‘THE CONTINUUM PARADIGM’
29TH JUNE 2022 (2 PM – 3 PM)
Keynote speaker:

Dr. Eric J.H.J. Mantelaers RA AA CISA C|CISO

• Head Department of Professional Practices RSM Accountants;
• Professor of Applied Sciences. Zuyd University of Applied Sciences (Future-proof Auditor);
• Teacher Auditing Maastricht University;
• Teacher Research Nyenrode Business University;
• Teacher Research and Accounting FHR Business School (Suriname).
RSM organization

RSM Financial Year 2021
GLOBAL HIGHLIGHTS

Revenue growth of 15.8% from $6.3bn to $7.26bn

- 860+ offices
- 51,000+ people internationally
- 123 countries
Minor: Data Driven Decision Making
Future-proof Auditor & Future-proof Financial
FROM HISTORIAN TO SENSOR
Continuum Paradigm (Reality or Fiction?)
From historian to sensor (1)

“Historian” vs “Sensor”

Double-entry bookkeeping, Pacioli, 1494

A citizen registers with the sensor, 433 years B.C.
From historian to sensor (2)

“Historian”

- Auditor checks figures afterwards and especially looks into the rear-view mirror.
- Auditor usually does his job after the end of the financial year.
- Auditor is often accused of looking mainly backwards and hardly forwards.
“Sensor”

• By monitoring very shortly after the event, deviations are more likely to be noticed.

• Suppose a bank is about to transfer a large sum of money to someone. Through Continuous Monitoring, it is possible to detect any irregularities before the completion of this transaction.
Components of the Continuum Paradigm
Most of you are not accountants, and often not even a financial

*Today’s challenge!*
The Origin of Accountancy

- 1929 Stock Market Crash
- Pincoff’s affair in the late 1870s
What means ‘Auditing’?

Testing reality against a standard

- Collecting data
- Confronting this data with the standard
- Report on the outcome
What means ‘Continuous’?

- **Continuous**: Within the normative maximum lead time after the event...
- **Reporting**: Automated reporting within the normative maximum lead time after the event...
- **Monitoring**: The automated identification of the deviation within the normative maximum lead time after the event...
- **Auditing**: The automated assignment of a judgment on the deviation within the normative maximum lead time after the event...
- **Assurance**: The automated granting of assurance certificate within the normative maximum lead time after the event...
Mandatory Obligation to Audit

- Independent Audit
- Financial Audit
- Non-Financial Audit
- Audit Objective
- Audit Methodology
- Human Bla Bla
- Audit Technology
<table>
<thead>
<tr>
<th>Traditional</th>
<th>Continuous</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Frequency:</td>
<td>1. Frequency:</td>
</tr>
<tr>
<td>• Periodic</td>
<td>• Continuous or more frequent</td>
</tr>
<tr>
<td>2. Approach:</td>
<td>2. Approach:</td>
</tr>
<tr>
<td>• Reactive</td>
<td>• Proactive</td>
</tr>
<tr>
<td>3. Procedures:</td>
<td>3. Procedures:</td>
</tr>
<tr>
<td>• Manual</td>
<td>• Automated</td>
</tr>
<tr>
<td>• Bulk of the work performed is centered around labor and time intensive audit procedures</td>
<td>• Bulk of the work performed is centered around handling exceptions and audit procedures requiring human judgement</td>
</tr>
<tr>
<td>• Independent roles of the internal and external auditor</td>
<td>• External auditor role becomes the certifier of the continuous auditing system</td>
</tr>
<tr>
<td>• Testing consists of analytical review procedures and substantive details testing (nature)</td>
<td>• Testing consist of continuous controls monitoring and continuous data assurance (nature)</td>
</tr>
<tr>
<td>• Controls testing and detailed testing occur independently (timing)</td>
<td>• Controls monitoring and detailed testing occur simultaneously (timing)</td>
</tr>
<tr>
<td>• Sampling in testing (extent)</td>
<td>• Whole population is considered in testing (extent)</td>
</tr>
<tr>
<td>• Humans perform testing</td>
<td>• Data modeling and data analytics are used for monitoring and testing</td>
</tr>
<tr>
<td>7. Reporting</td>
<td>7. Reporting:</td>
</tr>
<tr>
<td>• Periodic</td>
<td>• Continuous or more frequent</td>
</tr>
</tbody>
</table>
# Maturity Model Vasarhelyi

<table>
<thead>
<tr>
<th></th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Audit and management sharing</strong></td>
<td>Traditional Audit</td>
<td>Emerging</td>
<td>Maturing</td>
<td>Continuous Audit</td>
</tr>
<tr>
<td></td>
<td>• Independent and Adversarial</td>
<td>• Independent with some core monitoring shared</td>
<td>• Shared systems and resources where natural process synergies allow</td>
<td>• Purposeful Parallel systems and common infrastructures</td>
</tr>
<tr>
<td><strong>Management of audit functions</strong></td>
<td>• Financial organization supervises audit and matrix to Board of director</td>
<td>• Some degree of coordination between the areas of risk, auditing and compliance IT audit works independently</td>
<td>• IA and IT audit coordinate risk management and share automatic audit processes</td>
<td>• Centralized and integrates with risk management, compliance and SOX/layer with external audit.</td>
</tr>
<tr>
<td><strong>Analytic methods</strong></td>
<td>• Financial ratios</td>
<td>• Financial ratios at sector level/account level</td>
<td>• KPI level monitoring Structural continuity equations Monitoring at transaction level</td>
<td>• Corporate models of the main sectors of the business Early warning system</td>
</tr>
</tbody>
</table>
Audit Phases

Figure 1.9—Typical Audit Process Steps by Phase

Planning Phase
- Determine audit subject.
- Define audit objective.
- Set audit scope.
- Perform preaudit planning.
- Determine procedures.

Fieldwork and Documentation Phase
- Acquire data.
- Test controls.
- Issue discovery and validation.
- Document results.

Reporting Phase
- Gather report requirements.
- Draft report.
- Issue report.
- Follow up.

Source: ISACA, Information Systems Auditing: Tools and Techniques—Creating Audit Programs, USA, 2016
Demand for Audit & Assurance

Figure 4. Third parties demanding financial statement information (e.g. Soltuni 2007)
Theories: Hayes et al. (2005)

Policeman Theory
An auditor’s job is to focus on arithmetical accuracy and on the prevention and detection of fraud

Lending Credibility Theory
Audited financial statements are used by management to enhance the stakeholders’ faith in management’s stewardship

Theory of Inspired Confidence
The demand for audit services is the direct consequence of the participation of outside stakeholders in the company. These stakeholders demand accountability from the management, in return for their contribution to the company. Since information provided by the management might be biased, because conflict of interests, an audit of this information is needed.

Agency Theory
A company is viewed as the result of contracts, in which several groups make some kind of contribution to the company. A reputable auditor is appointed not only in the interest of third parties, but also in the interest of management.
Audit Quality: two main items

- Continuity, Going-concern Assessment
- Fraud detection
What can go wrong?

- Accountant checks the annual accounts 2021 of a transport company
- Bookkeeper commits fraud by transferring money from debtor
- Auditor performs audit procedures during the year in October (2021) and after the end of the year in January (2022), but also in January 2021
- During the months of February to September 2021, the accountant has the opportunity to disguise his fraud
- The accountant does not uncover this fraud
- Why not?
How to solve these challenges: Technology

Two dimensions

- Technology as an Audit Tool
- Technology as part of the Audit Client (environment)
Audit Technologies

- Blockchain
- Reinforcement learning
- Process Mining
Figure 1: The timeline of the use of audit-oriented technologies
Reinforcement Learning

Doolhof.....
Decentralized….
An Example of An Event Log of an Invoice

Invoice number 003
Supplier: AT&T
Posting date: Feb 10th 2010
120 USD
Description: Internet services Jan 2010
'Signature of John'
'Signature of Pete'

PLUS
- 'Create Invoice'
  Timestamp: Feb 12th 2010, 08:23 AM
  Originator: Mike
  Fields: supplier: AT&T, posting date: 02-10-2010, value: 100 USD,
  Description: Internet services Jan 2010

- 'Change'
  Timestamp: Feb 12th 2010, 08:43 AM
  Field changed: Value
  Value old: 100 USD
  Value new: 120 USD

- 'Sign'
  Timestamp: Feb 12th 2010, 08:44 AM
  Originator: John

Figure 1: Visualization of input data and event log data of an invoice.
<table>
<thead>
<tr>
<th>Level on which assurance can be provided</th>
<th>Examples</th>
<th>Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Statements</td>
<td>Banco de Portugal</td>
<td></td>
</tr>
<tr>
<td>Organisation</td>
<td>IT-organisation</td>
<td></td>
</tr>
<tr>
<td>Processes</td>
<td>Sales Process</td>
<td></td>
</tr>
<tr>
<td>Items</td>
<td>Accounts Receivable</td>
<td></td>
</tr>
<tr>
<td>Data</td>
<td>Price per Product</td>
<td></td>
</tr>
</tbody>
</table>
Financial vs. Non-financial

- Sustainability Reporting
- CSRD
- ESG (Environmental, Social, Governance)
- SDG (Sustainable Development Goals)
In an audit engagement, the auditor provides a high, but not absolute, level of assurance that the information subject to audit is free of material misstatement. This is expressed in the audit report as reasonable assurance.

- **Limited Assurance**
- **Non-Assurance**
Levels on which assurance can be provided
**Comprehensive Relationship Model**

- $\{\text{pos}\}$ = positive (accuracy)
- $\{\text{neg}\}$ = negative (completeness)

**A)** To be checked externally via Blockchain
**B)** To be checked internally
**C)** Not to be checked anymore

<table>
<thead>
<tr>
<th>Inventory ${\text{Audit objective}}$</th>
<th>Beginning (B) ${\text{neg}}$</th>
<th>Acquisition (A) ${\text{pos}}$</th>
<th>Ending (B) ${\text{pos}}$</th>
<th>Sales (A) ${\text{neg}}$ ${\text{pos}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>${\text{pos}}$</td>
<td>+</td>
<td>${\text{neg}}$</td>
<td>${\text{neg}}$</td>
<td>${\text{pos}}$</td>
</tr>
<tr>
<td>${\text{neg}}$</td>
<td>${\text{neg}}$</td>
<td>${\text{pos}}$</td>
<td>${\text{neg}}$</td>
<td>${\text{pos}}$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cash ${\text{Audit objective}}$</th>
<th>Beginning (A) ${\text{neg}}$</th>
<th>Disbursements (C) ${\text{neg}}$</th>
<th>Receipts (C) ${\text{pos}}$</th>
<th>Ending (A) ${\text{pos}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>${\text{pos}}$</td>
<td>${\text{neg}}$</td>
<td>${\text{neg}}$</td>
<td>${\text{pos}}$</td>
<td>${\text{neg}}$</td>
</tr>
<tr>
<td>${\text{neg}}$</td>
<td>${\text{neg}}$</td>
<td>${\text{neg}}$</td>
<td>${\text{neg}}$</td>
<td>${\text{pos}}$</td>
</tr>
</tbody>
</table>

**Accounts payable**

- $\{\text{Audit objective}\}$
  - Beginning (A) $\{\text{pos}\}$
  - $\{\text{neg}\}$

**Accounts receivable**

- $\{\text{Audit objective}\}$
  - Beginning (A) $\{\text{neg}\}$
  - $\{\text{pos}\}$

**Figure 1. Representation of comprehensive relationship model**
What should be equal?

3-Way Match

PO Quantity = Invoice Quantity = Receipt Quantity

PO Unit Price = Invoice Unit Price
Three-way Match

3 Way Match Concept

1. Purchase Order
2. Goods Receipt
3. Invoice Receipt
4. Payment
5. FI documents created to record Dr and Cr entries
Process Mining
Example 1: Audit of Financial Statements [a]
## 2 Financial Statements and Notes

### Financial Statements

**Table II.2.1 • Balance sheet of Banco de Portugal | EUR thousands**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Gross assets</td>
<td>Depreciation, amortisation and impairment</td>
</tr>
<tr>
<td>1 Gold and gold receivables</td>
<td>2</td>
<td>19,796,309</td>
<td>19,796,309</td>
</tr>
<tr>
<td>2 Claims on non-euro area residents denominated in foreign currency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Receivables from the IMF</td>
<td>3</td>
<td>3,902,084</td>
<td>3,902,084</td>
</tr>
<tr>
<td>2.2 Balances with banks and security investments, external loans and other external assets</td>
<td>4</td>
<td>5,059,183</td>
<td>5,059,183</td>
</tr>
<tr>
<td>3 Claims on euro area residents denominated in foreign currency</td>
<td>4</td>
<td>148,992</td>
<td>148,992</td>
</tr>
</tbody>
</table>
Example 2: ‘Audit’ of Non-financial information [a]
Example 2: ‘Audit’ of Non-financial information

**Reporting criteria**

The non-financial information needs to be read and understood together with the reporting criteria. The reporting criteria used for the preparation of the non-financial information are the International <IR> Framework of the IIRC and the applied supplemental reporting criteria, as disclosed in Appendix 1: ‘About this Report’ and Appendix 2: ‘Methodology & Definitions of Non-Financial Key Figures 2021’ of the Annual Report.

The absence of an established practice on which to draw, to evaluate and measure non-financial information allows for different, but acceptable, measurement techniques and can affect comparability between entities, and over time.
Example 2: ‘Audit’ of Non-financial information [c]

What we have reviewed

We have reviewed the non-financial information included in the following sections of the Annual Report for the year ended 31 December 2021 (hereafter: “the non-financial information”):

- About Us;
- Creating Value;
- Excellent Customer Focus;
- Meaningful Cooperative;
- Rock-Solid Bank;
- Empowered Employees; and
- Appendices
  - Appendix 1: About this Report
  - Appendix 2: Methodology & Definitions of Non-Financial Key Figures 2021

This review is aimed at obtaining a limited level of assurance.
Just one example…

Ex-Deloitte Auditor Faces Disciplinary Action for Improper Audit of S. Africa’s Steinhoff

By Janice Kew | April 23, 2021
Discussion about Audit Quality

- International Standards on Quality Management
- Audit Quality Indicators
ISQM1, ISQM2, ISA220 Interactive (Mantelaers 2021)

Knowledge management – Information system

Integrated, Iterative, Robust, Moving target, Scalability

Client

ISQM2-Engagement Level

Information and communication

ISQM1-Firm Level

Governance and leadership

Acceptance and continuance
Engagement performance

Firm’s risk assessment process

Quality risks

Quality objectives and Audit Quality Indicators (AQIs)

Documentation

Resources:
- Human
- Technological
- Intellectual

Stakeholders

- Laws and regulations
- Relevant ethical requirements

ISQA20-Audit Partner

Information and communication

Culture – Professional scepticism

Monitoring and remediation process
Overview of Audit Quality Indicators Initiatives (1)
### Overview of Audit Quality Indicators Initiatives (2)

<table>
<thead>
<tr>
<th>Owner</th>
<th>Background of the owner</th>
<th>Intended user</th>
<th>Transparency (public or private)</th>
<th>Short overview</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IDW – Germany</strong></td>
<td>Professional organisation</td>
<td>Audit committees, oversight body and public</td>
<td>Mainly for reporting to audit committees and oversight body</td>
<td>32 AQIs under four components below and one cross-divisional AQI: Quality culture, Workforce quality, Process quality, Communication</td>
</tr>
<tr>
<td><strong>Quartermasters – Netherlands</strong></td>
<td>Independent group of experts assigned by the Ministry of Finance</td>
<td>All stakeholders, including public</td>
<td>Subject to adoption by the Ministry of Finance, firms will be obliged to report</td>
<td>11 indicators under three categories: Audit quality, Quality control system, Context</td>
</tr>
<tr>
<td><strong>CMVM – Portugal</strong></td>
<td>Audit oversight body</td>
<td>Oversight body</td>
<td>For the first two years, exclusive reporting to the CMVM</td>
<td>Eight indicators, four of which are at firm-level, one at engagement level and three for both firm and engagement levels</td>
</tr>
<tr>
<td><strong>FAOA – Switzerland</strong></td>
<td>Audit oversight body</td>
<td>Oversight body</td>
<td>FOA presents a summary, including trends, in its annual reports</td>
<td>Nine indicators and three of these are to be reported separately for the Swiss Market Index (SMI) and non-SMI companies</td>
</tr>
<tr>
<td><strong>FRC – UK</strong></td>
<td>Audit oversight body</td>
<td>All stakeholders, including public</td>
<td>FRC will consult on AQIs to be included in audit firms’ transparency reports</td>
<td>FRC identified 52 AQIs that are monitored by the six largest audit firms in the UK, and these can be grouped into six broad categories</td>
</tr>
<tr>
<td><strong>CPAB – Canada</strong></td>
<td>Professional organisation</td>
<td>Audit committees and audit firms</td>
<td>This was a pilot project without any specific requirements, and most participants tracked AQIs</td>
<td>An exemplary list of 20 AQIs is presented along with their definitions and types</td>
</tr>
</tbody>
</table>
Audit Quality Indicators, Netherlands

In the Netherlands, the quartermasters, appointed to ensure the audit reform delivery, proposed (February 2022) 11 quality indicators that were developed upon a public consultation:

<table>
<thead>
<tr>
<th>Category</th>
<th>AQIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audit quality</td>
<td>▪ involvement of external auditor</td>
</tr>
<tr>
<td></td>
<td>▪ weaknesses in audits and financial statements</td>
</tr>
<tr>
<td></td>
<td>▪ contemporary topics: fraud and continuity</td>
</tr>
<tr>
<td>Workforce quality</td>
<td>▪ quality-enhancing measures</td>
</tr>
<tr>
<td></td>
<td>▪ quality control systems</td>
</tr>
<tr>
<td>Context</td>
<td>▪ culture</td>
</tr>
<tr>
<td></td>
<td>▪ audit team turnover</td>
</tr>
<tr>
<td></td>
<td>▪ investments in innovative technology</td>
</tr>
<tr>
<td></td>
<td>▪ budget overrun</td>
</tr>
<tr>
<td></td>
<td>▪ training hours for environmental, social and governance (ESG) matters</td>
</tr>
<tr>
<td></td>
<td>▪ client satisfaction</td>
</tr>
</tbody>
</table>
### Overview of Audit Quality Indicators Initiatives (3)

<table>
<thead>
<tr>
<th>Owner</th>
<th>Background of the owner</th>
<th>Intended user</th>
<th>Transparency (public or private)</th>
<th>Short overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICAI – India</td>
<td>Professional organisation</td>
<td>Oversight body and audit firms (for self-evaluation)</td>
<td>No public reporting envisaged</td>
<td>The model suggests scoring criteria for competency bases under three categories: Operations management – Human resource management – Strategic/functional management</td>
</tr>
<tr>
<td>ACRA – Singapore</td>
<td>Audit oversight body</td>
<td>Audit committees and audit firms</td>
<td>Audit firms are encouraged to share the AQI data privately with audit committees</td>
<td>The Framework comprises seven AQIs, which are to be disclosed at engagement and/or firm-level</td>
</tr>
<tr>
<td>IRBA – South Africa</td>
<td>Audit oversight body</td>
<td>Audit committees, audit firms and oversight body</td>
<td>IRBA issued a survey report based on AQI-related information provided by the firms auditing listed companies</td>
<td>The AQIs cover the following thematic areas: independence, tenure, Internal firm quality review processes, workload of partners and audit managers, span of control, technical resources, training, staff turnover</td>
</tr>
<tr>
<td>CAQ – US</td>
<td>Autonomous public policy organization</td>
<td>Audit firms</td>
<td>Firms are encouraged to consider public disclosure</td>
<td>The Framework includes a non-exhaustive list of firm-level AQIs for the six elements of audit quality: leadership, culture, and firm governance, ethics and independence, acceptance and continuance of clients and engagements, audit engagement performance monitoring</td>
</tr>
</tbody>
</table>
Session #7 - Thursday, June 30th (9PM – 11PM)

Papers related to the Continuum Paradigm

1. Amy Kitchiner
2. Lotte Verhoeven
3. Ed Curfs
4. Qing Huang
5. Anais Heeren
“Variation in job titles within the hospitality workforce: A computation grounded theory approach”

• The wide spectrum of job titles worldwide has become the main cause of confusion amongst the general public, organizations, and practitioners of services.

• This study aims to understand the variation in job titles in the hospitality industry for management jobs and propose standardization to combat disparity.

• A dataset of 1,000 job titles has been collected. This has been analyzed by means of grounded theory and computational grounded theory. The results show 210 standardized job titles.
“Towards a going concern assessment pipeline”

- Paper is about the **assessment of the going concern analysis** in the audit process, based on the professional judgment of the auditor. To support this individual and personal judgment of the auditor, a more direct source of information in the form of an automated going concern analysis could provide a solution.

- In this paper, **a method to automate the going concern analysis** was set up, using a combination of 16 forecasting algorithms. To build and validate the forecasting algorithms, 225 administrations have been divided in a train and test set.

- The results show **a confidence percentage** of 97.45% for Gradient Boosting Regressor, 96.79% for Decision Tree Regressor and 77.72% for AdaBoost Regressor on the basis of the condition current liabilities for Administration 1.
“How to Plot Current Pilots Results on the Audit Maturity Model? The Continuum Paradigm”

- This paper focuses on the possibilities and challenges of the Continuum Paradigm.
- Research question: What is the actual status regarding the Continuum Paradigm?
- The overall conclusion is that the average maturity level for Continuous Monitoring and Continuous Auditing reaches nearly stage 3: Maturing and no research has been performed based on a holistic and fully integrated continuous process.
Huang, Vasarhelyi & Mantelaers

“Toward a Continuous Measurement Model”

- The business and ERP data for accounting and auditing is close to continuous, but the accounting and auditing work is interval-based and loses the close to continuous characteristic of the business measurement process.
- A series of proxies for more frequent measures have emerged in the increasingly desperate attempt to have very short time market trading superiority.
- The objective in their paper is to propose a continuous measurement framework in critical areas of business.
Heeren, Mantelaers & Zoet

“Continuous Monitoring of Counter Accounts in Hospitality”

- **Sustainability reporting** has become common practice in organizations. A factor that is associated with the rise of sustainability reporting is **greenwashing**. In order to counter greenwashing practices, counter-accounting, referring to the use of information produced by actors outside a given organization or industry, aims to help verify statements made by organizations.
- The application of the system is demonstrated using data from the **hospitality sector** regarding the fulfillment of different job titles by male and female executives.
- The presented results shed light on occupational gender segregation and provide a basis from which more **continuous counter-accounting systems** can be developed.
“That’s the last box ticked – has anyone anything further to raise?”
Thank you for your time and attention