

ISO/IEC TR 14369:2018-01 (E)

Information technology - Programming languages, their environments and system software interfaces - Guidelines for the preparation of language-independent service specifications (LISS)

| Contents | | Page |
|--------------------|---|-------------|
| Foreword | | vii |
| Introduction | | viii |
| 1 | Scope | 1 |
| 2 | Normative references | 1 |
| 3 | Terms and definitions | 1 |
| 4 | Abbreviated terms | 4 |
| 5 | Overview | 4 |
| 5.1 | Services, interfaces, service providers and service users | 4 |
| 5.2 | Information technology services | 4 |
| 5.3 | Services and language independence | 5 |
| 5.4 | Language-independent specifications | 6 |
| 5.5 | Problems of language dependence and inbuilt assumptions | 7 |
| 5.5.1 | General | 7 |
| 5.5.2 | Representational assumptions | 7 |
| 5.5.3 | Implementation assumptions | 7 |
| 6 | Guidelines on strategy | 8 |
| 6.1 | General | 8 |
| 6.2 | General guidelines | 8 |
| 6.2.1 | Guideline: Dependence of the interface on the service | 8 |
| 6.2.2 | Guideline: What to do when there are interoperability, concurrency, or time constraint issues | 8 |
| 6.2.3 | Guideline: Use of marshalling/unmarshalling | 8 |
| 6.2.4 | Guideline: Recruiting expertise from a variety of backgrounds | 9 |
| 6.3 | What to do if starting from scratch | 9 |
| 6.3.1 | General | 9 |
| 6.3.2 | Guideline: Avoidance of implementation assumptions | 9 |
| 6.3.3 | Specifying the service in language-independent form | 9 |
| 6.3.4 | Specifying the interface to the service in language-independent form | 10 |
| 6.4 | What to do if starting from an existing language-dependent specification | 10 |
| 6.4.1 | General | 10 |
| 6.4.2 | General guidelines | 10 |
| 6.4.3 | Converting an existing language-dependent specification of the service into language-independent form | 12 |
| 6.4.4 | Converting an existing implicit interface into an explicit language-independent interface | 13 |
| 6.4.5 | Specifying a language-independent interface to a service whose specification is language-dependent | 14 |
| 7 | Guidelines on document organization | 15 |
| 7.1 | General | 15 |
| 7.2 | Guideline: The general framework | 15 |
| 7.2.1 | General | 15 |
| 7.2.2 | Checklist of parts for inclusion | 15 |

| | | |
|--------|--|----|
| 7.3 | Guideline: Production and publication | 16 |
| 7.4 | Guideline: Document organization when starting from a language-specific specification16 8 Guidelines on terminology | 17 |
| 8.1 | General | 17 |
| 8.2 | Guideline: The need for rigour | 17 |
| 8.3 | Guideline: The need for consistency | 17 |
| 8.4 | Guideline: Use of undefined terms | 17 |
| 8.5 | Guideline: Use of ISO 2382 | 17 |
| 8.6 | Guideline: Use of definition by reference | 18 |
| 8.7 | Guideline: Terminology used in bindings | 18 |
| 9 | Guidelines on use of formal specification languages | 18 |
| 9.1 | Guideline: Use of a formal specification language | 18 |
| 9.2 | Checklist of formal specification languages | 18 |
| 9.2.1 | General | 18 |
| 9.2.2 | Estelle | 18 |
| 9.2.3 | Lotos | 19 |
| 9.2.4 | VDM-SL | 19 |
| 9.2.5 | Z | 19 |
| 9.2.6 | Extended BNF | 20 |
| 9.3 | Guideline: Using formal specifications from the outset | 20 |
| 9.4 | Guideline: Use of operational semantics | 20 |
| 10 | Guidelines on interoperability | 21 |
| 10.1 | General | 21 |
| 10.1.1 | Interoperability with what? | 21 |
| 10.1.2 | The nature of the interoperation | 22 |
| 10.1.3 | How interoperation is invoked | 22 |
| 10.2 | Guidelines on interoperability with other instantiations of the same service | 22 |
| 10.2.1 | Guideline: Identifying features affecting interoperability | 22 |
| 10.2.2 | Guideline: Precise definition and rigorous conformity requirements | 22 |
| 10.2.3 | Guideline: Importance of exchange values | 23 |
| 10.3 | Guidelines on interoperability with other services | 23 |
| 10.3.1 | General | 23 |
| 10.3.2 | Guideline: Interoperability with other services being defined at the same time.23 10.3.3 Guideline: Interoperability with a pre-defined service | 23 |
| 11 | Guidelines on concurrency issues | 24 |
| 11.1 | General | 24 |
| 11.2 | Guidelines on concurrency within the service specification | 24 |
| 11.2.1 | Guideline: Avoidance of unnecessary concurrency requirements | 24 |
| 11.3 | Guidelines on concurrency of interaction with service users | 24 |
| 11.3.1 | General | 24 |
| 11.3.2 | Guideline: Handling of concurrent service requests | 25 |
| 11.3.3 | Guideline: Number of concurrent service requests handled | 25 |
| 11.3.4 | Guideline: Order of processing of service requests | 25 |
| 11.3.5 | Guideline: Criteria for prioritizing service requests | 25 |
| 11.4 | Guidelines on concurrency requirements on bindings | 25 |
| 11.4.1 | General | 25 |
| 11.4.2 | Guideline: Avoidance of concurrency requirements | 25 |
| 11.4.3 | Guideline: Specification of unavoidable concurrency requirements | 26 |
| 12 | Guidelines on the selection and specification of datatypes | 26 |
| 12.1 | General | 26 |
| 12.3 | Guideline: Specification of datatype parameter values | 26 |
| 12.4 | Guideline: Treatment of values outside the set defined for the datatype | 27 |
| 12.5 | Guideline: Specification of operations on data values | 27 |
| 12.6 | Guideline: Recommended basic set of datatypes | 27 |
| 12.7 | Guideline: Specification of arithmetic datatypes | 27 |
| 12.8 | Guideline: Approach to language bindings of datatypes | 28 |

| | | |
|--------|--|----|
| 12.9 | Guideline: Avoidance of representational definitions | 28 |
| 13 | Guidelines on specification of procedure calls | 28 |
| 13.1 | General | 28 |
| 13.2 | Guideline: Avoidance of unnecessary operational assumptions or detail | 29 |
| 13.4.1 | General | 29 |
| 13.4.2 | Guideline: Selection of datatypes of parameters | 30 |
| 13.4.3 | Guideline: Selection of parameter passing modes | 30 |
| 13.4.4 | Guideline: Use of bindings to LIPC | 31 |
| 13.5 | Interfacing via remote procedure calling (RPC) | 31 |
| 13.5.1 | General | 31 |
| 13.5.2 | Guideline: Avoid limiting the service specification because of constraints on the interface specification | 31 |
| 13.5.3 | Guideline: Specification of RPC interface | 32 |
| 13.5.4 | Guideline: Use of subsets | 32 |
| 13.6 | Guideline: Guidance concerning procedure calling to those defining language bindings to the language-independent service specification | 32 |
| 14 | Guidelines on specification of fault handling | 33 |
| 14.1 | General | 33 |
| 14.2 | Guideline: Fault detection requirements | 34 |
| 14.3 | Checklist of potential faults | 34 |
| 14.3.1 | Invocation faults | 34 |
| 14.3.2 | Execution faults | 34 |
| 14.4 | Guideline: Recovery from non-fatal faults | 35 |
| 15 | Guidelines on options and implementation dependence | 35 |
| 15.1 | General | 35 |
| 15.2 | Guidelines on service options | 36 |
| 15.2.1 | Guideline: Optional service features | 36 |
| 15.2.2 | Guideline: Avoidance of assumptions about the use of the service | 36 |
| 15.2.3 | Guideline: Use of query mechanism | 36 |
| 15.2.4 | Guideline: Management of optional service features | 36 |
| 15.2.5 | Guideline: Definition of optional features | 37 |
| 15.3 | Guidelines on interface options | 37 |
| 15.3.1 | Guideline: Completeness of interface | 37 |
| 15.3.2 | Guideline: Interface to service with options | 37 |
| 15.4 | Guidelines on binding options | 37 |
| 15.4.1 | Guideline: Completeness of binding | 37 |
| 15.4.2 | Guideline: Binding to a service with options | 37 |
| 15.4.3 | Guideline: Binding to a language with optional features | 38 |
| 15.5 | Guidelines on implementation dependence | 38 |
| 15.5.1 | Guideline: Completeness of definition | 38 |
| 15.5.2 | Guideline: Provision of implementation options | 38 |
| 15.5.3 | Guideline: Implementation-defined limits | 39 |
| 16 | Guidelines on conformity requirements | 40 |
| 16.1 | General | 40 |
| 16.2 | Guidelines for specifying conformity of implementations of the service | 41 |
| 16.2.1 | Guideline: Avoidance of assumptions about the implementation language | 41 |
| 16.2.2 | Guideline: Avoidance of representational assumptions | 41 |
| 16.2.3 | Guideline: Avoidance of implementation model | 41 |
| 16.2.4 | Guideline: Requiring end results rather than methods | 41 |
| 16.3 | Guidelines for specifying conformity of implementations of the interface | 41 |
| 16.3.1 | Guideline: Requirements on implementation-defined aspects | 41 |
| 16.4 | Guidelines for specifying conformity of bindings | 42 |
| 16.4.1 | Guideline: Propagating requirements to conforming bindings | 42 |
| 16.4.2 | Guideline: Adherence to defined semantics | 42 |
| 17 | Guidelines on specifying a language binding to a language-independent interface specification | 42 |
| 17.1 | General | 42 |

| | | |
|---|--|----|
| 17.2 | Guideline: Use of bindings to LID and LIPC | 42 |
| 17.3 | Guideline: Adherence to defined semantics | 42 |
| 17.4 | Guideline: Binding document organization | 43 |
| 17.5 | Guideline: "Reference card" binding documents | 43 |
| 18 | Guidelines on revisions | 44 |
| 18.1 | General | 44 |
| 18.2 | Kinds of change that a revision can introduce | 44 |
| 18.2.1 | General | 44 |
| 18.2.2 | Addition of a new feature | 44 |
| 18.2.3 | Change to the specification of a well-defined feature | 44 |
| 18.2.4 | Deletion of a well-defined feature | 44 |
| 18.2.5 | Deletion of ill-defined feature | 44 |
| 18.2.6 | Clarification of ill-defined feature | 45 |
| 18.2.7 | Change or deletion of obsolescent feature | 45 |
| 18.2.8 | Change of level definition | 45 |
| 18.2.9 | Change of specified limit to implementation-defined value | 45 |
| 18.2.10 | Change of other implementation requirement | 45 |
| 18.2.11 | Change of conformity clause | 45 |
| 18.3 | General guidelines applicable to revisions | 45 |
| 18.3.1 | Guideline: Revision compatibility | 45 |
| 18.4 | Guidelines on revision of the service specification | 45 |
| 18.4.1 | Guideline: Determining impact on interface and language bindings | 45 |
| 18.4.2 | Guideline: Minimising impact on interface and language bindings | 46 |
| 18.4.3 | Guideline: Use of incremental approach to revision | 46 |
| 18.5 | Guidelines on revision of the service interface | 46 |
| 18.5.1 | Guideline: Buffering unrevised bindings from changes | 46 |
| 18.5.2 | Guideline: Use of incremental amendments | 46 |
| 18.6 | Guidelines on revision of language bindings following revision of the service interface .. | 46 |
| 18.6.1 | Guideline: Buffering application programs from changes | 46 |
| 18.6.2 | Guideline: Use of incremental amendments | 46 |
| 18.7 | Guidelines on revision of a language binding following revision of the language | 47 |
| 18.7.1 | Guideline: Use of new language features | 47 |
| 18.7.2 | Guideline: Buffering "legacy" application programs from changes | 47 |
| 18.7.3 | Guideline: Buffering application programs by use of options | 47 |
| Annex A (informative) Brief guide to language-independent standards | | 48 |
| Annex B (informative) Glossary of language-independent terms | | 51 |
| Bibliography | | 64 |