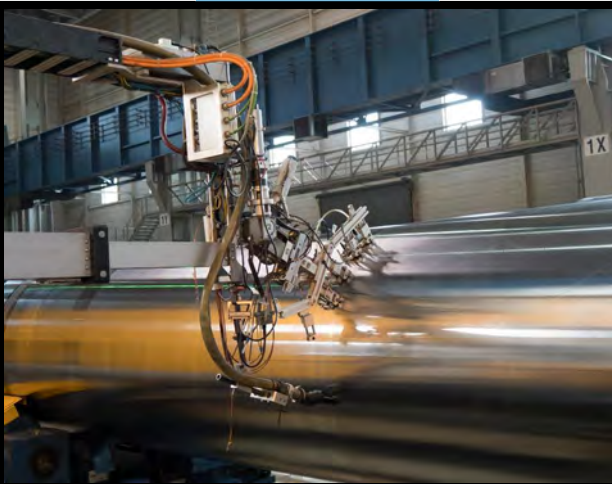


2013 – 2017:
Smart Data Analysis for Probabilistic Fracture Mechanics

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2010 2015 2020 2025

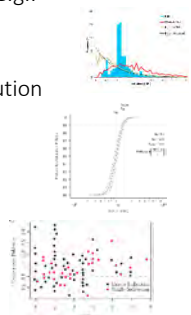


SIEMENS

Probabilistic Fracture Mechanics

More knowledge to be considered, e.g.:

- Sensitivity distribution
- Radial indication position distribution
- Indication size distribution
- Probability of detection (PoD)
- Conversion factor distribution



Based on this knowledge the implausibility of events can be calculated more exactly.

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2013 – 2017: Database for Smart Data Analysis

What is needed

- Digitally analyzable reports
- Database to store the values
- Analysis tools

Database & Frontend requirements

- Fast intranet-based frontend
- Multi language application
- Error-proof database layout
- Importing of reports



Smart Data Analysis

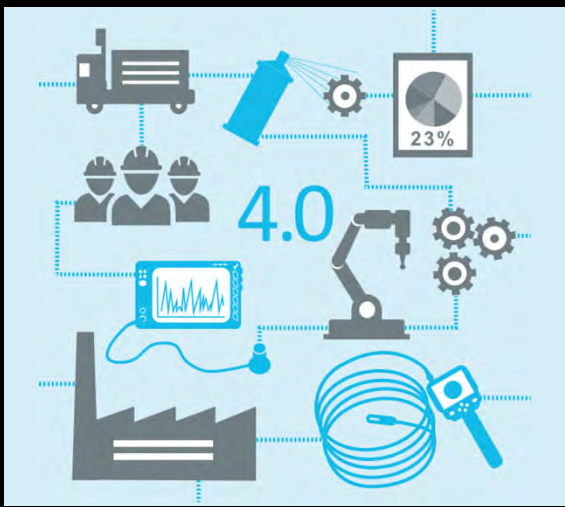


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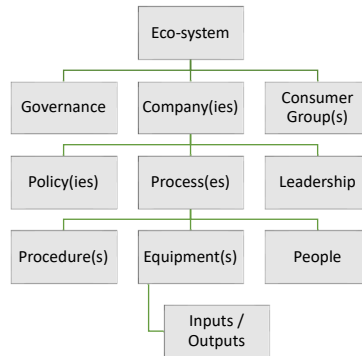
- Probabilistische Bruchmechanik
- Entwicklung der ZfP 4.0
- Öffentlich geförderte Projekte
- Training und Workshops
- Zusammenfassung



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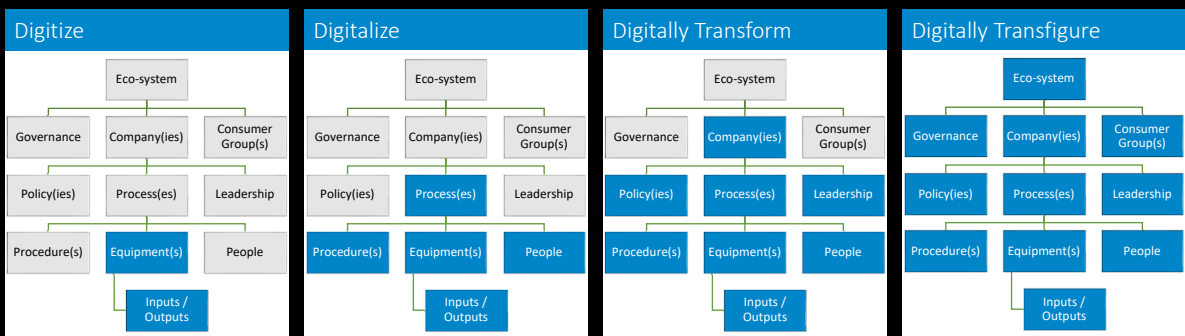
Industrialized Society

Industrialized Society



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Digital Penetration



Digital Society (2023) 2:54
<https://doi.org/10.1007/s44206-023-00084-w>
 ORIGINAL PAPER
 Modeling Digital Penetration of the Industrialized Society and its Ensuing Transfiguration
 Johannes Vrana^{1,2} • Ripi Singh³



<https://doi.org/10.1007/s44206-023-00084-w>

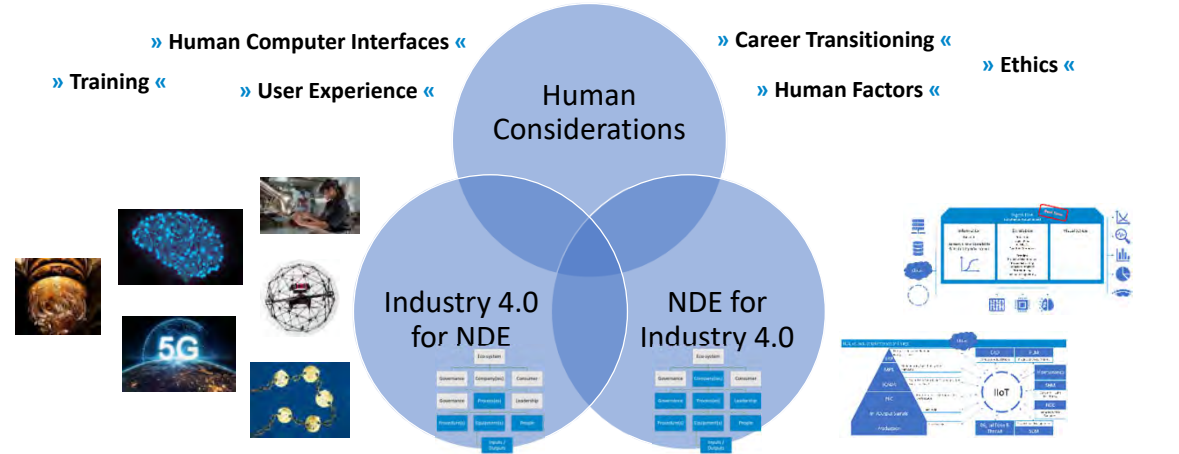


<https://youtu.be/8Som-Y37V4w>

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What is NDE 4.0?

What is NDE 4.0?



J. Vrana, R. Singh: "NDE 4.0—A Design Thinking Perspective", Journal of NDE 40, 8, <https://rdcu.be/cc0Tb> (2021).
 J. Vrana, R. Singh: "Cyber-Physical Loops as Drivers of Value Creation in NDE 4.0", Journal of NDE 40, 61, <https://rdcu.be/cGmZv> (2021). © Vrana GmbH 2017-2024 | vrana.net

2017:
Start of NDE 4.0



Abstract
 Industry 4.0 stands for the fourth industrial revolution that is ongoing all present. Industry 4.0 is a terminology preferred used in Europe to characterize the integration of production and communication technologies, the so called "smart factory". The first industrial revolution was the mechanization of work. The second was mass production and the assembly line. While the third revolution was the computer integrated manufacturing. Industry 4.0 encompasses the complete reworking of all industrial areas. Lowering costs and efficient in-line production will be possible also for low numbers of very unique parts for example by additive manufacturing (3D printing). A significant aspect is also quality and maintainability of these sometimes unique structures and components. NDE has to follow these trends, not only by adapting NDE techniques to the new technologies, but also introducing the capability of cyber systems into the inspection and maintenance processes. The requirements and challenges for this new technological area will be discussed. Chances for applications of new technologies and systems for NDE will be demonstrated online.

ZfP im Zeichen der Digitalisierung: „ZfP 4.0“

Basierend auf der Anregung aus dem Beirat der DGZfP, einen Fachausschuss mit dem Arbeitstitel „Digitalisierung in der ZfP“ zu gründen, haben sich am 20. Januar dieses Jahres Prof. Bernd Valeske vom IZfP, der Geschäftsführer der DGZfP, Dr. Matthias Purschke sowie der Vorstandsvorsitzende, Dr. Anton Erhard, getroffen. Ziel dieses Treffens war, eine Struktur für den neuen Fachausschuss zu finden und mögliche ZfP-relevante Themen zu definieren. Wie bei solchen „Findungstreffen“ üblich, galt es die Frage zu beantworten, ob die im Beirat vorgestellte Bezeichnung des Fachausschusses, welches sich natürlich auch an der Politik zur Industrie 4.0 orientiert, die Zielsetzungen für die ZfP richtig wiedergibt. Man einigte sich dann schnell auf die in der Überschrift genannte Bezeichnung. Angemerkert sei, dass der Zusatz „ZfP 4.0“ zwar diskutiert, aber erst im Nachhinein mit in die Bezeichnung aufgenommen wurde. Ein Ergebnis der Diskussion war, dass der Hauptteil der fachlichen Arbeit in dafür einzurichtenden Unterausschüssen (UA) stattfinden wird. Hierzu gibt es bereits folgende Ideen:

- Dokumentation, Datenouveränität (Vorstandsvorschlag zur Leitung des UA: Christian Pick)
- Intelligente Sensortechnologie
- Standardisierungsprozesse und Schnittstellen
- Einflüsse auf die Ausbildung
- Überwachung von Prüfsystem (Kognitive und eingebettete Systeme)
- Mensch-Maschine-Interaktion / Assistenz

Des Weiteren wurde der Termin für die Gründungssitzung des neuen Fachausschusses auf die KW 26/2017 festgelegt. Der Vorstand der DGZfP wird dort Prof. Bernd Valeske als Vorsitzenden und Christian Pick als stellvertretenden Vorsitzenden vorschlagen.

In diesem Zusammenhang sei auch darauf hingewiesen, dass es zum Thema „ZfP im Zeichen der Digitalisierung: ZfP 4.0“ auf der Jahrestagung in Koblenz eine Podiumsdiskussion geben wird. (s.a. S. 11)


Dr. Anton Erhard







Matthias Purschke, Anton Erhard und Bernd Valeske

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2021: Start of NDE 4.0 Conference Series











- 14. – 21. April 2021:
1st International Conference, Virtual
- 24. – 27. October 2022:
2nd International Conference in Berlin, Germany
- 03. – 07. March 2025:
3rd International Conference and Exhibition in Bengaluru, India
- 2027: ?

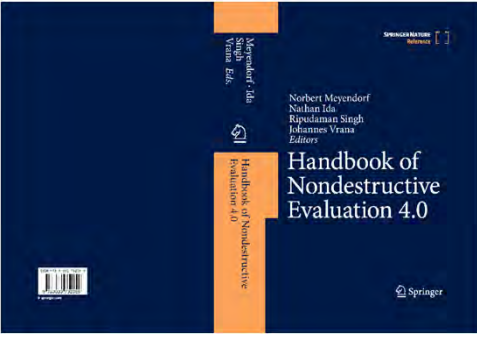
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2021/22: Books






Handbook of NDE 4.0






Available here:
<https://doi.org/10.1007/978-3-030-73206-6>

World of NDE 4.0





Available here:
<https://source.asnt.org/1s8ivdm/>

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5

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- Probabilistische Bruchmechanik
- Entwicklung der ZfP 4.0
- Öffentlich geförderte Projekte**
- Training und Workshops
- Zusammenfassung

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**2021 – 2024:
AIFRI – Artificial Intelligence For Rail Inspection**

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2010

2015

2020

NDE 4.0

2025

Situation

- ~88.000 km of tracks in Germany
- Inspected annually with Ultrasonics and Eddy Current
- Results evaluated by inspectors

AIFRI – Artificial Intelligence For Rail Inspection

Project Partners

Deutsches Zentrum für Schienenverkehrs-forschung-beiwe

DB NETZE

BAM
Bundesanstalt für Materialforschung und -prüfung

zedas


Technische Universität Berlin

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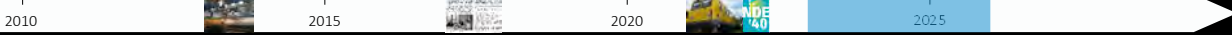
VRANA NDE 4.0 Consulting

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2023 – 2025:
NDEface-V – Development of a Universal NDE Data Interface to Optimise Design and Maintenance for Rail Vehicles – Preliminary Study



2010



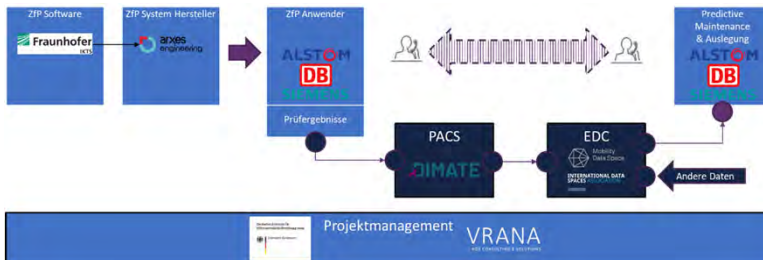
2015

2020

2025

Idee

Umsetzung einer sektorübergreifenden ZfP-Daten-Interoperabilität durch standardisierte Schnittstellen (für Schienenfahrzeuge)




Vorstudie

- Identifikation von geeigneten Anwendungsfällen
- Potential einer umfassenderen Nutzung von ZfP-Prüfdaten
- Ermittlung von
 - Hemmnissen
 - Hindernissen
 - Rahmenbedingungen

Durch:

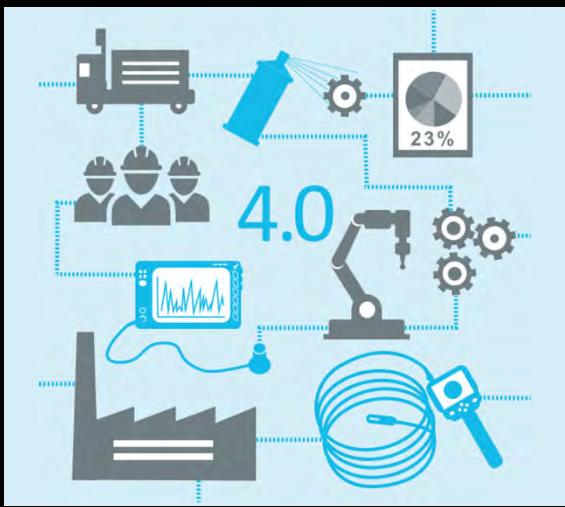
- Einzelinterviews mit den assoziierten Partnern
- 2 Workshops zur Ausarbeitung

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Inhalt

- Probabilistische Bruchmechanik
- Entwicklung der ZfP 4.0
- Öffentlich geförderte Projekte
- ➔ Training und Workshops
- Zusammenfassung




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2019:
Start of NDE 4.0 & Digital Transformation Courses

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2010 2015 2020 2025



Curriculum

1. Digitalization, Digital Transformation, Industrial Revolutions, and NDE 4.0
2. Cyber-Physical Loops
 1. IIoT
 2. Semantic Interoperability
 3. Digital Twins
3. Artificial Intelligence & Other Digitalization Tech
4. Data Security & Data Sovereignty
5. Use Cases

- 18.11.2019: ASNT Conference
NDE 4.0: Ideas, Basics, Technologies, Applications and How to Implement (4 Hours)
- 12.03.2022: SPIE Conference: Industry 4.0:
Introduction to Cyber Physical Transformation (1 Day)
- 24.05.2022: NDE 4.0 Conference:
The World of NDE 4.0: Let the Journey Begin (3 Hours)
- 26. – 27.04.2023, 22. – 23.05.2024 & 18. – 19.09.2024: Vector TUB
Einführung in ZfP 4.0 (2 Days):
- 05.12.2023: Insight Quality Services
Executive Course on Digital Transformation (1 Day)
- 26.05.2024: WCNDT
Welcome to the World of Digital Transformation and NDE 4.0 (1 Day)

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Digital Transformation Failure

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» In 2016, Forbes assessed the risk of failure in digital transformation to be 84%. «
<https://www.forbes.com/sites/forbescoachescouncil/2022/03/16/12-reasons-your-digital-transformation-will-fail/>

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Digital Transformation Failure

12 reasons why your DX could probably fail:

- Lack of alignment to business outcomes
- Lack of awareness within the organization
- Micromanagement/mismanagement of agile teams
- Distraction by the minutia
- Shiny toy syndrome
- Inability to translate into executive language
- Lack of control over external vendors
- Lack of training for internal users
- Loss of talent to competitors
- Resistance for fear of being replaced
- Slow decision-making processes
- Poor prioritization of development

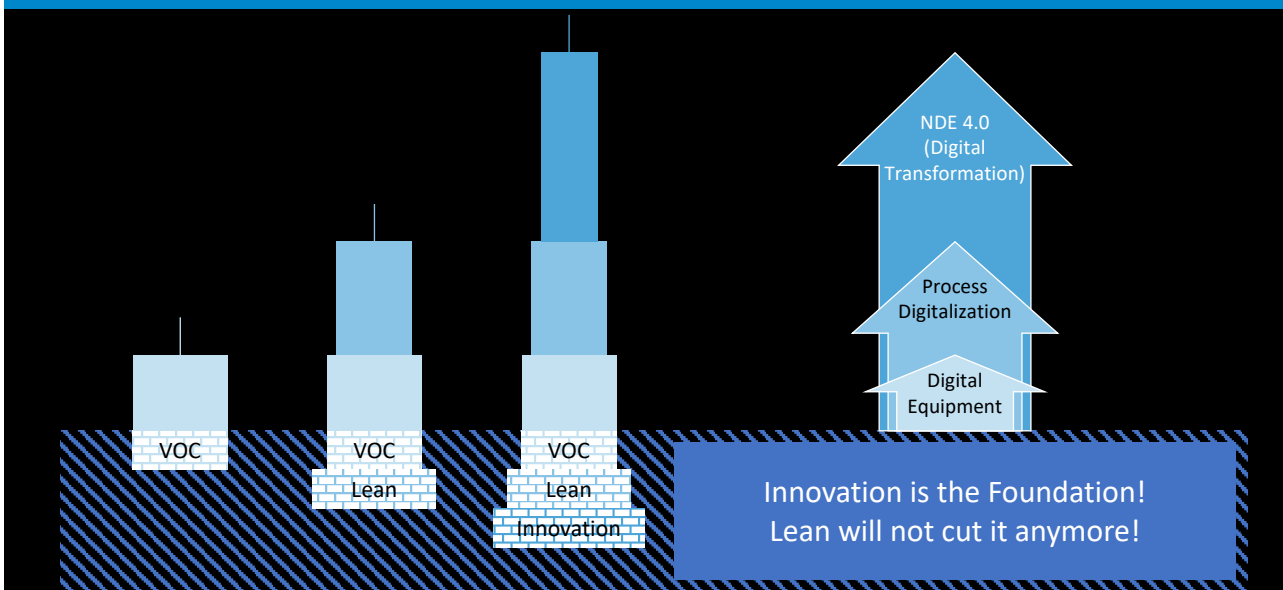
<https://www.forbes.com/sites/forbescoachescouncil/2022/03/16/12-reasons-your-digital-transformation-will-fail/>

» Humans are the problem.
And the (only) solution. «

<https://www.forbes.com/sites/forbescoachescouncil/2022/03/16/12-reasons-your-digital-transformation-will-fail/>

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Why is Innovation so Important to Digital Transformation?



It's not a typical Project or Task - It's a JOURNEY
We Must Prepare and Proceed

It's a JOURNEY

Few years

- Multiple steps
- Learn along the way

Uncertainty and Ambiguity

- End is not clear
- You must create it
- Higher obsolescence rate
- New skills required

It must make sense

- Technology that adds value
- Business economic value
- Safety – with intangibles

How?

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IDEATE – Not just Brainstorm !



IDEATE – Not just Brainstorm !

- Brainstorming does not always work
 - Group think, Democratic, ...
 - Insufficient participation from introverts
 - Internally generated triggers
 - Judgement withheld, limiting effectiveness
- Structured Ideation is better
 - Use Triggers
 - Set time limit
 - Aim for quantity
 - Do evaluate and build as a team
 - Use a neutral facilitator

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Ideation – Primary Fuel for the Innovation Culture

Ideation – Primary Fuel for the Innovation Culture

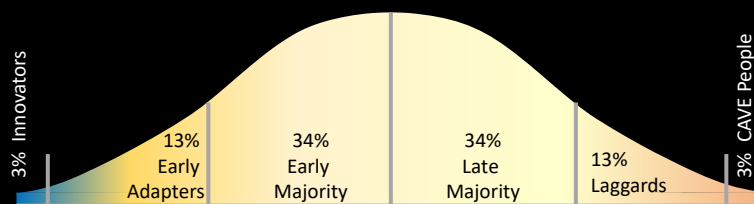
- A Process Better than Brainstorming
 - Pre-Defined topic or a challenge problem
 - Widespread participation (Volume, diversity) and social engagement
 - Higher frequency and sustained cadence
 - Follow through with Value Propositions
- Structure
 - Objective
 - Team
 - Formal Idea Generation Techniques
 - Evaluation and presentation tools



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Simple Voting on Ideas Drives Mediocrity




Simple Voting on Ideas Drives Mediocrity



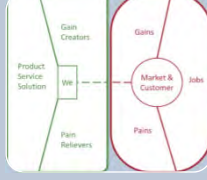


- Promising futuristic ideas will likely not be understood by most and rejected during the voting process.
- Simplest and common denominators will typically get more votes.
- Voting with a pre-defined criterion is a better way, as long as the team has time and intellect to discuss and caucus the impact.

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Ideation to Monetization – is a Disciplined Process

1.

Discovery

Pains/Gains

2.

Strategic Ideation

~100s

3.

Tactical Ideation

~10s

4.


Concept Qualification

~3-5

5.

Successful Projects

~2-3

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Digital Transformation & NDE 4.0 Multi-Day Workshops, Coaching, and Consulting

2010
2015
2020
NDE 4.0
2025





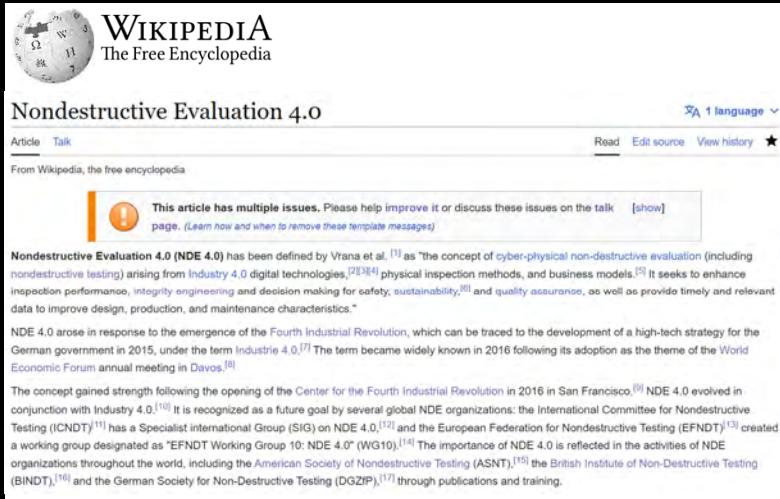






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NDE 4.0 @ Wikipedia



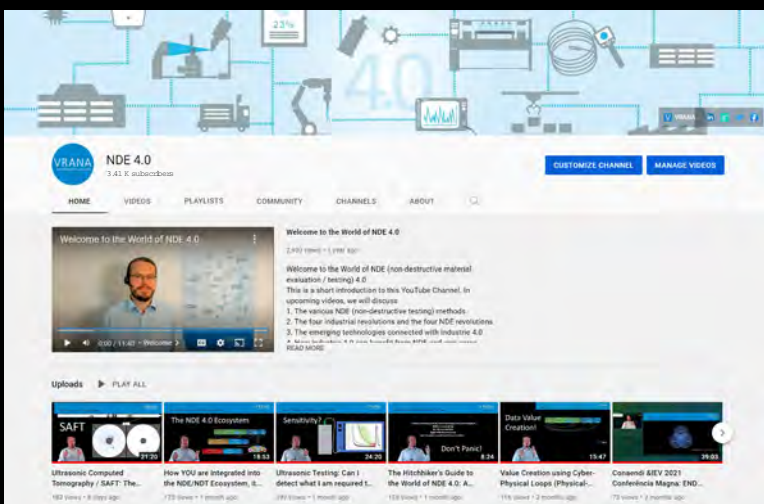
NDE 4.0 Wikipedia Article

Created by: Nathan Ida
Published: 2023-06-06

Now we need YOUR support to

- Fill this article with life
- Add and correct
- Translate to other languages

NDE 4.0 YouTube Channel



NDE 4.0 YouTube Channel

Facts:

- Founded: March 24th, 2020
- 32 NDE 4.0 Videos
- 14 UT Videos
- Panels, Announcements, ...

Guests:

- Ripi Singh
- Lennart Schulenburg
- Ramon S. Fernandez Orosco
- Marybeth Miceli
- Naveen Nair
- Kimberley Hayes
- Aru Anbarasu
- Tom Wenzel




More to come!

Available:

<https://www.youtube.com/c/nde40>

Contact

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