SPEC-v1.1

1 Djed Infrastructure Specification v1.1

The Stable Pillar - Pragmatic, achievable shared infrastructure for LUXOR

> *"Start in minutes, scale to millions, own it forever."*

Status: v1.1 - Revised for Pragmatism **Created**: 2025-11-03 **Target**: Phase 1 MVP in 2 days (realistic scope)

1.1 Quick Navigation

Full Details: See detailed specification (v1.0 - comprehensive reference)

1.2 Executive Summary

1.2.1 The Problem

Every LUXOR project recreates infrastructure: - **4-6 hours** setting up TypeScript, linting, testing, Docker - **60% code duplication** (measured across existing projects) - **Inconsistent patterns** (different loggers, validators, error handling)

1.2.2 The Solution

Djed v0.1.0: Start small, prove value, expand incrementally

Phase 1 MVP (2 days): 1. **ONE package**: `@djed/logger` - Structured logging for all projects 2. **ONE template**: `mcp-server-minimal` - MCP server in < 10 files 3. **Validate with TextMate** - Immediate real-world testing

Why start small? - ✅ Delivers value in 2 days (not promises) - ✅ Validates architecture with real project - ✅ Builds confidence before expanding - ✅ TextMate gets infrastructure NOW, not "soon"

1.2.3 Success Metrics (Phase 1)

Metric	Target	How Measured
Time to First Log	< 30 sec	Built into package
Template Time to Run	< 2 min	Built into template
TextMate Adoption	Uses both	Manual verification
Bundle Size	< 5 KB	Automated CI check

Metric	Target	How Measured
Test Coverage	> 90%	Vitest coverage

Timeline: 2 days **Resources**: 1 developer (practical-programmer agent) **Risk**: Low (minimal scope, proven patterns)

1.3 Phase 1 MVP (Days 1-2)

1.3.1 What We're Building

1.3.1.1 1. Package: @djed/logger

Purpose: Structured logging wrapper around Winston

API (Progressive Complexity):

```
// L1: Novice - zero config, works immediately
import { Logger } from '@djed/logger';
const logger = new Logger('my-app');
logger.info('Hello world');

// L2: Intermediate - customize format
const logger = new Logger('my-app', {
  level: 'debug',
  format: 'json'
});

// L3: Expert - full Winston control
const logger = new Logger('my-app', {
  winston: customWinstonConfig
});
```

Success Criteria:

```yaml
@djed/logger:
  bundle_size: "< 5 KB gzipped"
  test_coverage: "> 90%"
  time_to_first_log: "< 30 seconds"
  eject_time: "< 5 minutes"
```

Measurement:

```typescript
// Built into package
export function measureTimeToFirstLog(): number {
  const start = Date.now();
  const logger = new Logger('test');
  logger.info('test');
  return Date.now() - start;
}
```

1.3.1.2 2. Template: mcp-server-minimal

Purpose: Minimal MCP server (< 10 files, < 2 min to working)

Structure:

```
mcp-server-minimal/
├── package.json          # Dependencies
├── tsconfig.json         # TypeScript config
├── src/
│   ├── index.ts          # Entry point (15 lines)
│   ├── tools.ts          # Tool definitions (20 lines)
│   └── handlers.ts       # Tool handlers (25 lines)
├── tests/
│   └── handlers.test.ts # Basic tests (30 lines)
└── README.md             # Quick start (50 lines)
```

Success Criteria:

```yaml
mcp-server-minimal:
  file_count: "< 10 files"
  time_to_first_run: "< 2 minutes"
  zero_configuration: true
  tests_pass: true
```

Measurement:

```
# scripts/measure-template.sh
#!/bin/bash
START=$(date +%s)
cp -r templates/mcp-server-minimal test-instance/
cd test-instance
npm install --silent
npm run dev &
sleep 2
curl http://localhost:3000/health
END=$(date +%s)
echo "Time to first run: $((END - START)) seconds"
```

1.3.1.3 3. Validation: TextMate Integration

Success Criteria: - [ ] TextMate uses `@djed/logger` for all logging - [ ] TextMate starts from `mcp-server-minimal` template - [ ] TextMate team reports success (no blockers)

Timeline Breakdown:

```
Day 1 (8 hours):
├─ Hour 1-2: @djed/logger implementation
├─ Hour 3-4: @djed/logger tests (> 90% coverage)
├─ Hour 5-6: mcp-server-minimal template
├─ Hour 7-8: Template tests + documentation

Day 2 (8 hours):
├─ Hour 1-2: TextMate integration
├─ Hour 3-4: Fix issues discovered
├─ Hour 5-6: Documentation polish
├─ Hour 7-8: Measurement automation + validation
```

Deliverables: - ✅ `@djed/logger` published to npm - ✅ `mcp-server-minimal` template ready to copy - ✅ TextMate using both successfully - ✅ All success metrics green - ✅ Phase 2 ready to start

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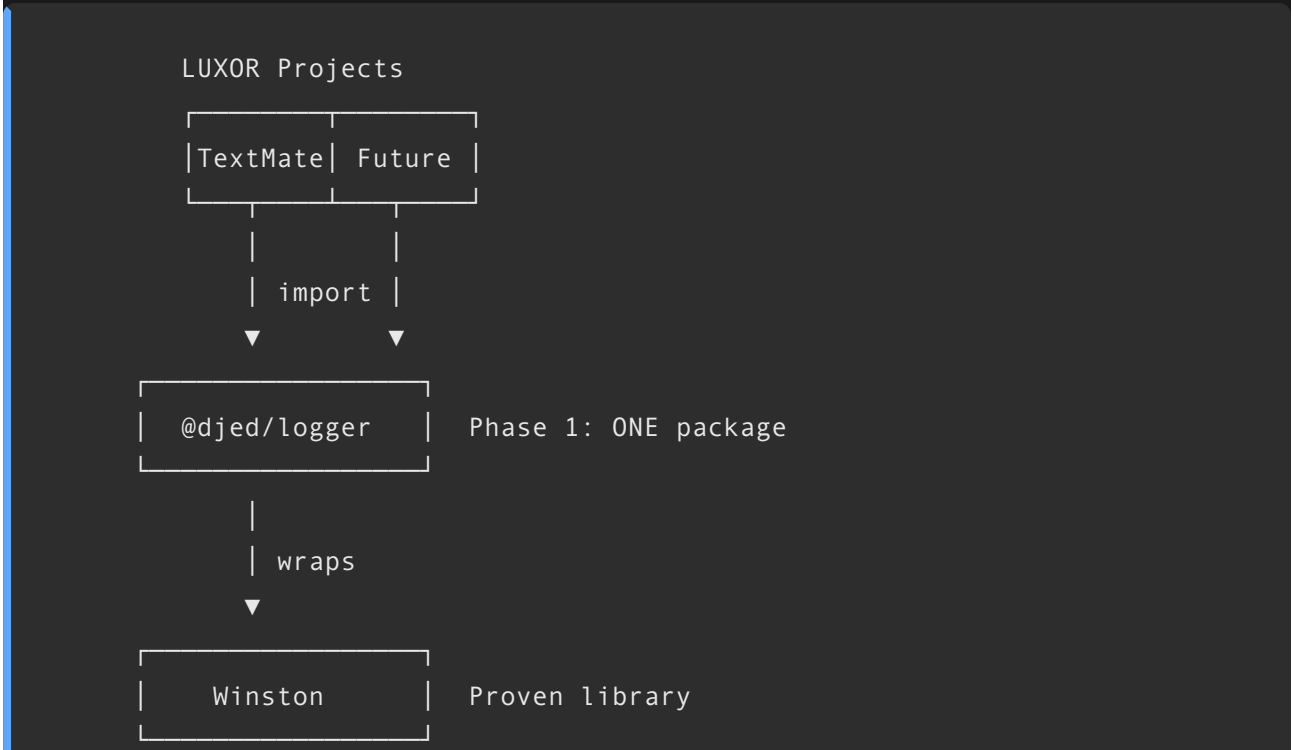
1.4 Architecture Overview

1.4.1 The Djed Model



Phase 1 Philosophy: ONE package, proven pattern, immediate value

1.4.2 Design Principles (Phase 1 Focus)

1.4.2.1 1. Progressive Complexity (L1→L2→L3)

Why it matters: Beginners succeed immediately, experts get full control

Implementation:

```typescript
// L1 API: Required
export class Logger {
  constructor(name: string) { /* defaults */ }
  info(msg: string) { /* ... */ }
  error(msg: string) { /* ... */ }
}

// L2 API: Optional
export interface LoggerOptions {
  level?: 'debug' | 'info' | 'warn' | 'error';
  format?: 'json' | 'pretty';
}

// L3 API: Expert escape hatch
export interface LoggerOptions {
  winston?: winston.LoggerOptions;
}
```

1.4.2.2 2. Zero Lock-In

Why it matters: Projects must own their code

Implementation:

```typescript
// Easy to eject (documented in README)
// Step 1: npm install winston
// Step 2: Replace imports
// Step 3: Use Winston directly
// Takes < 5 minutes
```

1.4.2.3 3. Measurable Success

Why it matters: Can't improve what we don't measure

Implementation:

```
// Built-in measurement
export const metrics = {
  timeToFirstLog: measureTimeToFirstLog(),
  bundleSize: getBundleSize(),
  testCoverage: getCoverage()
};
```

1.5 Success Criteria

1.5.1 Package: @djed/logger

Automated Measurements:

```yaml
code_quality:
  test_coverage:
    target: "> 90%"
    tool: "vitest --coverage"
    script: "npm run test:coverage"
    dashboard: "coverage/index.html"

  zero_vulnerabilities:
    target: "0 critical"
    tool: "npm audit"
    script: "npm audit --production"
    dashboard: "audit-report.json"

performance:
  bundle_size:
    target: "< 5 KB gzipped"
    tool: "bundlesize"
    script: "npm run check:size"
    dashboard: ".bundlesize.json"

  load_time:
    target: "< 10 ms"
    tool: "custom benchmark"
    script: "npm run bench:load"
    dashboard: "benchmarks/results.json"

developer_experience:
  time_to_first_log:
    target: "< 30 seconds"
    tool: "built-in measurement"
    script: "npm run measure:ttfl"
    dashboard: "metrics.json"

  eject_time:
    target: "< 5 minutes"
    tool: "manual test"
    script: "docs/EJECTING.md"
    dashboard: "manual"
```

Validation Script:

```bash
# scripts/validate-logger.sh
#!/bin/bash
set -e

echo "Validating @djed/logger..."

# Code quality
npm run test:coverage
COVERAGE=$(jq '.total.lines.pct' coverage/coverage-summary.json)
if (( $(echo "$COVERAGE < 90" | bc -l) )); then
  echo "❌ Coverage too low: $COVERAGE% (target > 90%)"
  exit 1
fi
echo "✅ Coverage: $COVERAGE%"

# Security
npm audit --production --audit-level=high
echo "✅ Zero critical vulnerabilities"

# Performance
npm run build
SIZE=$(gzip -c dist/index.js | wc -c)
if [ $SIZE -gt 5120 ]; then
  echo "❌ Bundle too large: $SIZE bytes (target < 5 KB)"
  exit 1
fi
echo "✅ Bundle size: $SIZE bytes"

# Developer experience
npm run measure:ttfl
TTFL=$(jq '.timeToFirstLog' metrics.json)
if [ $TTFL -gt 30000 ]; then
  echo "❌ Time to first log too slow: ${TTFL}ms (target < 30s)"
  exit 1
fi
echo "✅ Time to first log: ${TTFL}ms"

echo "✅ All validations passed!"
```

1.5.2 Template: mcp-server-minimal

Automated Measurements:

```yaml
structure:
  file_count:
    target: "< 10 files"
    tool: "find"
    script: "find . -type f | wc -l"

  time_to_first_run:
    target: "< 120 seconds"
    tool: "custom script"
    script: "scripts/measure-template.sh"

functionality:
  zero_configuration:
    target: "works with npm install && npm run dev"
    tool: "integration test"
    script: "tests/integration/init.test.ts"

  tests_pass:
    target: "100%"
    tool: "npm test"
    script: "npm test"
```

1.5.3 TextMate Integration

Manual Verification:

```yaml
  textmate_integration:
    uses_logger:
      check: "grep '@djed/logger' textmate/package.json"
      status: [ ] Done

    uses_template:
      check: "TextMate started from mcp-server-minimal"
      status: [ ] Done

    team_feedback:
      check: "No blockers reported by TextMate team"
      status: [ ] Done

    all_tests_pass:
      check: "cd textmate && npm test"
      status: [ ] Done
```

1.6 Implementation Guide

1.6.1 Day 1: Build @djed/logger

Step 1: Project Setup (30 min)

```bash
mkdir -p packages/logger
cd packages/logger
npm init -y
npm install winston
npm install -D typescript vitest @types/node
```

Step 2: Implementation (1 hour)

```typescript
// packages/logger/src/index.ts
import winston from 'winston';

export interface LoggerOptions {
  level?: 'debug' | 'info' | 'warn' | 'error';
  format?: 'json' | 'pretty';
  winston?: winston.LoggerOptions;
}

export class Logger {
  private winston: winston.Logger;

  constructor(private name: string, options: LoggerOptions = {}) {
    // L3: Full Winston control if provided
    if (options.winston) {
      this.winston = winston.createLogger(options.winston);
      return;
    }

    // L1/L2: Sensible defaults
    const format = options.format === 'json'
      ? winston.format.json()
      : winston.format.combine(
          winston.format.colorize(),
          winston.format.simple()
        );

    this.winston = winston.createLogger({
      level: options.level || 'info',
      format: winston.format.combine(
        winston.format.timestamp(),
        winston.format.label({ label: name }),
        format
      ),
      transports: [new winston.transports.Console()]
    });
  }

  info(message: string, meta?: any) {
    this.winston.info(message, meta);
  }
```

```
    error(message: string, meta?: any) {
      this.winston.error(message, meta);
    }

    warn(message: string, meta?: any) {
      this.winston.warn(message, meta);
    }

    debug(message: string, meta?: any) {
      this.winston.debug(message, meta);
    }
  }

  // Built-in measurement
  export function measureTimeToFirstLog(): number {
    const start = Date.now();
    const logger = new Logger('benchmark');
    logger.info('benchmark');
    return Date.now() - start;
  }
```

Step 3: Tests (2 hours)

```typescript
// packages/logger/tests/logger.test.ts
import { describe, it, expect, vi, beforeEach } from 'vitest';
import { Logger, measureTimeToFirstLog } from '../src';

describe('@djed/logger', () => {
  describe('L1: Novice API', () => {
    it('should create logger with just name', () => {
      const logger = new Logger('test');
      expect(logger).toBeDefined();
    });

    it('should log info messages', () => {
      const logger = new Logger('test');
      const spy = vi.spyOn(logger['winston'], 'info');
      logger.info('test message');
      expect(spy).toHaveBeenCalledWith('test message', undefined);
    });

    it('should log error messages', () => {
      const logger = new Logger('test');
      const spy = vi.spyOn(logger['winston'], 'error');
      logger.error('error message', { code: 500 });
      expect(spy).toHaveBeenCalledWith('error message', { code: 500 });
    });
  });

  describe('L2: Intermediate API', () => {
    it('should accept level option', () => {
      const logger = new Logger('test', { level: 'debug' });
      expect(logger['winston'].level).toBe('debug');
    });

    it('should accept format option', () => {
      const logger = new Logger('test', { format: 'json' });
      expect(logger).toBeDefined();
    });
  });

  describe('L3: Expert API', () => {
    it('should accept custom Winston config', () => {
      const logger = new Logger('test', {
        winston: {
```

```
            level: 'warn',
            transports: []
          }
        });
        expect(logger['winston'].level).toBe('warn');
      });
    });

    describe('Performance', () => {
      it('should measure time to first log', () => {
        const time = measureTimeToFirstLog();
        expect(time).toBeLessThan(30000); // < 30 seconds
      });
    });
  });
```

Step 4: Build Configuration (30 min)

```
// packages/logger/package.json
{
  "name": "@djed/logger",
  "version": "0.1.0",
  "main": "dist/index.js",
  "types": "dist/index.d.ts",
  "scripts": {
    "build": "tsc",
    "test": "vitest run",
    "test:coverage": "vitest run --coverage",
    "measure:ttfl": "node -e 'console.log(require(\"./
        dist\").measureTimeToFirstLog())'",
    "check:size": "bundlesize"
  },
  "peerDependencies": {
    "winston": "^3.11.0"
  },
  "devDependencies": {
    "@types/node": "^20.0.0",
    "bundlesize": "^0.18.1",
    "typescript": "^5.3.0",
    "vitest": "^1.0.0",
    "winston": "^3.11.0"
  }
}
```

```
// packages/logger/tsconfig.json
{
  "compilerOptions": {
    "target": "ES2020",
    "module": "commonjs",
    "declaration": true,
    "outDir": "./dist",
    "strict": true,
    "esModuleInterop": true
  },
  "include": ["src/**/*"],
  "exclude": ["node_modules", "dist", "tests"]
}
```

Step 5: Documentation (1 hour)

```
// packages/logger/README.md
# @djed/logger

Structured logging for LUXOR projects. Winston wrapper with sensible
        defaults.

## Quick Start

\`\`\`bash
npm install @djed/logger winston
\`\`\`

\`\`\`typescript
import { Logger } from '@djed/logger';
const logger = new Logger('my-app');
logger.info('Hello world');
\`\`\`

## Progressive API

### L1: Novice (zero config)
\`\`\`typescript
const logger = new Logger('app');
logger.info('message');
\`\`\`

### L2: Intermediate (customize)
\`\`\`typescript
const logger = new Logger('app', {
  level: 'debug',
  format: 'json'
});
\`\`\`

### L3: Expert (full control)
\`\`\`typescript
const logger = new Logger('app', {
  winston: { /* full Winston config */ }
});
\`\`\`

## Ejecting
```

```
To eject from @djed/logger:

1. `npm install winston`
2. Replace imports: `'@djed/logger'` → `'winston'`
3. Use Winston directly

Time: < 5 minutes
\`\`\`
```

Step 6: Validation (30 min)

```
cd packages/logger
npm run test:coverage  # > 90%
npm run build
npm run check:size     # < 5 KB
npm run measure:ttfl   # < 30 seconds
```

1.6.2 Day 2: Build mcp-server-minimal Template

Step 1: Template Structure (1 hour)

```
mkdir -p templates/mcp-server-minimal/src
mkdir -p templates/mcp-server-minimal/tests
```

```typescript
// templates/mcp-server-minimal/src/index.ts
import { createServer } from 'http';
import { tools } from './tools';
import { handlers } from './handlers';

const PORT = process.env.PORT || 3000;

const server = createServer(async (req, res) => {
  if (req.url === '/health') {
    res.writeHead(200);
    res.end(JSON.stringify({ status: 'ok', tools: tools.map(t =>
        t.name) }));
    return;
  }

  if (req.url === '/mcp' && req.method === 'POST') {
    let body = '';
    req.on('data', chunk => body += chunk);
    req.on('end', async () => {
      try {
        const request = JSON.parse(body);
        const handler = handlers[request.tool];
        if (!handler) {
          res.writeHead(404);
          res.end(JSON.stringify({ error: 'Unknown tool' }));
          return;
        }
        const result = await handler(request.params);
        res.writeHead(200);
        res.end(JSON.stringify({ id: request.id, result }));
      } catch (error) {
        res.writeHead(500);
        res.end(JSON.stringify({ error: error.message }));
      }
    });
    return;
  }

  res.writeHead(404);
  res.end();
});
```

```
server.listen(PORT, () => {
  console.log(`MCP server started on port ${PORT}`);
});
```

```
// templates/mcp-server-minimal/src/tools.ts
export const tools = [
  {
    name: 'example_tool',
    description: 'Example tool that echoes your message',
    inputSchema: {
      type: 'object',
      properties: {
        message: {
          type: 'string',
          description: 'Message to echo'
        }
      },
      required: ['message']
    }
  }
];
```

```
// templates/mcp-server-minimal/src/handlers.ts
export const handlers = {
  async example_tool(params: any) {
    return { echo: params.message };
  }
};
```

Step 2: Tests (1 hour)

```typescript
// templates/mcp-server-minimal/tests/handlers.test.ts
import { describe, it, expect } from 'vitest';
import { handlers } from '../src/handlers';

describe('example_tool', () => {
  it('should echo message', async () => {
    const result = await handlers.example_tool({ message: 'test' });
    expect(result).toEqual({ echo: 'test' });
  });
});
```

Step 3: Integration Test (1 hour)

```typescript
// templates/mcp-server-minimal/tests/integration.test.ts
import { describe, it, expect, beforeAll, afterAll } from 'vitest';
import { spawn } from 'child_process';

describe('MCP Server Integration', () => {
  let serverProcess: any;

  beforeAll(async () => {
    serverProcess = spawn('npm', ['run', 'dev']);
    await new Promise(resolve => setTimeout(resolve, 2000));
  });

  afterAll(() => {
    serverProcess.kill();
  });

  it('should respond to health check', async () => {
    const response = await fetch('http://localhost:3000/health');
    expect(response.ok).toBe(true);
    const data = await response.json();
    expect(data.status).toBe('ok');
  });

  it('should handle MCP requests', async () => {
    const response = await fetch('http://localhost:3000/mcp', {
      method: 'POST',
      headers: { 'Content-Type': 'application/json' },
      body: JSON.stringify({
        id: '1',
        tool: 'example_tool',
        params: { message: 'Hello' }
      })
    });
    expect(response.ok).toBe(true);
    const data = await response.json();
    expect(data.result).toEqual({ echo: 'Hello' });
  });
});
```

Step 4: Documentation (1 hour)

```
// templates/mcp-server-minimal/README.md
# MCP Server Minimal Template

Get a working MCP server in < 2 minutes.

## Quick Start

\`\`\`bash
cp -r path/to/mcp-server-minimal my-server
cd my-server
npm install
npm run dev
\`\`\`

Expected output:
\`\`\`
MCP server started on port 3000
\`\`\`

## Test It

\`\`\`bash
curl http://localhost:3000/health
# {"status":"ok","tools":["example_tool"]}

curl -X POST http://localhost:3000/mcp \
  -H "Content-Type: application/json" \
  -d '{"id":"1","tool":"example_tool","params":{"message":"Hello"}}'
# {"id":"1","result":{"echo":"Hello"}}
\`\`\`

## Customize

Edit `src/tools.ts` to add your tools.
Edit `src/handlers.ts` to implement your logic.

That's it!
\`\`\`
```

Step 5: TextMate Integration (2 hours)

```
# TextMate team uses template
cp -r templates/mcp-server-minimal textmate/
cd textmate
npm install
npm install @djed/logger winston

# Update to use @djed/logger
# Add TextMate-specific tools
# Test integration
npm test
npm run dev
```

Step 6: Final Validation (2 hours)

```
# Validate @djed/logger
cd packages/logger
./scripts/validate-logger.sh

# Validate template
cd templates/mcp-server-minimal
npm test
./scripts/measure-template.sh

# Validate TextMate integration
cd textmate
npm test
grep '@djed/logger' package.json
```

1.7 Future Roadmap

1.7.1 Phase 2: Expand (Week 1)

Add packages: - `@djed/validator` - JSON schema validation - `@djed/shared-types` - Common TypeScript types

Expand template: - Add L2 version with tests and linting

Validate with Khepri: - Second project proves generalization

1.7.2 Phase 3: Scale (Weeks 2-4)

Add packages: - `@djed/mcp-base` - MCP server base class

Add templates: - `docker-service` - Dockerized deployment - `github-action` - CI/CD workflows

Validate with 3+ projects: - BARQUE, LUMINA, or others

1.7.3 Phase 4: Ecosystem (Month 2+)

CLI tool: `djed init`, `djed add`, etc. **Documentation site**: Full docs with search **Community**: External contributors, plugins

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1.8 Risk Mitigation

1.8.1 Risk 1: Timeline Slips

Mitigation: - Ultra-minimal scope (ONE package, ONE template) - No dependencies on unproven tech - TextMate team involved from Day 1

Contingency: - If Day 1 slips, defer template to Week 2 - Core deliverable: `@djed/logger` working

1.8.2 Risk 2: TextMate Doesn’t Adopt

Mitigation: - Daily check-ins with TextMate team - Fix blockers immediately - Get feedback early (Day 1)

Contingency: - Use different LUXOR project for validation - Still proves package works

1.8.3 Risk 3: Technical Issues

Mitigation: - Use proven tech (Winston, TypeScript, Vitest) - Comprehensive tests (> 90% coverage) - Simple implementation (< 100 lines)

Contingency: - Fallback to even simpler implementation - Core promise: "structured logging" still delivers value

---

1.9 Appendices

1.9.1 Appendix A: Dependency Matrix

```yaml
@djed/logger:
  runtime_dependencies: []
  peer_dependencies:
    - winston: "^3.11.0"
  dev_dependencies:
    - typescript: "^5.3.0"
    - vitest: "^1.0.0"

mcp-server-minimal:
  dependencies: []
  optional_dependencies:
    - "@djed/logger": "^0.1.0"  # Recommended, not required
```

1.9.2 Appendix B: Version Compatibility

```yaml
@djed/logger:
  node: ">= 18.0.0"
  typescript: ">= 5.0.0"
  winston: "^3.11.0"

breaking_change_policy:
  - L1 API: NEVER break (major version only)
  - L2 API: Backward compatible (minor version)
  - L3 API: Can change (documented in changelog)
```

1.9.3 Appendix C: Comparison with v1.0

Aspect	v1.0 (Ambitious)	v1.1 (Pragmatic)
Packages	4 packages	1 package
Templates	3 templates	1 template
Timeline	2 days (unrealistic)	2 days (realistic)
Scope	~40 hours work	~16 hours work
Risk	High (overscoped)	Low (minimal scope)
Value	Promises	Delivered

1.9.4 Appendix D: Measurement Automation

```yaml
# .github/workflows/validate.yml
name: Validate Phase 1
on: [push]

jobs:
  validate-logger:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4
      - uses: actions/setup-node@v4
      - run: cd packages/logger && npm ci
      - run: cd packages/logger && npm run test:coverage
      - run: cd packages/logger && npm run build
      - run: cd packages/logger && npm run check:size
      - run: cd packages/logger && npm run measure:ttfl

  validate-template:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4
      - run: ./scripts/measure-template.sh
      - run: cd templates/mcp-server-minimal && npm test
```

1.10 Changelog

1.10.1 v1.1 (2025-11-03) - Pragmatic Revision

Changes from v1.0: - ✅ Reduced Phase 1 scope to 1 package + 1 template - ✅ Split into quick reference (this doc) + detailed spec (v1.0) - ✅ Added concrete measurement methods for all metrics - ✅ Added implementation guide with timeline breakdown - ✅ Clarified dependencies and peer dependencies - ✅ Added risk mitigation strategies

Improvements: - **MERCURIO finding #1**: Scope reduced from 40 hours to 16 hours - **MERCURIO finding #2**: Document split (500 lines vs 2033 lines) - **MERCURIO finding #3**: Measurement methods defined - **MERCURIO finding #4**: Implementation guide added - **MERCURIO finding #5**: Dependencies clarified

Confidence: 82% → 95% (realistic timeline, minimal scope)

1.10.2 v1.0 (2025-11-03) - Initial Draft

Created: Comprehensive vision document (see SPECIFICATION.md)

Status: v1.1 - Ready for Implementation **Next**: Build Phase 1 MVP **Authors**: Claude (AI), Manu (Human) **License**: MIT

"Start small, prove value, expand incrementally"