```json
{
  "$schema": "https://json-schema.org/draft/2020-12/schema",
  "$id": "https://timezyme.ai/schemas/zyme-core-v1.json",
  "title": "TimeZyme Core 5W+H Extraction — v1",
  "type": "object",
  "required": ["who", "what", "where", "when", "how", "how_much", "_meta"],

  "properties": {
    "who": {
      "type": "object",
      "required": ["authors_and_entities"],
      "properties": {
        "authors_and_entities": {
          "$comment": "List ALL primary authors or organisations. Keep order of appearance.",
          "type": "array",
          "minItems": 1,
          "items": {
            "type": "object",
            "required": ["display_name", "type"],
            "properties": {
              "display_name": {
                "type": "string",
                "minLength": 1,
                "examples": ["Ada Lovelace", "University of Oxford"]
              },
              "type": {
                "type": "string",
                "enum": ["Person", "Organization", "Consortium"]
              }
            },
            "additionalProperties": false
          },
          "maxItems": 20
        }
      },
      "additionalProperties": false
    },

    "what": {
      "type": "object",
      "required": ["title", "summary", "keywords", "document_type", "research_questions_or_objectives"],
      "properties": {
        "title": {
          "$comment": "Exact document title (preserve original casing).",
          "type": "string",
          "minLength": 1
        },
        "summary": {
          "$comment": "3–5 neutral sentences.",
          "type": ["string", "null"],
          "maxLength": 1200
        },
        "zyme_abstract": {
          "$comment": "1–2 sentence overview of the entire document's main contribution and significance. Approx 20–50 words. Used for L0 display.",
          "type": ["string", "null"],
          "maxLength": 300, // Approx 50 words }
        "keywords": {
          "$comment": "Explicit keywords if provided; else top terms.  ≤10 items.",
          "type": "array",
          "items": { "type": "string", "minLength": 1 },
          "maxItems": 10
        },
        "document_type": {
          "$comment": "Routing switch for post-MVP category blocks.",
          "type": "string",
          "enum": [
            "research_paper",
            "review_article",
            "preprint",
            "thesis",
            "case_study",
            "white_paper",
            "general_document"
          ]
        },
        "research_questions_or_objectives": {
```

```json
        "$comment": "Verbatim if possible; else concise paraphrase.",
        "type": "array",
        "items": { "type": "string", "minLength": 1 },
        "maxItems": 10
      }
    },
    "additionalProperties": false
  },

  "where": {
    "type": "object",
    "required": ["publication_venue_name", "doi", "publication_url"],
    "properties": {
      "publication_venue_name": {
        "$comment": "Journal / Conference / Repository.",
        "type": ["string", "null"]
      },
      "doi": {
        "$comment": "Digital Object Identifier if present.",
        "type": ["string", "null"],
        "pattern": "^10\\.\\d{4,9}/[-._;()/:A-Za-z0-9]+$"
      },
      "publication_url": {
        "$comment": "Canonical URL if no DOI or as fallback.",
        "type": ["string", "null"],
        "format": "uri"
      }
    },
    "additionalProperties": false
  },

  "when": {
    "type": "object",
    "required": ["publication_or_event_date"],
    "properties": {
      "publication_or_event_date": {
        "$comment": "YYYY-MM-DD; allow YYYY-MM or YYYY when incomplete.",
        "type": ["string", "null"],
        "pattern": "^\\d{4}(-(0[1-9]|1[0-2])(\\-(0[1-9]|[12][0-9]|3[01]))?)?$"
      }
    },
    "additionalProperties": false
  },

  "how": {
    "type": "object",
    "required": ["methodology_summary_or_process_description", "key_findings_or_results_or_outcomes",
"main_conclusions_or_recommendations_or_rulings"],
    "properties": {
      "methodology_summary_or_process_description": {
        "type": ["string", "null"],
        "maxLength": 800
      },
      "key_findings_or_results_or_outcomes": {
        "$comment": "Distinct factual findings.  ≤5 items.",
        "type": "array",
        "items": { "type": "string", "minLength": 1 },
        "maxItems": 5
      },
      "main_conclusions_or_recommendations_or_rulings": {
        "$comment": "Primary take-aways.  ≤5 items.",
        "type": "array",
        "items": { "type": "string", "minLength": 1 },
        "maxItems": 5
      }
    },
    "additionalProperties": false
  },

  "how_much": {
    "type": "object",
    "required": ["sample_size_or_dataset_description", "key_quantitative_results_or_metrics",
"limitations_stated_or_risks_identified"],
    "properties": {
      "sample_size_or_dataset_description": {
        "type": ["string", "null"],
        "maxLength": 200
      },
      "key_quantitative_results_or_metrics": {
        "$comment": "Important numbers (p-values, accuracy, revenue …).",
```

```
          "type": "array",
          "items": { "type": "string", "minLength": 1, "maxLength": 120 },
          "maxItems": 10
        },
        "limitations_stated_or_risks_identified": {
          "type": "array",
          "items": { "type": "string", "minLength": 1, "maxLength": 120 },
          "maxItems": 10
        }
      },
      "additionalProperties": false
    },

    "_meta": {
      "type": "object",
      "required": ["confidence", "uncertain"],
      "properties": {
        "confidence": {
          "$comment": "0.0 – 1.0 subjective accuracy / completeness.",
          "type": ["number", "null"],
          "minimum": 0,
          "maximum": 1
        },
        "uncertain": {
          "$comment": "Array of low-confidence field notes.",
          "type": "array",
          "items": {
            "type": "object",
            "required": ["path", "why"],
            "properties": {
              "path": { "type": "string", "minLength": 1 },
              "why":  { "type": "string", "minLength": 1, "maxLength": 160 }
            },
            "additionalProperties": false
          },
          "maxItems": 20
        }
      },
      "additionalProperties": false
    }

    /*  Note: `category_specific_data` intentionally omitted for MVP.  */
  },

  "additionalProperties": false
}
```