Cyber Security
A Look Across Two Decades

A Quantitative Analysis of the Language of Security 2002-2019

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Cyber Security: A Look Across Two Decades

Results from the quantitative analysis of the semantics content of 17 annual Global Information Security Surveys from EY spanning the period 2002-2019
To build a quantitative understanding on how the focus and priorities of the Security industry have evolved throughout the last 2 decades

Why Did We Do This?

No access to underlying data sets meant we could not compare or normalise results in a meaningful way. Semantics reveal the way the results were interpreted and the language used in such analysis is a good indicator of the industry focus points year after year.

Why did we analyse semantics instead of results?

Why the EY GISS?

- The **timespan** covered: *It was actually first produced in 1998 but we could not trace the first 4 issues*.
- The **consistency** in layout, size and approach.
- The level of depth and general **quality** of the analysis.

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We performed a quantitative analysis of the frequency of keyword markers across a set of 77,750 meaningful words extracted from the text of the 17 GISS reports.

5 key findings, as indicators on how we (Security Practitioners) communicate with senior stakeholders and how our language has evolved over the past 2 decades.
Finding 1

• The most common words are generic
• But while the language in the reports is dominated by generic terms, their overall proportion tends to be diminishing

We tend to talk about Security in more and more specific terms
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**Finding 2**

When adding a sentiment analysis layer over the data, the 2 decades appear to be split by a clear semantic shift towards a more technical and more negative language.

*If our language around Security has become more specific, it has also become more technical and more negative.*
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Finding 3

This split reflects a significant shift in focus across the 2 decades.

The Compliance and Risk considerations which dominate the period 2002-2009 are clearly replaced by Incidents and Threats considerations during the following decade.
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Finding 4

Outsourcing and Cloud considerations dominate sharply during a short middle period (2010-11-12) then vanish into acceptance

A sense of Realisation seems to dominate the junction between the 2 decades:

This is no longer JUST about Compliance and Risk: Tech is changing, Threats are real and Incidents do impact Business
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**Finding 5**

Our Business language tends to sharpen throughout the last decade but our focus on Execution and People tends to dwindle.
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Keyword markers such as risk / threat / compliance / incident are 3.5 times more frequent across all reports than governance / budget / delivery / priority / culture / skill

We tend to talk a lot about what could go wrong ... ... but not as much about we could do to fix things
The semantics analysis shows the clear emergence of 2 periods

2002-2009
>> The Compliance Decade

2010-2019
>> The Realisation Decade

- Security as a balancing act between Compliance Requirements and Risk Appetite (and costs)
- Security as a necessary barrier against real Threats in a context of massive technological change (and the aftermath of a historical financial crisis)

**The CISO as Risk Manager**

**The CISO as Fire Fighter**
What the next decade must address

**2002-2009**
>> The CISO as Risk Manager

**2010-2019**
>> The CISO as Fire Fighter

**Beyond 2020**
>> The CISO as Transformation Leader

*The Compliance Decade*
Security as a balancing act between Compliance Requirements and Risk Appetite (and costs)

*The Realisation Decade*
Security as a necessary barrier against real Threats in a context of massive technological change (and the aftermath of a historical financial crisis)

*The Execution Decade*
Security as an imperative in the “when-not-if” era, in a context of significant maturity deficit in many firms (and potentially massive regulatory fines)
3 management considerations in conclusion ahead of the next decade

- The profile of the transformation leaders will be key.
- Transformation takes time and there may not be quick-wins.
- More than ever, this is about culture and governance, not just technology.

A good “fire-fighter” may not be a good “transformer.”

Senior management must be able to look beyond the short-term and stay focused on transformational objectives.

Throwing money at tech vendors will not build anything lasting without the right organisation and operating model.
We gathered all EY Global Information Security Surveys from 2002 to 2019 in PDF format.

We read each PDF using the pdf_text function from the pdftools package in order to obtain the full text for each page in machine-readable format. Because of the nature of PDFs, some of the text could not properly be read (fancy headlines, non-standard font in some titles, etc.) but we were successful in getting more than 95% of the content of each report.

We then performed some amount of data cleaning – removing standard English stopwords (e.g. and, but, all, did, ...), all one- and two-letter words, as well as some reports-specific uninformative words such as: ernst, young, annual, survey, percent, or respondents.

We used the quanteda package – the standard tool for managing and analyzing textual data in R – in order to turn the raw text into analyzable format called a document-feature matrix (dfm).

A dfm is simply a (typically very sparse) matrix where each row $i$ is a different document (here, each row is a year), each column $j$ is a word, and every entry $[i, j]$ is the count of word $j$ in document $i$. No stemming was performed at this stage.

We then computed the top 100 terms for each year and exported the final ranking (along with absolute counts and frequencies) to CSV for easy analysis in Excel. Stemming and grouping of terms was performed manually in Excel using domain-expertise.

After manually selecting the most interesting terms to the analysis, we went back to the dfm to complete the count for those terms in years in which they did not make it to the top 100.

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The Security Transformation Research Foundation

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