the analytical chemist. This leads to a new definition of instrumentation which extends the Value Chain available to manufacturers.

From Sensor to Answer - A New Definition of the Instrument



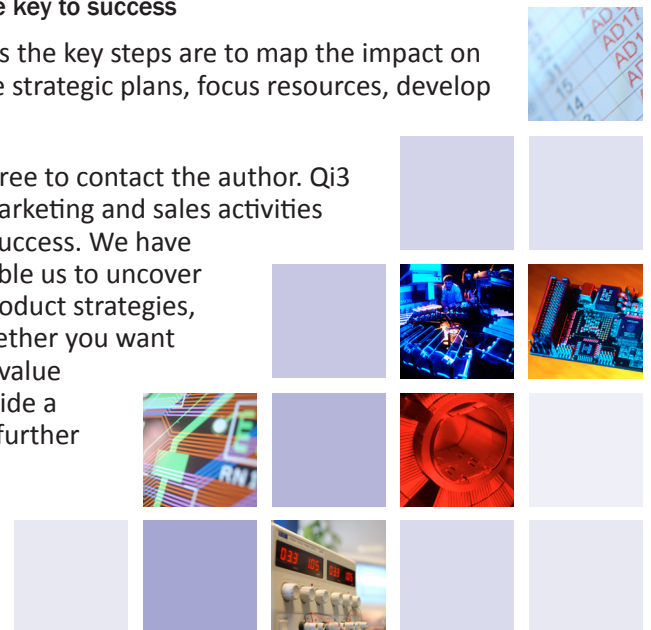
This new view on instrumentation extends the value chain from “sensor to answer”. Companies who embrace these changes will find new sources of market share, sales and profits. If this user need for the answer is not filled by the instrumentation companies, then others will step in to fill the gap, taking a significant proportion of the value chain and threatening the instrument companies links with the end users.

So what should instrumentation companies do? The fragmentation and the variety of drivers for change mean that there is no simple picture of the impact on individual companies or market niches. For some there will be major opportunities, others will face critical threats, and some may not be affected at all. However there are some key points for guidance that can be highlighted:

- Success or survival will be determined by companies’ abilities to map the impact of changes on their market niches and to implement strategic plans that harness or mitigate these changes successfully.
- Innovation will continue to be key to success and survival in the sector, but innovation needs to be focused on solving user needs at an acceptable price
- It is important to rethink value and supply chains from a user pull rather than a technology push view, evaluating how customers use the output of instruments, their future needs, and the impact this will have on sensor technology, instrument design, services and distribution channels
- Bespoke strategies rather than ‘one size fits all’ solutions are the key to success

For companies with a will to capitalise on the potential opportunities the key steps are to map the impact on the organisation, assess the innovation needs, evolve or re-orientate strategic plans, focus resources, develop necessary partnerships, and move rapidly to implementation.

If you wish to discuss the findings of this report further, please feel free to contact the author. Qi3 offers in-depth, hands-on expertise across the whole spectrum of marketing and sales activities to help our clients achieve competitive advantage and commercial success. We have developed proprietary working models and methodologies that enable us to uncover critical changes in user needs, develop differentiating market and product strategies, and implement highly effective ‘Go-to-Market’ programmes. So whether you want to investigate new markets for a technology, or find out how to add value to your organisation’s current marketing competencies, we can provide a range of services, carefully tailored to suit your business needs. For further information, go to www.qi3.co.uk.



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