

An Integrated, Three-Layer Textbook of Event Technology: Concept, Method and Standards Reference

Companion paper to the Handbook of Event and Entertainment Technology (FORSCH-0183)

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forschung@tschueller.com Companion paper to **FORSCH-0183** — *Handbook of Event and Entertainment Technology* (v0.6) · CC BY 4.0 · 2026

Abstract

Event technology is an interface discipline: electrical engineering, mechanics, optics, acoustics, information technology, materials science and occupational safety converge under time pressure and in changing environments. The relevant training literature, by contrast, is mostly divided along trade lines — lighting, sound and rigging each in their own books, without a shared physical-mathematical foundation and without a consistent standards reference. This paper describes the concept, method and standards architecture of an integrated textbook (FORSCH-0183) that overcomes this division. At its core lies a twofold layering: three **learning levels** (L1 apprentice, L2 master/technician, L3 engineer/master's) and three **standards layers** (A international, B European, C national/industry-specific with a focus on Austria and a comparative view of Germany and Switzerland). Both forms of layering are brought together in a unified didactic chapter structure. The paper justifies this approach, explains the method for handling standards that are in transition at the time of publication (in particular Machinery Regulation (EU) 2023/1230 and EN 17206), and situates the handbook within a three-part work series spanning technology, management and law. It explicitly states the limits of the work: a textbook and reference work replaces neither competence nor instruction nor the legally binding standard.

Keywords: event technology · entertainment technology · engineering pedagogy · three-layer standards reference · occupational safety · open educational resource (OER)

1. Problem statement: a discipline without an integrated textbook

Anyone setting up an event technically never works in just one trade/discipline. The same person — or at least the same team under shared supervision — calculates loads for the truss, dimensions cable cross-sections and protection concepts, assesses sound levels with respect to both audience and workers, plans sightlines and brightness budgets for projection, and at the same time bears legal responsibility for the safety of people. The technical trades of an event are tightly coupled in practice: the total current draw of the lighting system determines distribution planning; the rigging load hangs from the same points as the sound reinforcement; the safety concept links crowd management, escape routes, pyrotechnics and laser.

The training and specialist literature, however, rarely reflects this coupling. It is predominantly

organized **by trade/discipline**: one book on lighting technology, another on sound reinforcement, a third on rigging. Each is valuable within its subject, yet the shared physical-mathematical foundation — level calculation, statics, electrical power, wave propagation — is introduced anew and differently in each volume, and the standards reference remains mostly implicit or narrowed to the respective national industry rule. Learners progressing from career entry through the master level to university study find no work that accompanies them across all three stages and beyond the boundaries of the individual trade.

This gap is not only didactically unsatisfactory but also relevant to safety. It is precisely the most dangerous activities in the industry — working under voltage, at height, under suspended loads, with pyrotechnics or laser — that demand an understanding which transcends the boundaries of the individual trade. A fragmented literature impedes exactly the networked thinking that practice requires.

2. Aim and contribution

The Handbook of Event and Entertainment Technology pursues the opposite ambition to the trade-specific division: an **integrated** textbook modelled on the great standard works of other disciplines (such as Campbell in biology or the established engineering textbooks), one that builds all trades on a common foundation and consistently serves three learning levels.

The contribution of this work is less the discovery of new technical knowledge than its **integration and structuring**: the consistent reduction of all trades to common physical quantities and methods of calculation, the consistent didactic layering from the intuitive to the model-based, and the systematic, three-layer standards reference. The present paper documents this architecture so that it becomes comprehensible, open to critique and transferable — to other language areas, other national standards layers and related fields of technical training.

3. Method: the twofold layering

The core didactic concept consists of two orthogonal forms of layering that work together in every chapter.

3.1 Three learning levels (L1-L3)

Each topic is developed across three levels that build on one another and are mapped to learning objectives according to Bloom:

- **L1 — apprentice/entry**: intuition, definitions, safe handling, minimum knowledge. Target level *Knowing/Understanding* (naming, describing, handling safely).
- **L2 — journeyman/technician/master**: calculation, dimensioning, application of standards, fault finding. Target level *Applying/Analysing* (calculating, dimensioning, finding faults).
- **L3 — engineer/bachelor's-master's**: model building, systems theory, optimization, limiting cases, research. Target level *Evaluating/Creating* (modelling, optimizing, assessing limiting cases).

The levels are not split off into separate chapters or volumes but carried as layers within each topic. In this way the same reader can work through the material several times as her competence grows, without changing works, and so bridge the gap from the intuitive rule to the underlying theory.

3.2 Three standards layers (A/B/C)

In parallel with the learning levels, the standards reference is structured in three layers — not as a catalogue of regulations, but as a comprehensible derivation of the rule from its level:

- **Layer A — international**: IEC, ISO, CIE, AES, SMPTE, ITU, CISPR, ANSI/ESTA.
- **Layer B — European**: EN, harmonized standards, EU directives and regulations (low voltage, EMC, machinery, PPE, pyrotechnics), the CE concept with presumption of

conformity.

- **Layer C — national/industry-specific:** with a focus on Austria (ÖVE/ÖNORM, TAEV, OETHG, ASchG/AStV) and a comparative view of Germany (DIN VDE, DGUV, VStättV, IGWV SQ) and Switzerland (SUVA).

This layering makes visible that a national industry rule is usually the concretization of a European standard, which in turn rests on an international document. Learners thus understand not only *what* applies but *why* and *at which level* — and can determine for themselves the layer that governs their particular case.

3.3 Unified chapter structure

Both forms of layering are brought together through a recurring standard didactic structure. Every chapter follows the same layout: graduated learning objectives (L1/L2/L3, Bloom-coded); an opening based on a real production scenario; layered theory (intuition → calculation → model); a standards box with three-layer concordance; worked examples with solution paths; safety and practice marginalia with a warning symbol; a section on common errors and troubleshooting; a summary with key terms; graduated exercises (knowledge/application/transfer); and cross-references to other trades. This repeatability allows selective reading — for instance only the L2 layer or only the standards boxes — and makes the work usable both as a textbook and as a reference work.

4. Structure of the work

The handbook is divided into nine parts comprising 31 chapters, together with eight appendices (A–H). Common foundations (the discipline, physical-mathematical tools, law/standardization/responsibility) are followed by the core technical parts in the order of their physical dependence: electrical engineering as the energetic base; building on it, lighting, sound and video technology; then the mechanically dominated trades of rigging, stage and machinery technology; next laser, energy and sustainability; and finally project management, event safety and work organization. The appendices bundle the recurrently needed material: a collection of formulas (A), tables and guide values (B), a standards concordance international↔European↔national (C), a connector reference (D), quantities and symbols (E), a bilingual glossary (F), inspection and checklist templates (G), as well as a thematically organized list of standards and literature (H).

The length is around 24,000 words. All chapters are, in the present version, worked out to a consistent reference depth.

5. Handling standards in transition: the VERIFICATION REQUIRED principle

A textbook that makes the standards reference part of its programme faces a fundamental methodological problem: standards change, and several sets of rules central to the industry are currently in transition. **Machinery Regulation (EU) 2023/1230** replaces Machinery Directive 2006/42/EC and applies from 20 January 2027; the rigging guideline standard **EN 17206** is being continuously revised (Part 2 in the 2024 version, a draft prEN 17206-1:2025 in progress); and Austrian state event law is inconsistently regulated across nine state acts.

The work meets this problem with two conventions. First, standards are deliberately cited in the running text **without edition year**: the version valid at the time of application is always authoritative. Second, all specific figures and limit values — load capacities, level limits, safety distances — are expressly marked as **guide values** and bear the note **VERIFICATION REQUIRED**: they serve for calculation and order of magnitude, but do not replace verification against the valid standard or the manufacturer's data sheet. Safety-critical tables that cannot be standardized generically in a sound way — such as truss load tables, which always depend on type and load case — are deliberately left open, with reference to the respective valid manufacturer's documentation.

This discipline is not a deficiency but a methodological commitment: an integrated textbook

cannot generate binding force from itself; it can only train, explain and connect. The binding force remains with the standard in its original text.

6. Placement within the work series

The handbook is the technical-engineering volume of a three-part engagement with events. Alongside it stand a volume on **event management** (planning, phases, economics, touring; FORSCH-0143) and one on **event law and permit management** in Austria. The three volumes deliberately overlap at the interfaces — safety concept, rigging load, power supply, permit conditions — and refer to one another rather than each treating these points of contact exhaustively itself. The technology book describes *how* something is safely built and operated; the management book, *how* a production is planned and steered; the law book, *under which conditions* it may take place. This demarcation prevents redundancy and at the same time makes the coupling of the three perspectives explicit.

7. Limits and non-goals

The work understands itself expressly as a textbook and reference work, not as a competence or legal document. It replaces no professional competence, no instruction on the specific work equipment, and no legally binding standard. The guide values stated are calculation aids, not a basis for the design of safety-critical decisions. The national focus is on Austria; the comparative references to Germany and Switzerland are orienting and not exhaustive. Finally, the work is a snapshot in a phase of normative transition: it names the sets of rules currently in transition but cannot anticipate their outcome. In case of doubt, the respective current standard in its original text applies.

8. Availability, license and citation

The handbook is published under **CC BY 4.0** (text) and **CC BY-SA 4.0** (figures) as an open educational resource and is deposited via Zenodo with a persistent identifier (DOI). Free use, distribution and adaptation are thus possible with attribution. This companion paper shares the license and serves as a citable scholarly entry point documenting the concept and method of the work.

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Literature and sources (selection)

The normative and further sources are listed thematically organized in Appendix H of the handbook. For the sets of rules in transition mentioned in this paper, the following may be highlighted: Regulation (EU) 2023/1230 (machinery; applicable from 20 January 2027); EN 17206:2020+AC:2021 together with EN 17206-2:2024 and draft prEN 17206-1:2025; EN ISO 13849-1:2023; IEC 60825-1:2014; ISO 20121:2024. The version valid at the time of application is authoritative in each case.