LRMOO proposed FOL

2024-09-08

Table 1. LRMOO Classes

| **LRMOO ID** | **LRMOO Class** | **FOL** | **Remarks** |
| --- | --- | --- | --- |
| F1 | Work | F1(x) ⇒ E89(x) | Subclasses not indicated  *And must relate to at least one F2* |
| F2 | Expression | F2(x) ⇒ E73(x) | *And must relate to a F1* |
| F3 | Manifestation | F3(x) ⇒ E73(x) | *And must relate to at least one F2* |
| F5 | Item | F5(x) ⇒ E24(x) | *And must relate to a F3* |
| F11 | Corporate Body | F11(x) ⇒ F55(x) |  |
| F12 | Nomen | F12(x) ⇒ E89(x) |  |
| F18 | Serial Work [PRESSOO] | F18(x) ⇒ F1(x) |  |
| F27 | Work Creation | F27(x) ⇒ E65(x) |  |
| F28 | Expression Creation | F28(x) ⇒ E12(x)  F28(x) ⇒ E65(x) | Multiple hierarchies |
| F30 | Manifestation Creation | F30(x) ⇒ E12(x)  F30(x) ⇒ E65(x) | Multiple hierarchies  Subclasses not indicated |
| F31 | Performance | F31(x) ⇒ E7(x) |  |
| F32 | Item Production Event | F32(x) ⇒ E12(x) |  |
| F33 | Reproduction Event | F33(x) ⇒ E12(x)  F33(x) ⇒ F30(x) | Multiple hierarchies |
| F36 | Script Conversion | F36(x) ⇒ E29(x) |  |
| F39 | Family | F39(x) ⇒ F55(x) |  |
| F55 | Collective Agent | E74(x) ⇒ F55(x) | Subclasses not indicated |

Table 2. LRMOO Properties

| **LRMOO ID** | **LRMOO Property Name** | **LRMOO Domain Class** | **LRMOO Range Class** | **FOL** | **Remarks** |
| --- | --- | --- | --- | --- | --- |
| R1 | is logical successor of (has successor) | F1 Work | F1 Work | R1(x,y) ⇒ F1(x)  R1(x,y) ⇒ F1(y)  R1(x,y) ⇒ P130(x,y)  R1(x,y) ⇒ ¬R1(y,x)  ¬R1(x,x) | *Not transitive*  Asymmetric  Irreflexive |
| R2 | is derivative of (has derivative) | F1 Work | F1 Work | R2(x,y) ⇒ F1(x)  R2(x,y) ⇒ F1(y)  R2(x,y) ⇒ R68(x,y)  long path: R2i(x,y) ⇔ (∃uzw) [F2(u) ∧ R3(x,u) ∧ F28(z) ∧ P16i(u,z) ∧ F2(w) ∧ R17(z,w) ∧ R3i(w,y)]  R2(x,y,z) ⇒ R2(x,y) ∧ E55(z)  R2(x,y) ∧ R2(y,z) ⇒ R2(x,z)  R2(x,y) ⇒ ¬R2(y,x)  ¬R2(x,x) | *Inverse shortcut of 3 node path*  .1 has type  Transitive  Asymmetric  Irreflexive |
| R3 | is realised in (realises) | F1 Work | F2 Expression | R3(x,y) ⇒ F1(x)  R3(x,y) ⇒ F2(y)  R3(x,y) ⇒ P130(x,y) | *Quantification: necessary, dependent* |
| R4 | embodies (is embodied in) | F3 Manifestation | F2 Expression | R4(x,y) ⇒ F3(x)  R4(x,y) ⇒ F2(y)  R4(x,y) ⇒ P165(x,y) | *Quantification: necessary, dependent* |
| R5 | has component (is component of) | F2 Expression | F2 Expression | R5(x,y) ⇒ F2(x)  R5(x,y) ⇒ F2(y)  R5(x,y) ⇒ P148(x,y)  R5(x,y) ∧ R5(y,z) ⇒ R5(x,z)  R5(x,y) ⇒ ¬R5(y,x)  ¬R5(x,x) | Transitive  Asymmetric  Irreflexive |
| R7 | exemplifies (is exemplified by) | F5 Item | F3 Manifestation | R7(x,y) ⇒ F5(x)  R7(x,y) ⇒ F3(y)  R7(x,y) ⇒ P128(x,y) | *Quantification: necessary* |
| R8 | combines (is combined to form) | F12 Nomen | F12 Nomen | R8(x,y) ⇒ F12(x)  R8(x,y) ⇒ F12(y)  long path: R8(x,y) ⇔ (∃uzwv) [E62(u) ∧ R33(x,u) ∧ E90(z) ∧ P190i(u,z) ∧ E90(w) ∧ P106(z,w) ∧ E62(v) ∧ P190(w,v) ∧ R33i(v,y)]  R8(x,y) ⇒ ¬R8(y,x)  ¬R8(x,x) | *Shortcut of 4 node path*  *Not transitive*  Asymmetric  Irreflexive |
| R10 | is member of (has member) | F1 Work | **E28 Conceptual Object** | R10(x,y) ⇒ F1(x)  R10(x,y) ⇒ E28(y) | No superproperty or path |
| R11 | has issuing rule (is issuing rule of) [PRESSOO] | F18 Serial Work | **E29 Design or Procedure** | R11(x,y) ⇒ F18(x)  R11(x,y) ⇒ E29(y)  R11(x,y) ⇒ (∃z) [F30(z) ∧ R19i(x,z) ∧ P16(z,y)] | Shortcut through F30, *weak* |
| R15 | has fragment (is fragment of) | F2 Expression | **E90 Symbolic Object** | R15(x,y) ⇒ F2(x)  R15(x,y) ⇒ E90(y)  R15(x,y) ⇒ P106(x,y) |  |
| R16 | created (was created by) | F27 Work Creation | F1 Work | R16(x,y) ⇒ F27(x)  R16(x,y) ⇒ F1(y)  R16(x,y) ⇒ P94(x,y) | *Quantification: necessary, dependent* |
| R17 | created (was created by) | F28 Expression Creation | F2 Expression | R17(x,y) ⇒ F28(x)  R17(x,y) ⇒ F2(y)  R17(x,y) ⇒ P94(x,y) | *Quantification: necessary, dependent* |
| R19 | created a realisation of (was realised through) | F28 Expression Creation | F1 Work | R19(x,y) ⇒ F28(x)  R19(x,y) ⇒ F1(y)  R19(x,y) ⇒ P16(x,y) | *Quantification: necessary, dependent* |
| R24 | created (was created through) | F30 Manifestation Creation | F3 Manifestation | R24(x,y) ⇒ F30(x)  R24(x,y) ⇒ F3(y)  R24(x,y) ⇒ P94(x,y) | *Quantification: necessary, dependent* |
| R27 | materialized (was materialized by) | F32 Item Production Event | F3 Manifestation | R27(x,y) ⇒ F32(x)  R27(x,y) ⇒ F3(y)  R27(x,y) ⇒ P16(x,y) |  |
| R28 | produced (was produced by) | F32 Item Production Event | F5 Item | R28(x,y) ⇒ F32(x)  R28(x,y) ⇒F5(y)  R28(x,y) ⇒ P108(x,y) | *Quantification: necessary, dependent* |
| R29 | reproduced object (was object reproduced by) | F33 Reproduction Event | F5 Item | R29(x,y) ⇒ F33(x)  R29(x,y) ⇒ F5(y)  R29(x,y) ⇒ P16(x,y) | *Quantification: necessary* |
| R30 | reproduced publication (was publication reproduced by) | F33 Reproduction Event | F3 Manifestation | R30(x,y) ⇒ F33(x)  R30(x,y) ⇒F3(y)  R30(x,y) ⇒ P16(x,y) | *Quantification: necessary* |
| R33 | has string | F12 Nomen | **E62 String** | R33(x,y) ⇒ F12(x)  R33(x,y) ⇒ E62(y)  R33(x,y) ⇒ P3(x,y) | *Quantification: necessary* |
| R35 | is specified by (specifies) | F12 Nomen | F2 Expression | R35(x,y) ⇒ F12(x)  R35(x,y) ⇒ F2(y)  R35(x,y) ⇒ P67(y,x) | *Quantification: necessary, dependent* |
| R36 | uses script conversion (is script conversion used in) | F12 Nomen | F36 Script Conversion | R36(x,y) ⇒ F12(x)  R36(x,y) ⇒ F36(y)  R36(x,y) ⇔ (∃z) [E65(z) ∧ R17i(x,z) ∧ P33(z,y)] | Shortcut through E65*, strong* |
| R54 | has language (is language of) | F12 Nomen | **E56 Language** | R54(x,y) ⇒ F12(x)  R54(x,y) ⇒ E56(y)  R54(x,y) ⇒ P2(x,y) |  |
| R56 | has related form (is related form of) | F12 Nomen | F12 Nomen | R56(x,y) ⇒ F12(x)  R56(x,y) ⇒ F12(y)  R56(x,y) ⇔ (∃z) [E1(z) ∧ P67(x,z) ∧ P67i(z,y)]  R56(x,y,z) ⇒ R56(x,y) ∧ E55(z)  R56(x,y) ⇒ R56(y,x)  ¬R56(x,x) | Shortcut through E1, *strong*  .1 has type  Symmetric  Irreflexive |
| R67 | has part (forms part of) | F1 Work | F1 Work | R67(x,y) ⇒ F1(x)  R67(x,y) ⇒ F1(y)  R67(x,y) ⇒ P148(x,y)  R67(x,y) ∧ R67(y,z) ⇒ R67(x,z)  R67(x,y) ⇒ ¬R67(y,x)  ¬R67(x,x) | Transitive  Asymmetric  Irreflexive |
| R68 | is inspired by (is inspiration for) | F1 Work | F1 Work | R68(x,y) ⇒ F1(x)  R68(x,y) ⇒ F1(y)  R68(x,y) ⇒ P130(x,y)  R68(x,y) ⇔ F1(y) ∧ (∃z) [F27(z) ∧ R16i(x,z) ∧ P15(z,y)]  ¬R68(x,x)  R68(x,y) ⇒ ¬R67(x,y) ∧ ¬R67(y,x) | Shortcut through F27, *strong* and superproperty  Irreflexive  *Neither Work may be part of the other* |
| R69 | has physical form (is physical form of) | F3 Manifestation | **E55 Type** | R69(x,y) ⇒ F3(x)  R69(x,y) ⇒ E55(y)  R69(x,y) ⇒ P2(x,y) | *Quantification: necessary* |
| R70 | has dimension (is dimension of) | F3 Manifestation | **E54 Dimension** | R70(x,y) ⇒ F3(x)  R70(x,y) ⇒ E54(y)  R70(x,y) ⇒ P43(x,y)  R70(x,y) ⇐ (∃z) [F5(z) ∧ R7i(x,z) ∧ P43(z,y)] | Inferred from path *Quantification: necessary, dependent* |
| R71 | has part (is part of) | F3 Manifestation | F3 Manifestation | R71(x,y) ⇒ F3(x)  R71(x,y) ⇒ F3(y)  R71(x,y) ⇒ P148(x,y)  R71(x,y) ∧ R71(y,z) ⇒ R71(x,z)  R71(x,y) ⇒ ¬R71(y,x)  ¬R71(x,x) | Transitive  Asymmetric  Irreflexive |
| R73 | takes representative attribute from (bears representative attribute for) | F1 Work | F2 Expression | R73(x,y) ⇒ F1(x)  R73(x,y) ⇒ F2(y)  R73(x,y) ⇒ (∃z) [E13(z) ∧ P140i(x,z) ∧ P16(z,y)] | Shortcut through E13*, weak*  *Quantification: necessary* |
| R74 | uses expression of (has expression used in) | F1 Work | F1 Work | R74(x,y) ⇒ F1(x)  R74(x,y) ⇒ F1(y)  R74(x,y) ⇒ P130(x,y)  ¬R74(x,x) | *Not transitive*  Irreflexive |
| R75 | incorporates (is incorporated in) | F2 Expression | F2 Expression | R75(x,y) ⇒ F2(x)  R75(x,y) ⇒ F2(y)  R75(x,y) ⇒ P165(x,y)  R75(x,y) ∧ R75(y,z) ⇒ R75(x,z)  R75(x,y) ⇒ ¬R75(y,x)  ¬R75(x,x)  ¬(∃z) [F1(z) ∧ [R3(z,x) ∧ R3(z,y)]] (not this line but the one below:)  R3(x,z) ∧ R3(y,z) ⇒ x=y | Transitive  Asymmetric  Irreflexive  *The 2 F2 realise different F1* |
| R76 | is derivative of (has derivative) | F2 Expression | F2 Expression | R76(x,y) ⇒ F2(x)  R76(x,y) ⇒ F2(y)  R76(x,y) ⇒ P130(x,y)  R76(x,y) ⇔ (∃z) [F28(z) ∧ P16i(x,z) ∧ R17(z,y)]  R76(x,y,z) ⇒ R76(x,y) ∧ E55(z)  R76(x,y) ⇒ ¬R76(y,x)  ¬R76(x,x) | Shortcut through F28, *strong* and superproperty  .1 has type  Asymmetric  Irreflexive |
| R77 | accompanies or complements (is accompanied or complemented by) | F1 Work | F1 Work | R77(x,y) ⇒ F1(x)  R77(x,y) ⇒ F1(y)  R77(x,y) ⇒ (∃z) [E7(z) ∧ P19i(x,z) ∧ P19(z,y)]  ¬R77(x,x) | Shortcut through E7*, weak*  Irreflexive |
| R78 | has alternate | F3 Manifestation | F3 Manifestation | R78(x,y) ⇒ F3(x)  R78(x,y) ⇒ F3(y)  R78(x,y) ⇒ (∃z) [F2(z) ∧ R4(x,z) ∧ R4i(z,y)]  R78(x,y) ∧ R78(y,z) ⇒ R78(x,z)  R78(x,y) ⇒ R78(y,x)  ¬R78(x,x) | Shortcut through F2*, weak*  Transitive  Symmetric  Irreflexive |
| R79 | has representative expression attribute (is representative expression attribute of) | F1 Work | **E55 Type** | R79(x,y) ⇒ F1(x)  R79(x,y) ⇒ E55(y)  R79(x,y) ⇒ P2(x,y) |  |
| R80 | performed (is performed in) | F31 Performance | F1 Work | R80(x,y) ⇒ F31(x)  R80(x,y) ⇒ F1(y)  R80(x,y) ⇒ P130(x,y) | *Quantification: necessary* |
| R81 | recorded (is recorded in) | F28 Expression Creation | F31 Performance | R81(x,y) ⇒ F28(x)  R81(x,y) ⇒ F31(y) | No superproperty or path |

Questions:

* Are the arrows for shortcuts and paths correct?
* Not transitive: is this reflected in FOL or only when transitive?
* Quantification: is this reflected?
* Indicating obligation of WEMI links
* Check special conditions on R65, R75

Table 3. Transferred FRBROO Classes

| **FRBROO ID** | **FRBROO Class** | **FOL** | **Remarks** |
| --- | --- | --- | --- |
| F38 | Character | F38(x) ⇒ E28(x) |  |
| F51 | Pursuit | F51(x) ⇒ E7(x) |  |
| F52 | Name Use Activity | F52(x) ⇒ E13(x) |  |

Table 4. Transferred FRBROO Properties

| **FRBROO ID** | **FRBROO Property Name** | **FRBROO Domain Class** | **FRBROO Range Class** | **FOL** | **Remarks** |
| --- | --- | --- | --- | --- | --- |
| R57 | is based on (is basis for) | F38 Character | **E39 Actor** | R57(x,y) ⇒ F38(x)  R57(x,y) ⇒ E39(y)  R57(x,y) ⇒ (∃z) [E65(z) ∧ P94i(x,z) ∧ P17(z,y)] | Shortcut through E65 |
| R58 | has fictional member (is fictional member of) | F38 Character | F38 Character | R58(x,y) ⇒ F38(x)  R58(x,y) ⇒ F38(y)  R58(x,y) ⇒ ¬R58(y,x)  ¬R58(x,x) | ***Not transitive***  **Asymmetric**  **Irreflexive** |
| R59 | had typical subject (was typical subject of) | F51 Pursuit | **E1 CRM Entity** | R59(x,y) ⇒ F51(x)  R59(x,y) ⇒ E1(y)  R59(x,y) ⇒ (∃z) [E89(z) ∧ P94(x,z) ∧ P129(z,y)] | **Shortcut** through E89 |
| R60 | used to use language (was language used by) | F51 Pursuit | **E56 Language** | R60(x,y) ⇒ F51(x)  R60(x,y) ⇒ E56(y)  R60(x,y) ⇒ (∃z) [E33(z) ∧ P94(x,z) ∧ P72(z,y)]  R60(x,y,z) ⇒ R60(x,y) ∧ E55(z) | Shortcut through E33  .1 has type |
| R61 | occurred in kind of context (was kind of context for) | F52 Name Use Activity | **E55 Type** | R61(x,y) ⇒ F52(x)  R61(x,y) ⇒ E55(y)  R61(x,y) ⇒ (∃z) [F51(z) ∧ P9i(x,z) ∧ P2(z,y)] | Shortcut through F51 |
| R62 | was used for membership in (was context for) | F52 Name Use Activity | **E74 Group** | R62(x,y) ⇒ F52(x)  R62(x,y) ⇒ E74(y)  R62(x,y) ⇒ (∃z) [E85(z) ∧ P17(x,z) ∧ P144(z,y)] | Shortcut through E85 |
| R63 | named (was named by) | F52 Name Use Activity | **E1 CRM Entity** | R63(x,y) ⇒ F52(x)  R63(x,y) ⇒ E1(y)  R63(x,y) ⇒ P140(x,y) | *Quantification: necessary* |
| R64 | used name (was name used by) | F52 Name Use Activity | **E41 Appellation** | R64(x,y) ⇒ F52(x)  R64(x,y) ⇒ E41(y)  R64(x,y) ⇒ P16(x,y) | *Quantification: necessary* |

NB:

* R58 doesn’t include statements of transitivity, symmetry or reflexivity
* R59: error: not a subproperty line but a shortcut line