

Verbish Models: *How to Coax Semantics into Your Data Models*

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References by Ronald G. Ross:

Business Rule Concepts (3rd Ed), August, 2009, www.BRSolutions.com

Principles of the Business Rule Approach, Addison-Wesley, 2003

Entity Modeling: Techniques and Application, Database Research Group, 1987



Are You Verb Challenged?



Business Rule Solutions, LLC
The Business Rule Technique Company

▶ About Ronald G. Ross



Ronald G. Ross is Co-Founder and Principal of Business Rule Solutions, LLC (*BRSolutions.com*). BRS provides workshops, consulting, publications, and methodology supporting business analysis, business rules, business vocabulary, decisioning, and rule management. His popular public seminars, the first on business rules (starting 1996) and the longest-running in the industry, are given through AttainingEdge in North America and IRM-UK in Europe.

Mr. Ross co-develops **Proteus[®]**, BRS's landmark methodology, featuring numerous innovative techniques including the popular **RuleSpeak[®]** (free on *RuleSpeak.com*, now also in Spanish, German and Dutch). These are the latest offerings in a 35-year career that has consistently featured creative, business-driven solutions.

Mr. Ross is also Executive Editor and regular columnist of *BRCCommunity.com* and its flagship on-line publication, **Business Rules Journal**. Sponsored by BRS, BRCCommunity.com is a non-commercial vertical community for professionals working in the field. Mr. Ross was formerly Editor of the *Data Base Newsletter* from 1977 to 1998.

Mr. Ross is recognized internationally as the “father of business rules.” He has served as Co-Chair of the annual **Business Rules Forum Conference** since 1997. He was a charter member of the Business Rules Group (BRG) in the 1980s, and an editor of the two landmark BRG papers, “The Business Motivation Model: *Business Governance in a Volatile World*” (2000, revised 2005, 2007) and the “Business Rules Manifesto” (2003). He is also active in OMG standards development for business rules and business models, including SBVR.

Mr. Ross (*RonRoss.info*) is the author of eight professional books. His newest are: *Business Rule Concepts* (2009), a third edition of his popular, easy-to-read handbook, and *Principles of the Business Rule Approach*, Addison-Wesley (2003). An earlier work, *The Business Rule Book* (1994, 1997), was the seminal work in the field. Mr. Ross was honored with DAMA International's Individual Achievement Award for 1995. He received his M.S. in information science from Illinois Institute of Technology, and his B.A. from Rice U.



What is the world's leading cause of ambiguity?



Business Rule: *An order must not be shipped if the outstanding balance exceeds credit authorization.*

... something seems to be hidden or missing.

Ask: Outstanding balance *of what?*

↳ order? ...customer? ...account? ...shipment?

Credit authorization *of what?*

↳ order? ...customer? ...account? ...shipment?





Hidden or missing facts *are not good!*

Original Rule: *An order must not be shipped if the outstanding balance exceeds credit authorization.*

Facts:

- customer places order
- customer has credit authorization
- customer holds account
- account has outstanding balance

Revised Rule: *An order must not be shipped if the outstanding balance of the account held by the customer that placed the order exceeds the credit authorization of the customer.*

Example from: www.RuleSpeak.com



The Message ...

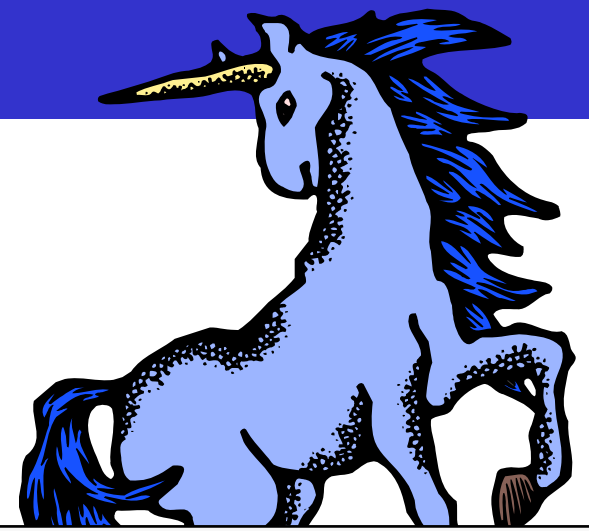
Facts → verbs

- ◆ You need *verbs* to write good business rules.
- ◆ You need *verbs* to write good requirements.
- ◆ You need *verbs* to write good business communications.

In short, you need verbs to write *anything*.

... *So why aren't we using verbs more fully?!*





Myth: Verbs simply indicate processes

“verb”

... a word belonging to that part of speech that characteristically is the grammatical center of a predicate and expresses an act, occurrence, or mode of being ...

“predicate”

2: the part of a sentence or clause that expresses what is said of the subject and that usually consists of a verb with or without objects, complements, or adverbial modifiers

From: Merriam-Webster Unabridged Dictionary (emphasis added)

“A verb, then, is not just a word that refers to an action or state but the chassis of a sentence. It is a framework with receptacles for the other parts ... to be bolted onto.”

The Stuff of Thought, by Steven Pinker, Viking, 2007, p. 31

Example: “To place” ... as in, a customer *placing* an order

There is something a customer can do:
Place an order.
... That’s a process.



There is something that can be known:
A customer *can place* an order.
... That’s a fact.

Which perspective most important for ... ?!

- ◆ Expressing business rules (criteria for operational decisions).
- ◆ Achieving reusability or sharing of data (e.g., data modeling).
- ◆ Providing high-quality information (e.g., BI).
- ◆ Retaining know-how (knowledge retention).
- ◆ Eliminating stove-pipe products (product re-engineering).



The Pedigree ...

- ◆ Sjr Nijssen, “An Architecture for Knowledge Base Software”, paper presented at the Australian Computer Society conference, July 1981, pp.1-96. Available at www.FBMf.eu. ... [CogNIAM]
- ◆ Terry Halpin (with Tony Morgan), 2nd Ed., Information Modeling and Relational Databases. San Francisco: Morgan Kaufmann, 2008. ... [ORM]
- ◆ Semantics of Business Vocabulary and Business Rules (SBVR) 1.0, 2007, OMG.

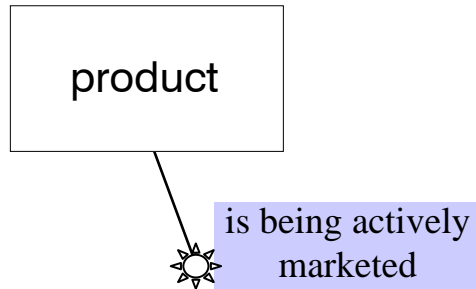
For background on the SBVR and the consortium that produced it, refer to: “A Brief History of the Business Rule Approach,”
Business Rules Journal. Available at www.BRCommunity.com

For explanation of SBVR modeling constructs, refer to:
Business Rule Concepts (3rd Ed), Part II, by Ronald G. Ross,
2009, www.BRSolutions.com



1. Unary Facts ...

Verbs about only one thing



A **unary fact type** always provides a simple *yes-or-no* answer (i.e., is assumed Boolean).

The fact type *product is being actively marketed...*

- ◆ Involves only a single term, *product*, and is therefore *unary*.
- ◆ Indicates that a given product either *is or is not* being actively marketed.
- ◆ Like any fact type, could be relevant to business rules.

Example

Rule: A briefing may be given only for a product that *is being actively marketed*.

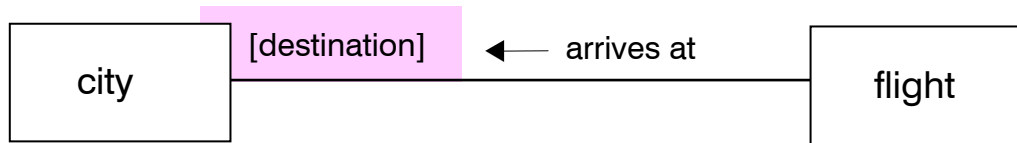
Legend

☀ = fact type



2. Roles ...

Nouns whose meaning (semantics) is all tied up with verbs



Business people often have a special term for a concept they use only in the context of some particular fact type.

Example

Business people might say:
flight arrives at destination

- ◆ *Destination* is simply a special name given to a *city* where a flight arrives.
- ◆ Such a **role** name designates the part the concept *city* plays in the context of the fact type.



2. Roles ... (*cont*)

Role names are a particularly good way to handle terms that simply reflect the wording of a fact type.



Owner simply reflects the wording *owns*.

Like any term, a role name could be relevant to business rules.

Example

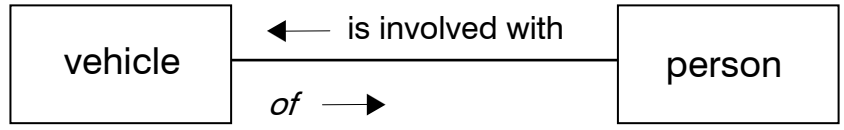
Rule: *A parking citation may be given only to the owner of a vehicle.*



3. Reversal ...

Verbs of the opposite persuasion

Data Model ...



What are you going to do with ...

Business Rule: *A vehicle must not transport more than 4 passengers.*

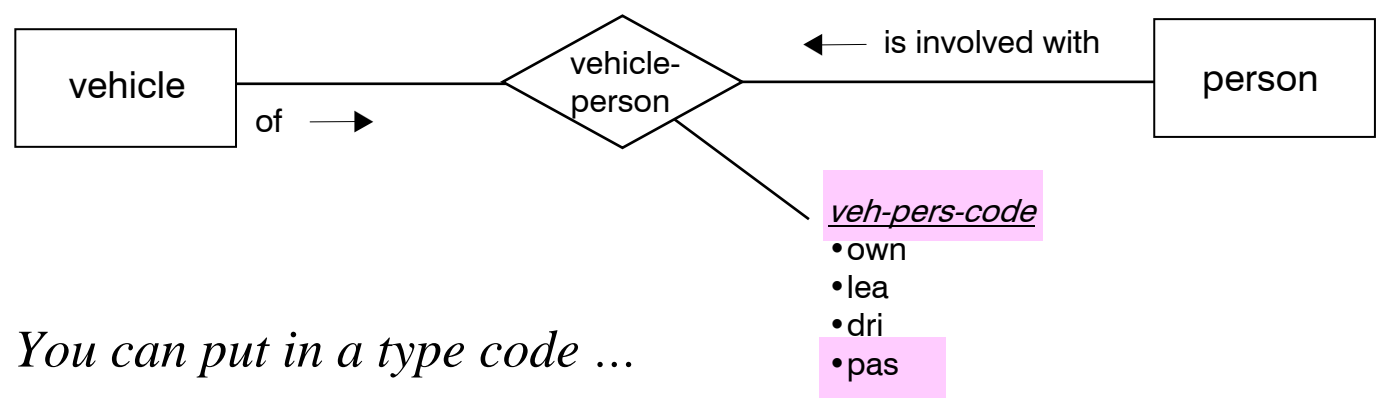
Issues That Can Be Handled Well Only Using Verbs

“Intersection data” in data models

Business Rule: A vehicle must not transport more than 4 passengers.

↳ But people can *own, lease, drive or ride in* vehicles.

Data Model ...



You can put in a type code ...

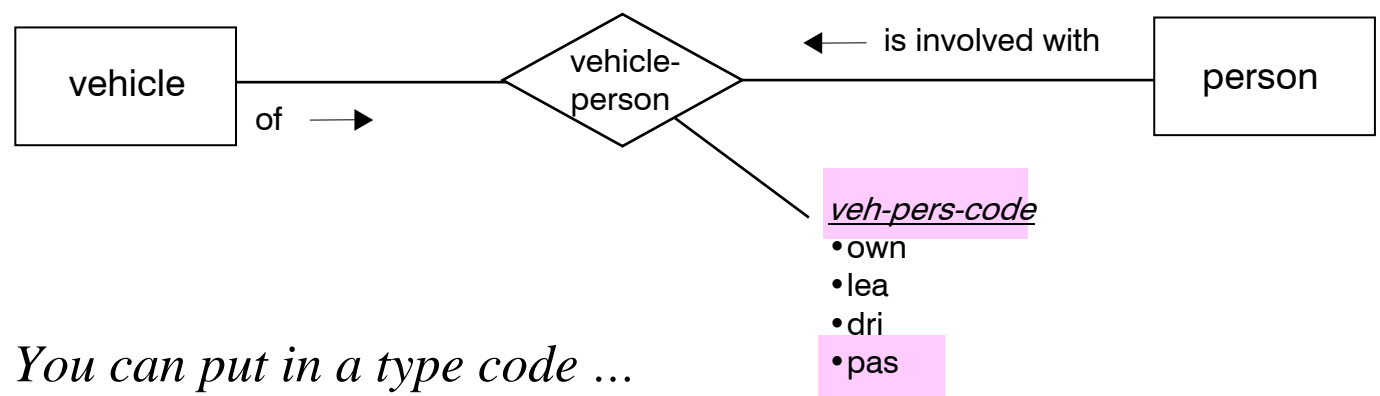
‘Data’ Rule: A vehicle must not be of more than 4 people where veh-pers-code = “pas”.

Yuck!

“Intersection data” in data models (cont)

Business Rule: *A person must not lease a vehicle the person owns.*

Data Model ...



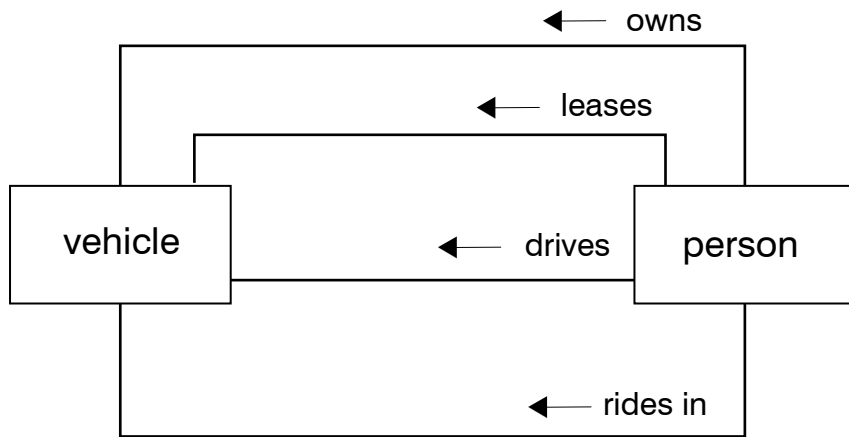
You can put in a type code ...

‘Data’ Rule: A person must not be involved with the same vehicle where veh-per-code = “lea” and veh-per-code = “own”.

Double Yuck!

➤ What Fact Types Are About

Fact models are really verbal models

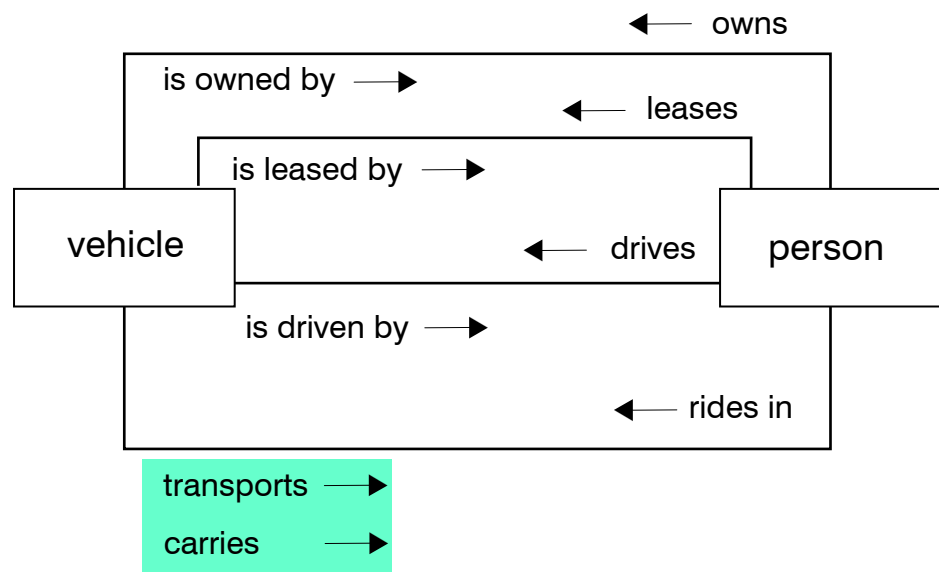


Associative fact types are expressed using verbish *wording(s)* indicating how (usually two) concepts relate.

- ◆ Fact types are never ‘mandatory’ ...
They simply indicate what *can* be known or what *can* happen.
- ◆ Two or more concepts can be related more than once ...
... if the meanings (semantics) of the verbs are different(!).

➤ What Fact Types Are About

Opposite-direction wordings ...

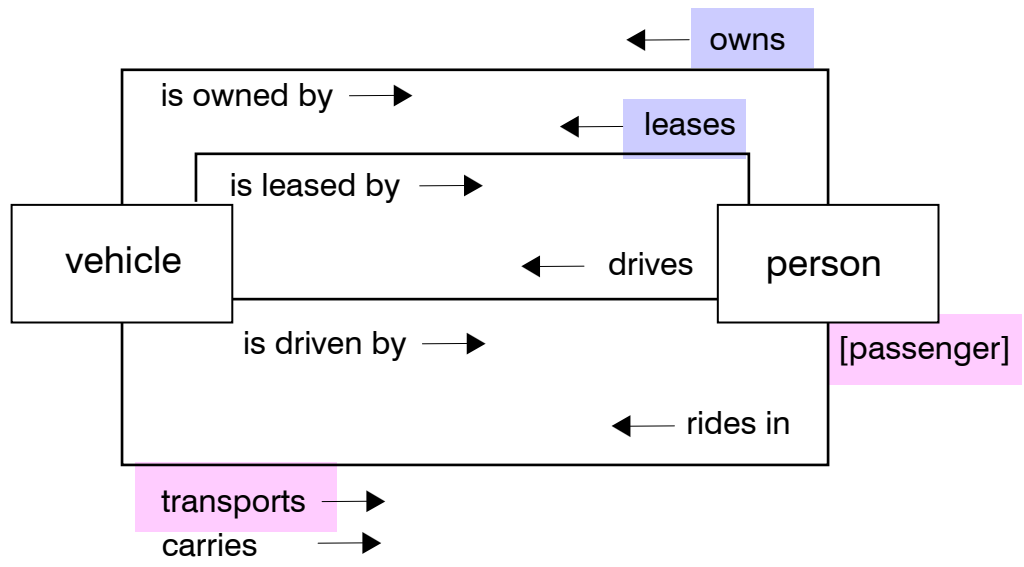


Binary fact types are always **bi-directional** (even if not worded explicitly).

- ◆ The “direction” of the little arrow indicates how to “read” the fact type (and nothing more!).
- ◆ Any verbish concept can have **synonyms ...**
... if the meaning (semantics) is 100% the same(!).

▶ What Fact Types Are About

Verbalizing business rules ...



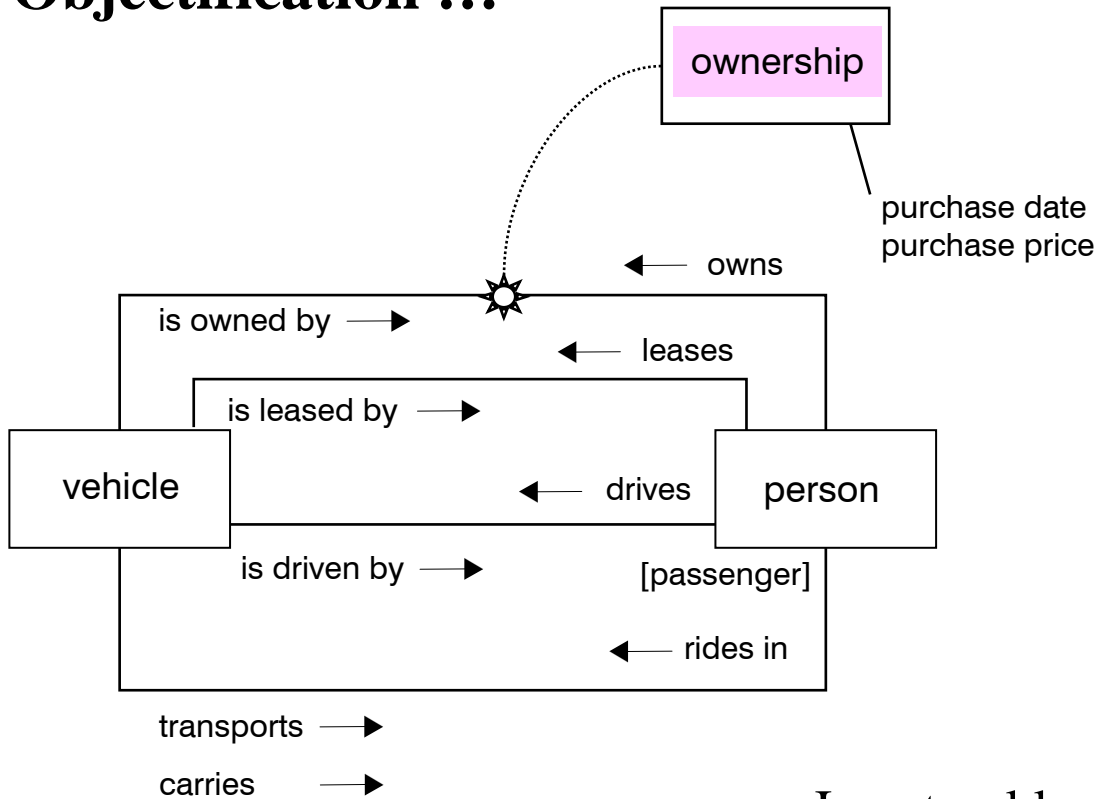
Back to the business rules ...

Rule: A vehicle must not transport more than 4 passengers.

Rule: A person must not lease a vehicle the person owns.

➤ What Fact Types Are About

Objectification ...



‘Intersections’ start off verbish!

Objectify: 1a : to cause to become or to assume the character of an object

From: Merriam-Webster Unabridged Dictionary

Legend
☀ = fact type

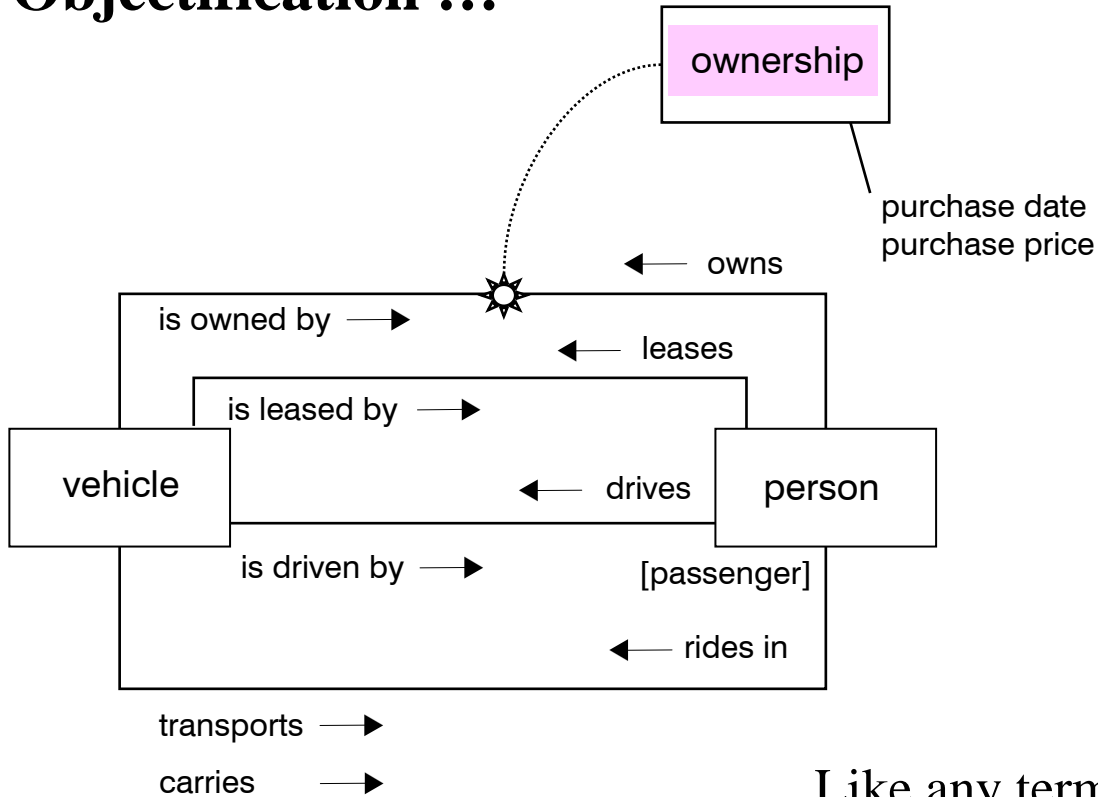
In natural language, we often turn verbs into nouns, so we can talk about them as ‘things’.

- ◆ In other words, we **objectify** (or reify) them.
- ◆ Because objectifications (e.g., **ownership**) are ‘things’, they can have properties.



➤ What Fact Types Are About

Objectification ...



Like any term, an objectification could be relevant to business rules.

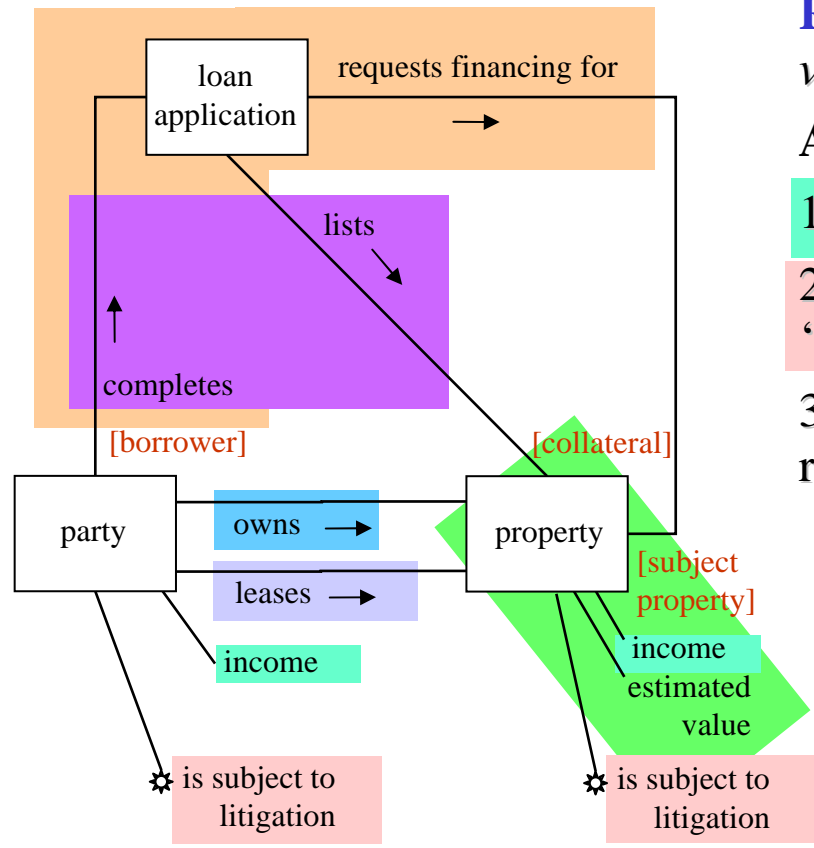
Legend
★ = fact type

Example

Rule: *Proof of purchase must be provided to establish ownership of a vehicle.*



Mortgage applications

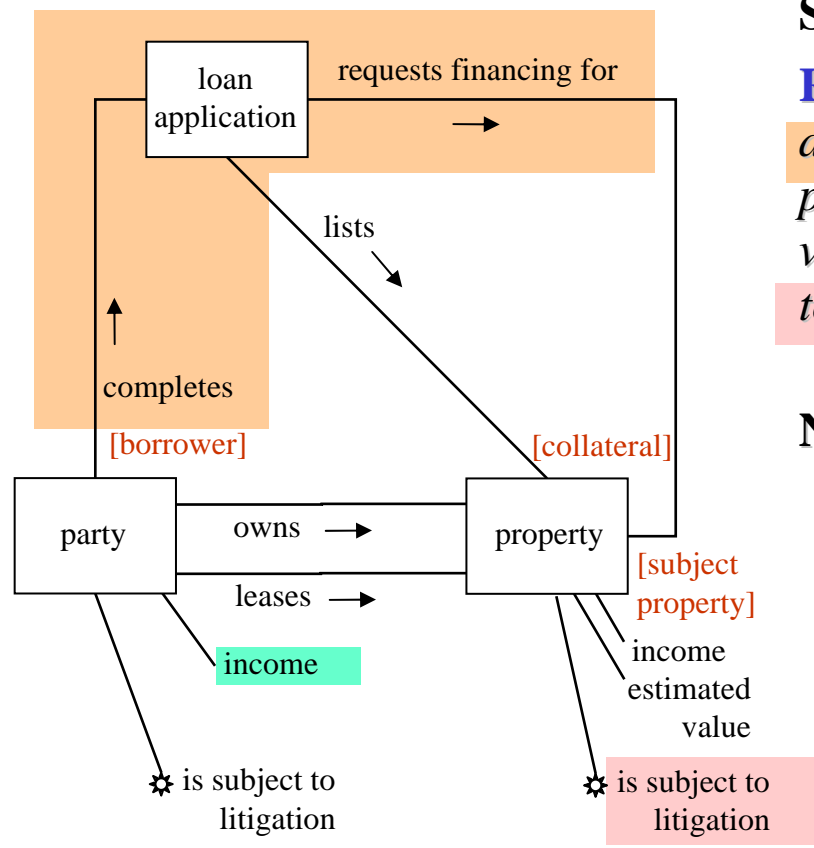


Rule: *Income must be GT 20% of the estimated value if subject to litigation.*

Ambiguities ...

1. Which 'income'?
2. Which is 'subject to litigation' ... 'party' or 'property'?
3. Which *fact types* should be used to interpret the rule correctly?
 - a. Income and estimated value of the property?
 - b. Income of the party who owns the property?
 - c. Income of the party who leases the property?
 - d. Income of the party who completes the loan application listing the property as collateral?
 - e. Income of the party who completes the loan application requesting financing for the property?

Mortgage applications

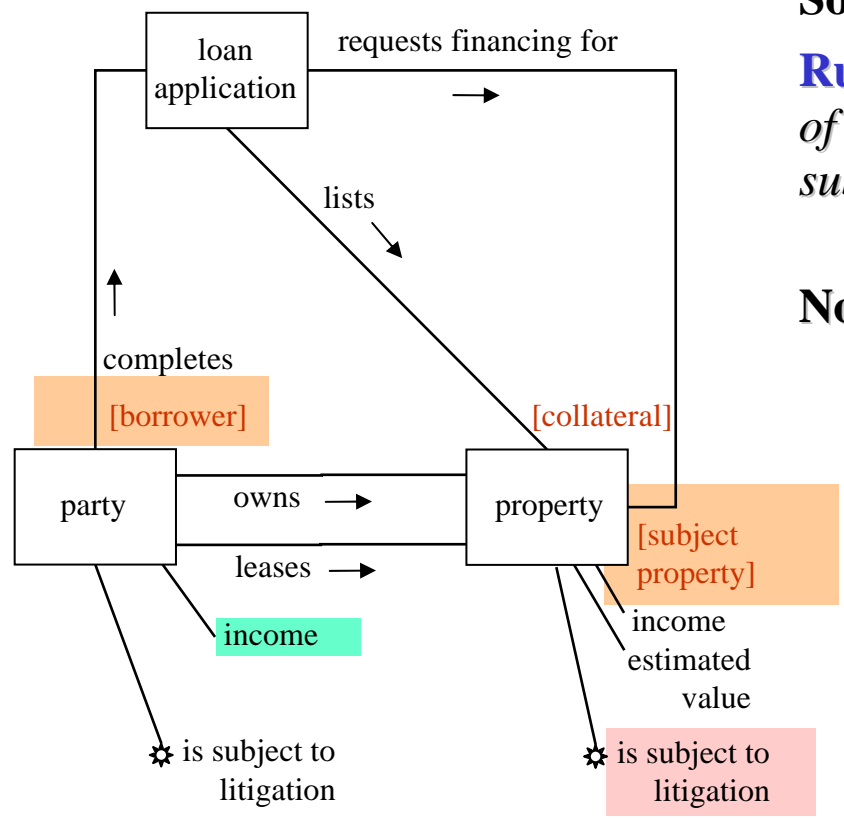


Solution 1. Embedding the fact types ...

Rule: The income of the party who completes a loan application requesting financing for a property must be GT 20% of the estimated value of the property if the property is subject to litigation.

Now unambiguous ... *but a bit wordy.*

Mortgage applications



Solution 2. Using roles ...

Rule: *The income of a borrower must be GT 20% of the estimated value of the subject property if the subject property is subject to litigation.*

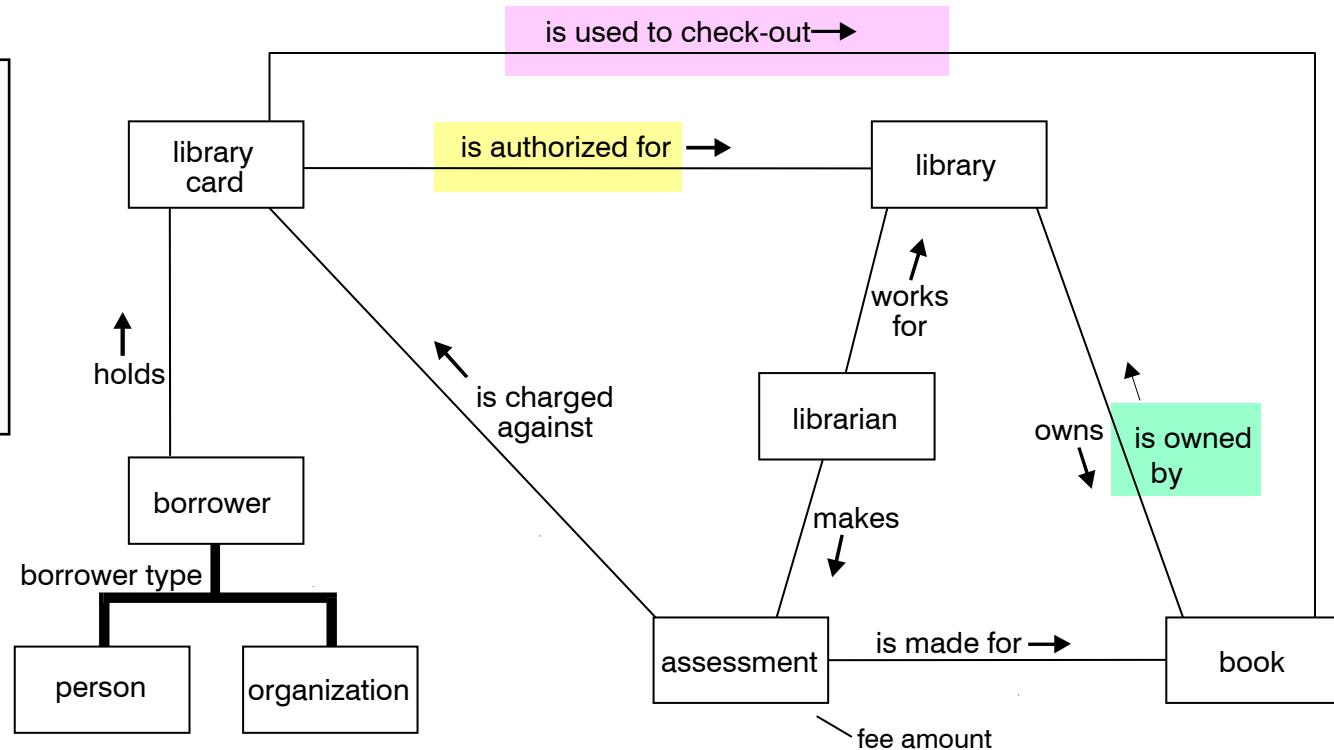
Now unambiguous ... and to the point.

Verbs, Fact Models and Business Rules

Library fact model

Business rules are verbish!

Note: “Must” and “may” are verbal auxiliaries.



Rule: A library card must be authorized for a library.

Rule: A library card may be used to check-out a book only if the book is owned by a library for which the card is authorized.





Defining Terms: *The Concepts Catalog (Glossary)*

An ASSESSMENT is a specific monetary charge against a Library Card for abuse of books or borrowing privileges.

A BOOK is any document, publication or work in any media that is held by or available through a Library.

A BORROWER is a Person or Organization of interest to a Library that can potentially borrow Books.

A BORROWER TYPE is the category of a Borrower -- i.e., Person or Organization.

A FEE AMOUNT is the total amount of an Assessment.

A LIBRARIAN is a certified professional who can work in a Library in an official capacity.

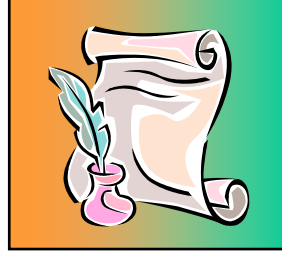
A LIBRARY is a repository of Books and/or a lender of Books to Borrowers.

A LIBRARY CARD is an agreement between a Borrower and a Library indicating that the parties agree to abide by the Library's book-lending rules.

An ORGANIZATION is legal entity that can act independently of particular persons.

A PERSON is an individual who acts in his own behalf.





Article 3. Deliberate Knowledge, Not A By-Product

3.1. Rules build on facts, and facts build on concepts as expressed by terms.

3.2. Terms express business concepts; facts make assertions about these concepts; rules constrain and support these facts.

3.3. Rules must be explicit. No rule is ever assumed about any concept or fact.

3.4. Rules are basic to what the business knows about itself – that is, to basic business knowledge.

3.5. Rules need to be nurtured, protected, and managed.

*by Business Rules Group, 2003
www.BusinessRulesGroup.org*

A building-block approach to developing and retaining
◆ ***criteria for making operational decisions***
◆ ***business know-how ... that scales.***



Reference: Business Rule Concepts, (3rd Ed), Chapter 1 and Part II.

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▶ What Good Rules Do For Us

1. Protect us from known or perceived real-life risks

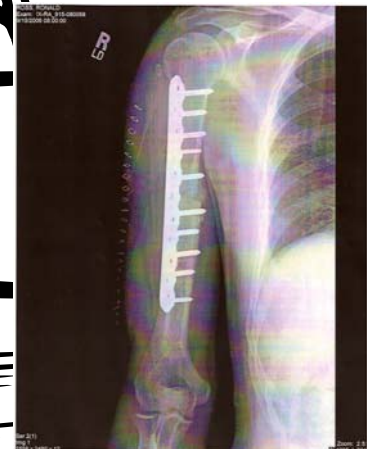
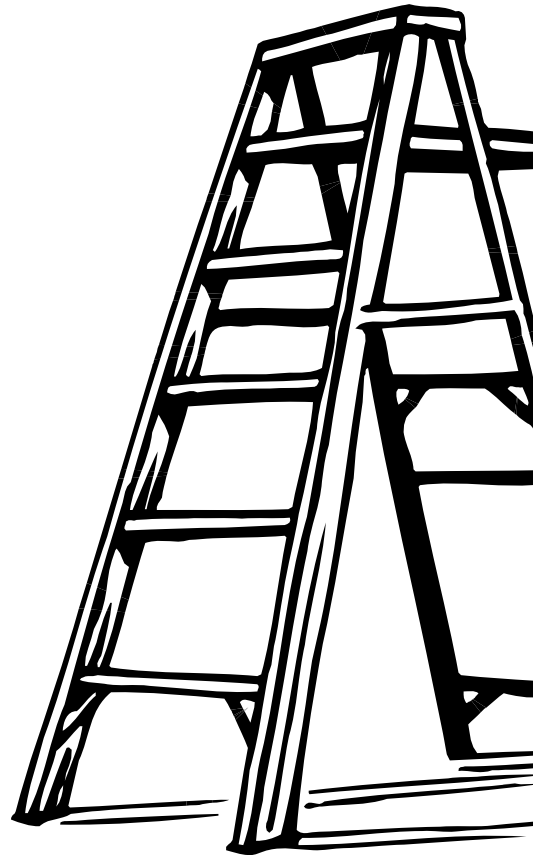
Good operational-level rules ...

- ◆ Provide markers of known dangers.
- ◆ Keep you on 'friendly paths'.

Business rules:

Never stand on the top rung of a ladder.

Never use a ladder by yourself.



2. Provide criteria for making minute-to-minute business decisions

Classifications and Computations

“... criteria for shaping concepts.”

Business rule:

A customer is always considered a gold customer if the customer places more than 12 orders during a calendar year.

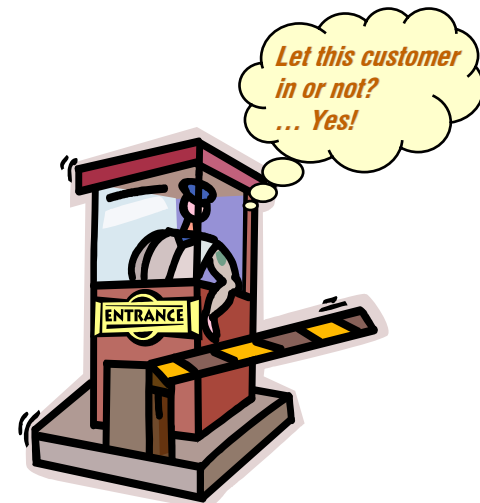


Human Behavior

“... criteria for conduct or action.”

Business rule:

A gold customer must be allowed access to the warehouse.



3. Keep us aligned with business goals and objectives

Good operational-level rules ...

- ◆ Ensure the ‘big picture’ doesn’t get lost in the nitty-gritty of minute-to-minute work.
- ◆ Define the boundaries of desirable and/or optimal behavior.

Business rule:



“Any customer can have a car painted any color that he wants so long as it is black.”

Henry Ford (1863-1947)

My Life and Work (1922), Chapter IV

4. Provide a pragmatic means to express and retain know-how

Good operational-level rules ...

- ◆ Encode knowledge.
- ◆ Communicate that knowledge to people displaced in time, place and activity.

The “gray-hair” problem ...
... and training.



5. Make the business agile

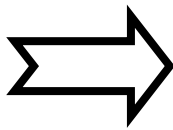


▶ What Good Rules Do For Us

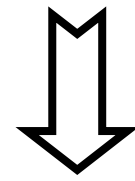
How do you get from here to there ... *fast*?



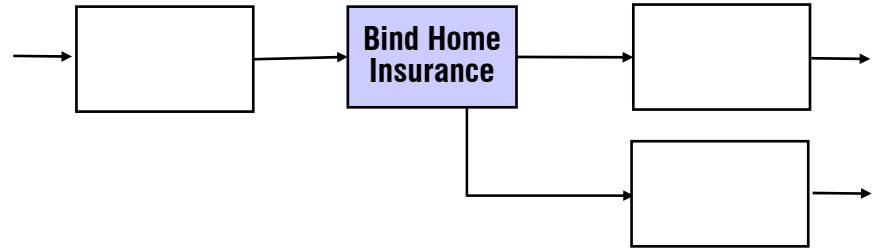
Business Policy: *No new home-owner insurance while a storm like this threatens.*



Business Rule: *A home-owner insurance policy must not be bound for any home within the 4-day cone of uncertainty for any tropical storm.*



Operational Business Process



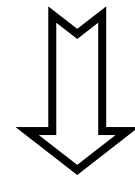
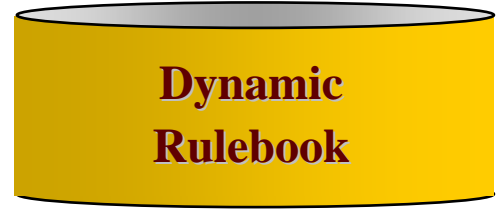
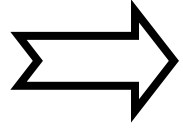
▶ What Good Rules Do For Us

Deployment should be ...

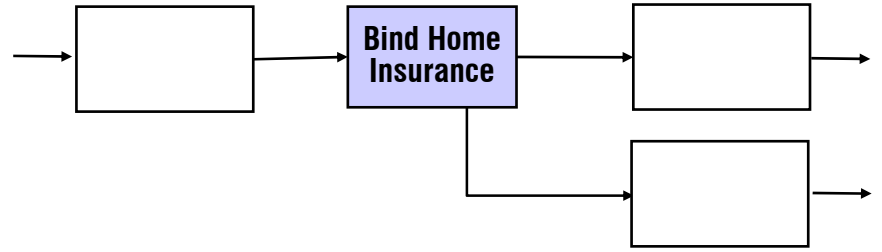


- ✓ timely
- ✓ effective
- ✓ selective
- ✓ traceable
- ✓ repeatable
- ✓ retractable

- ✓ Business Policies
- ✓ Contracts & Agreements
- ✓ Regulatory Constraints
- ✓ Competitive Tactics
- ✓ etc.



**Operational
Business
Process**

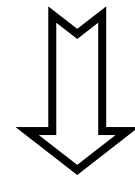
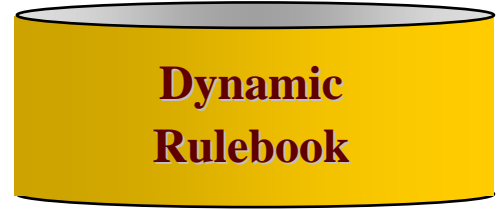
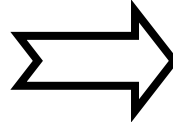


➤ What Good Rules Do For Us

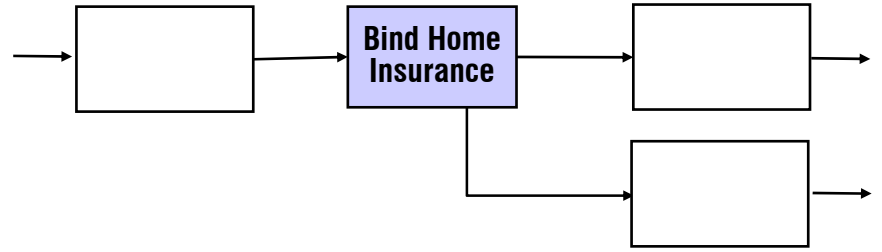
Is there any alternative?

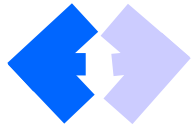


- ✓ Business Policies
- ✓ Contracts & Agreements
- ✓ Regulatory Constraints
- ✓ Competitive Tactics
- ✓ etc.



**Operational
Business
Process**





A best practice for rule management ... *Automated Rulebooks*

***Fingertip
Business
Rules!***

“... Rules apply across processes and procedures. There should be one cohesive body of rules, enforced consistently across all relevant areas of business activity.”

Business Rules Manifesto (2.3) – www.BusinessRulesGroup.org



Managing Your Guidance ...

- ◆ Single-sourced (no matter how many times “published”)
- ◆ Versions tracked
- ◆ Interpretations tracked
- ◆ Usage and context tracked
- ◆ Vocabulary is controlled

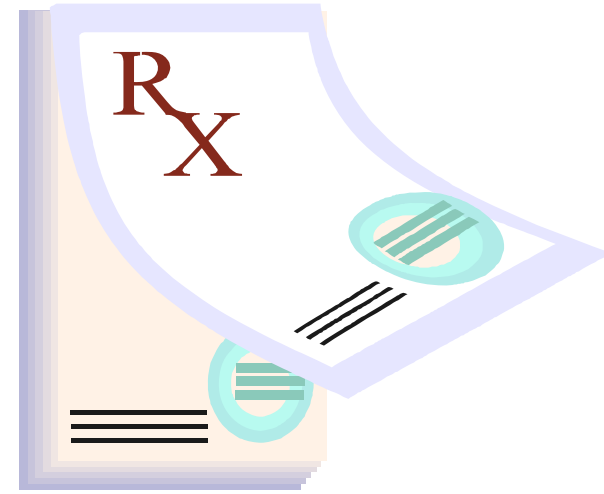
Reference: Business Rule Concepts,
(3rd Ed.), Chapter 3.



Case Study

Large Health Care Organization

- ◆ **Changes to business rules are passed to IT in the form of pseudo-code and rule engine statements.**
- ◆ **Only one person on the business side is able to perform each of these two hand-offs, respectively.**



Assessment: “fast and streamlined” ... BUT, risks:

- ⇔ Depends on single business-side resources.
- ⇔ Requires training and expertise in arcane languages.
- ⇔ Doesn't allow broader review, analysis, communication and refinement in the business intent associated with each change.
- ⇔ Provides no guarantee that business intent won't be prematurely slanted to the technical expressions.
- ⇔ Preempts business-level communication about the changes, and sharing and retention of related motivation and know-how.



How to have business conversations in business terms

“Business people don’t set variables
and they don’t call functions.”

Don Baisley, Microsoft

Business Rule: An employee must have a name.

System Rule: If an employee does not have a name, then ???



*A business rule statement does not
look for and respond to violations!*



How to have business conversations in business terms

“Business people don’t set variables
and they don’t call functions.”

Don Baisley, Microsoft

... *And they don’t say “null”!*

Business Rule: *An expeditor must be assigned to an order shipped but not invoiced for more than a week.*

System Rule: *If system_date_time minus shipping_date_time is greater than 1 week and invoicing_date_time = null, then post ...*



*The absence of something is
not a something!*



How to have business conversations in business terms

“Business people don’t set variables and they don’t call functions.”

Don Baisley, Microsoft

... *And they don’t naturally use type codes in most cases!*

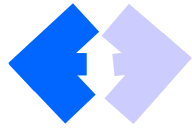
Business Rule: *A customer with preferred status must have its orders filled within a day.*

System Rule: *If `customer_status = "P"` and any `ship_date > order_date + 24 hours`, then post ...*



Type codes are how you represent something in a system!





A best practice for expressing rules ...

✧ Business rules must be understandable 'out of context'.

Meaning

***Say what you mean ...
and mean what you say.***



Expression

Example

Discourse-Dependent Rule:
No smoking.

Discourse-Independent Rule:
*A person must not smoke any
tobacco product inside any building.*



RuleSpeak®



Rules about Expressing Rules

1. A business rule statement must include one (but just one) of the following keywords:

↔ *must ... or must not*

↔ *only ... (especially only if)*

A rule statement adds a keyword to terms and facts.

2. A business rule must remove a degree of freedom.

3. A business rule statement must be a sentence.



RuleSpeak[®]

... for business-friendly business rules in structured natural language
... in English (2.0), Dutch, Spanish & German ... released April, 2009
*... free on **www.RuleSpeak.com***

Origin:

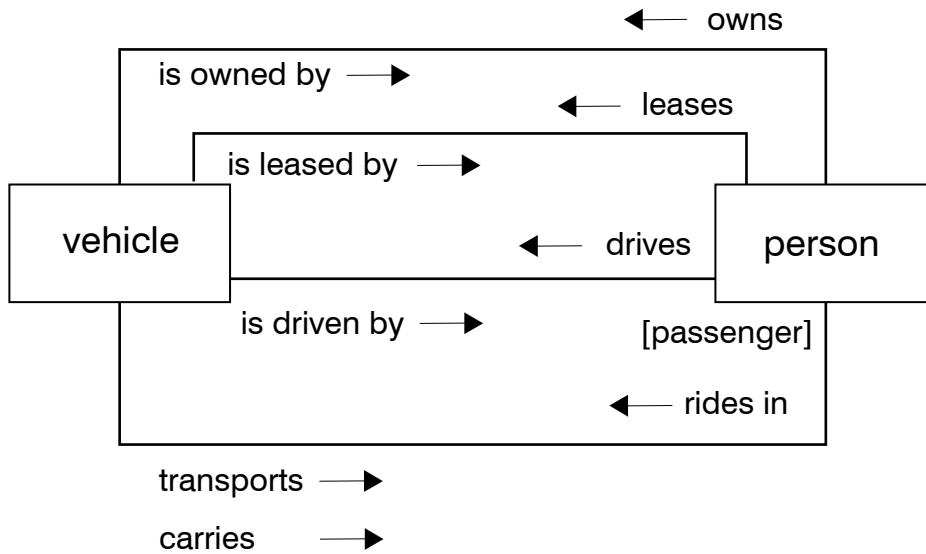
- ◆ Developed by Business Rule Solutions, LLC (BRS) starting in 1996.
- ◆ Applied in hundreds of projects since that time.

Standardization:

- ◆ One of three reference notations used in the creation of SBVR.
- ◆ Fully consistent with that standard.



How to have business conversations in business terms



Back to ...

Rule: *A vehicle must not transport more than 4 passengers.*

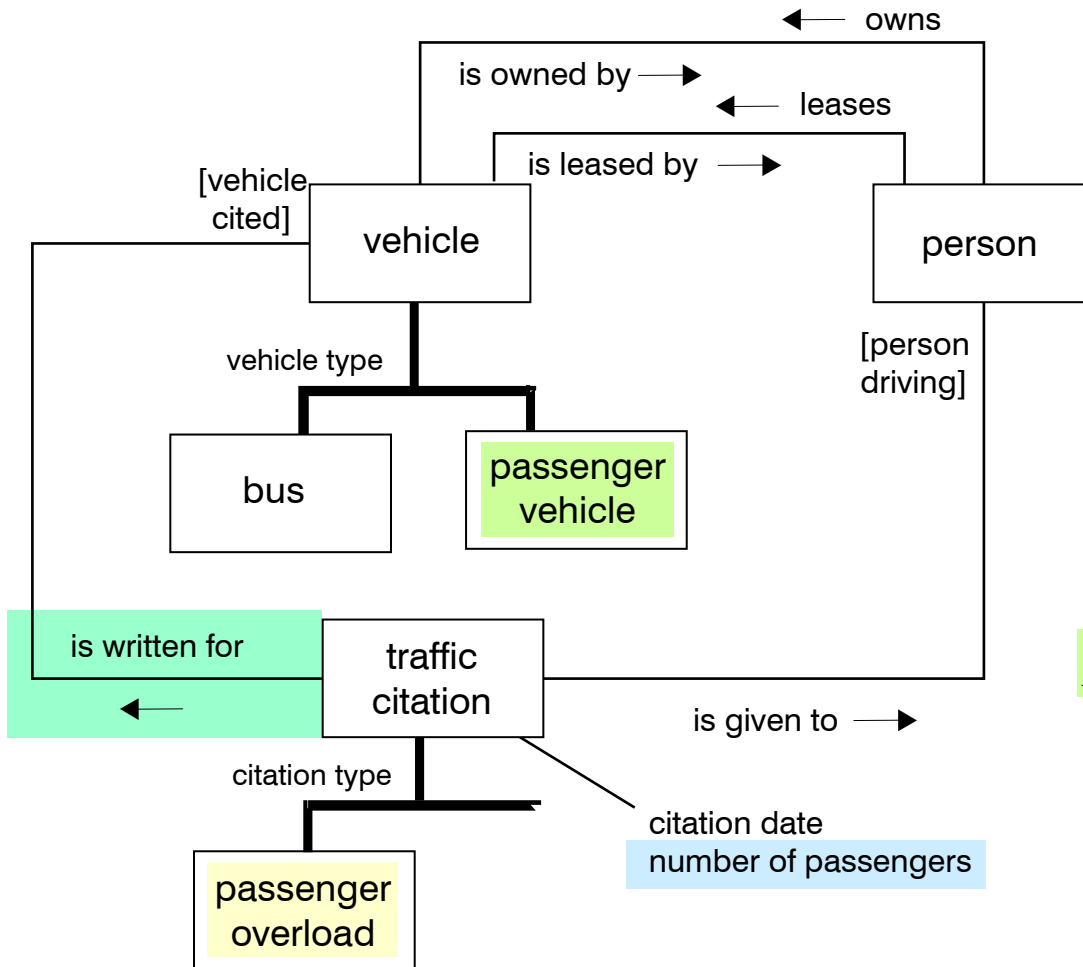
Questions ...

- ◆ Is the person who *drives* a vehicle considered a passenger?
- ◆ Does the rule apply to *buses* ... or just to passenger cars?
- ◆ Does the business rule mean a vehicle can't carry more than 4 passengers *ever* ... or just at any *given point in time*?
- ◆ Can the same person be a passenger in the same vehicle *more than one time over time*?



▶ About Business Analysis

How to have business conversations in business terms (cont)



The *real* business rules might be:

Rule: A *passenger overload* traffic citation must be written for a *passenger vehicle* carrying more than 4 passengers.

Rule: A traffic citation may be given only to a person driving.

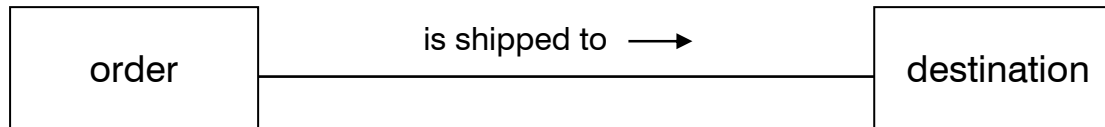




Building current business practices into structure ... *... is not good!*

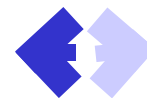
What happened to the cardinality? Example ...

- ◆ Company ABC currently permits an order to be shipped only to a single destination.
- ◆ Customers are beginning to request multi-destination orders.
- ◆ This new policy might have to be adopted in the future.



Current Rule: *An order must not be shipped to more than one destination.*

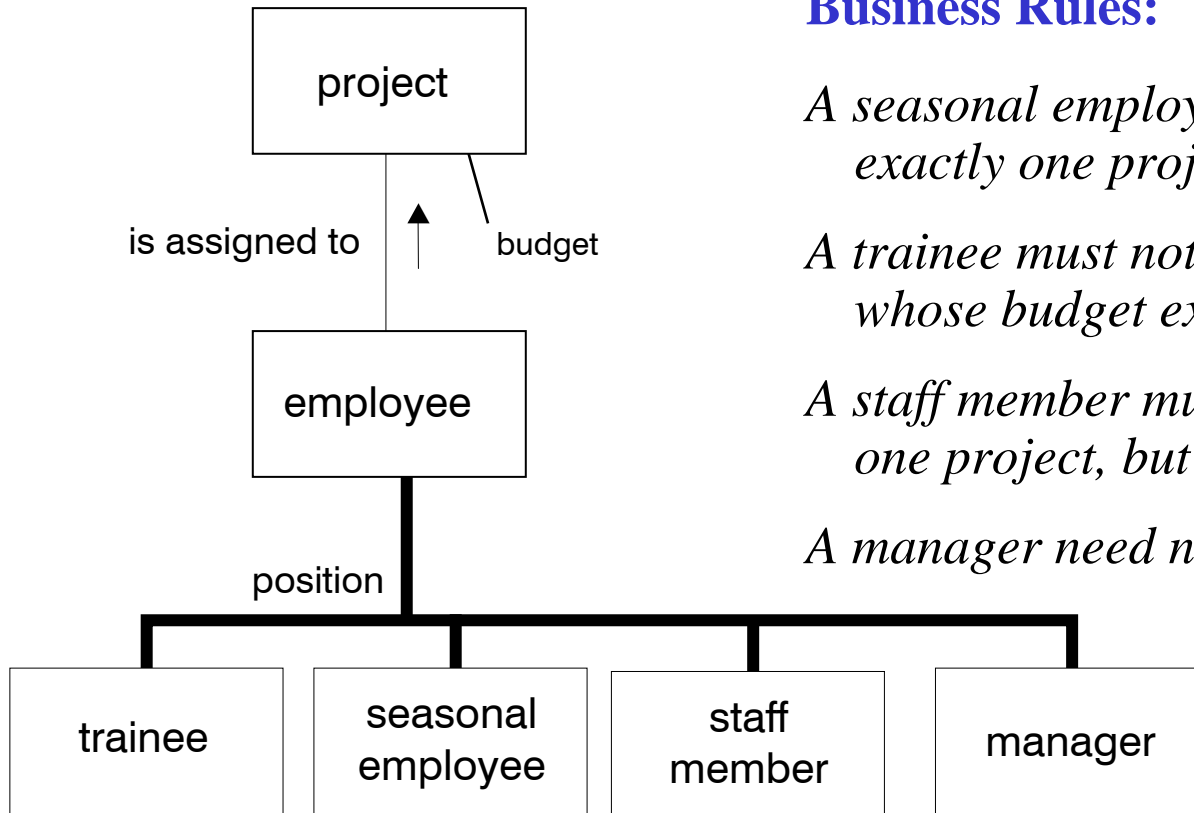
Note: This current rule can be changed or dropped at any time!



*Use business rules to express
current business practices!*



Cardinality is often conditional anyway ...



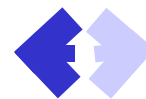
Business Rules:

A seasonal employee must be assigned to exactly one project.

A trainee must not be assigned to a project whose budget exceeds \$1M.

A staff member must be assigned to at least one project, but not more than 10.

A manager need not be assigned to a project.



Express conditional cardinalities as business rules!



Order approval

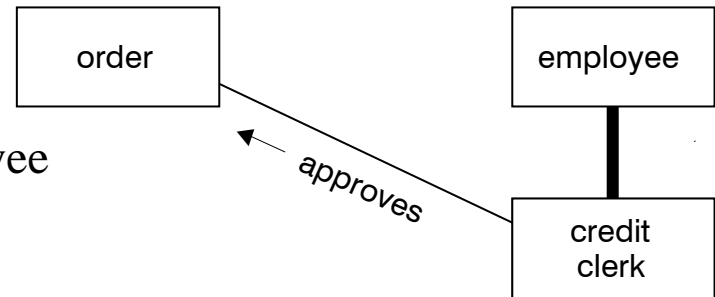
Current Business Practice

Fact: credit clerk approves order

Fact: credit clerk is a category of employee

Ask:

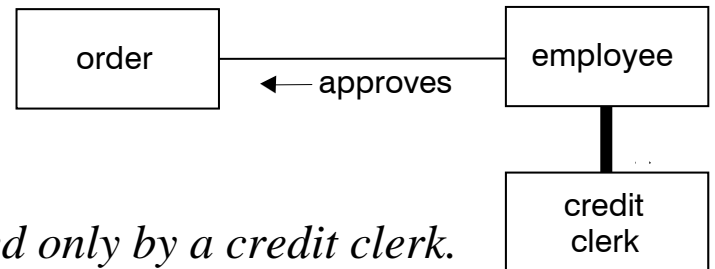
- ↪ Why credit clerk?
- ↪ Why not *other* employees in the future?
- ↪ Why not *any* employee?



Revised Version

Fact: employee approves order

Current Rule: *An order may be approved only by a credit clerk.*



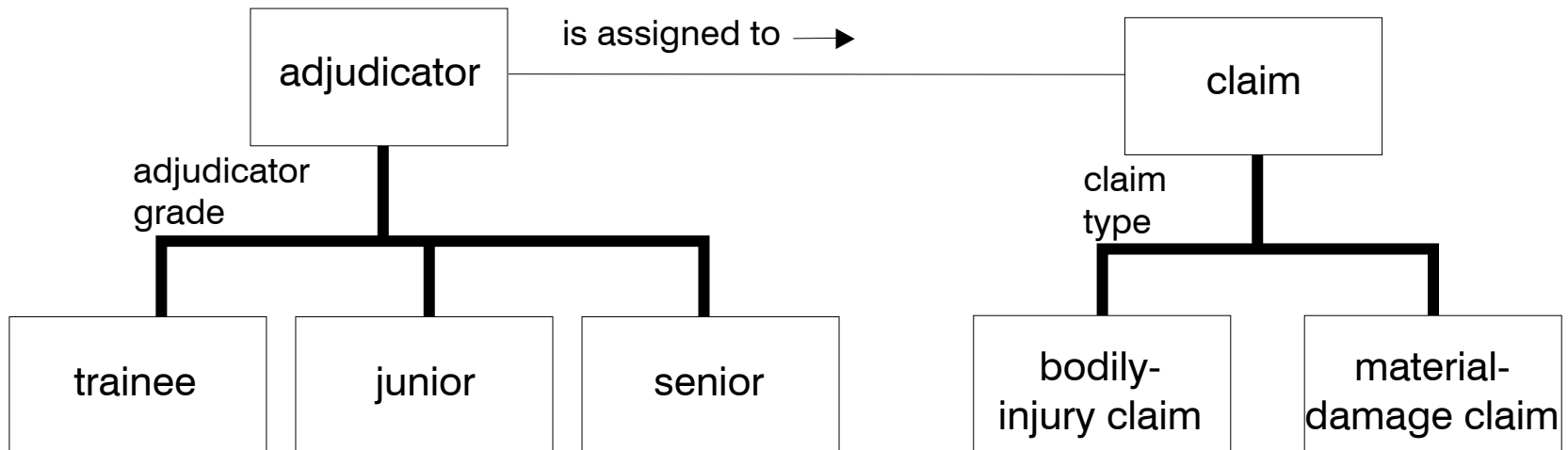
Note: The current rule can be changed or dropped at any time!



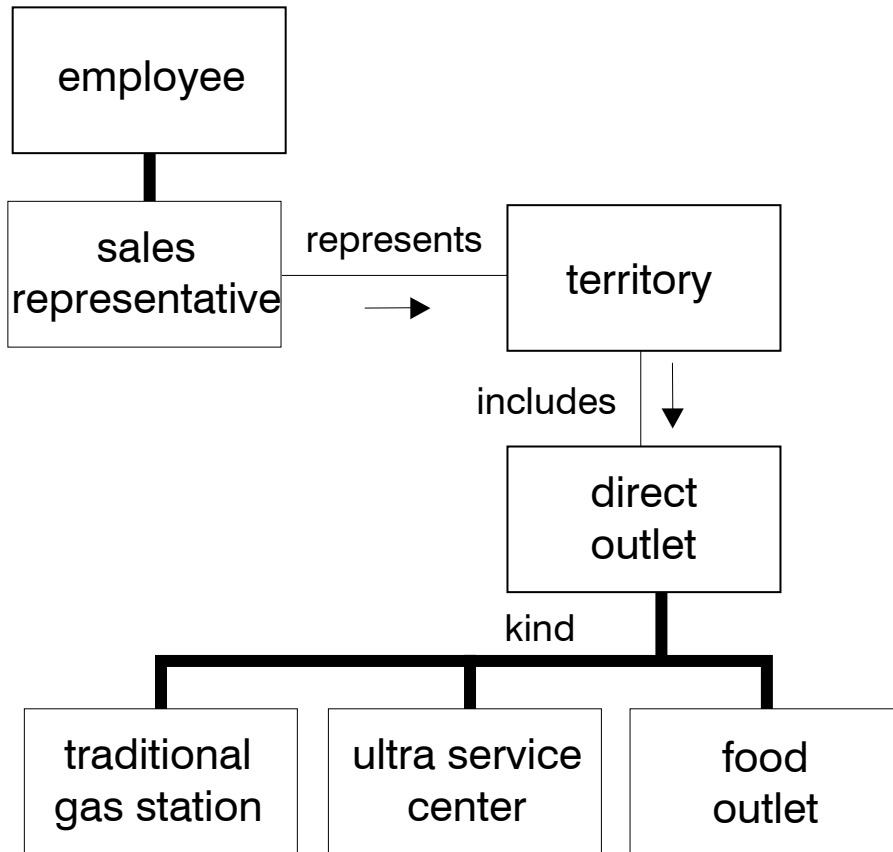
Generalizing facts

Rule: *A claim must not be assigned to a trainee adjudicator.*

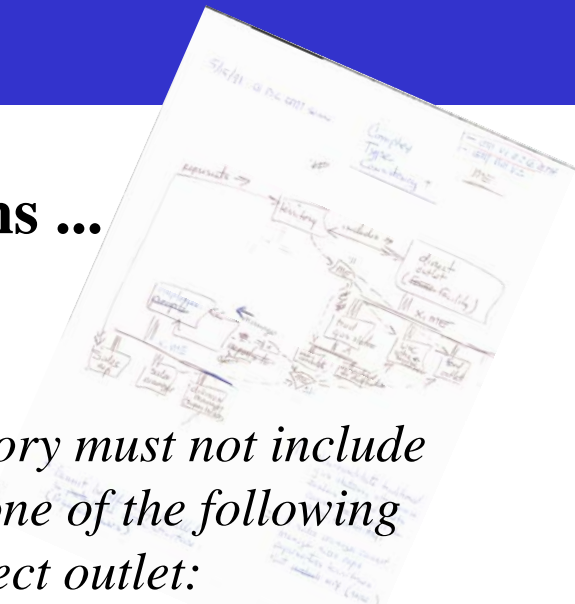
Rule: *A junior adjudicator must not be assigned to a bodily-injury claim.*



Constraints just don't come in nice, neat forms ...



is candidate for modification



- Rule:** A territory must not include more than one of the following kinds of direct outlet:
- traditional gas station that is not a candidate for modification
 - ultra service center
 - food outlet

Rule: A sales representative must not represent a territory that ... (same).

Example from: www.RuleSpeak.com

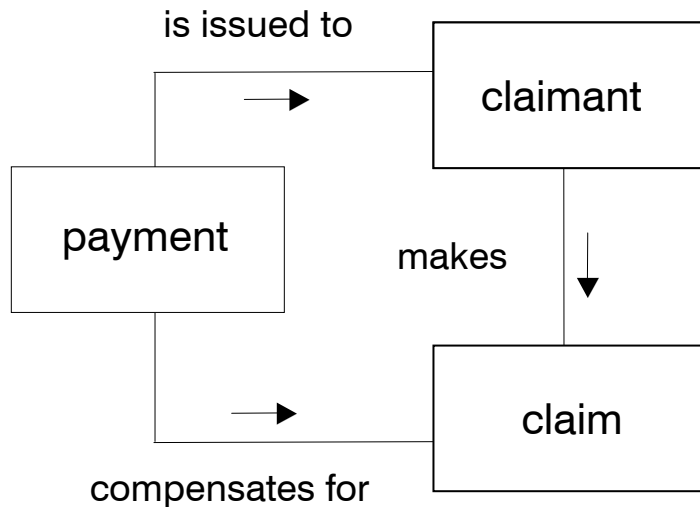


Express complex constraints as business rules!



Constraints just don't come in nice, neat forms ...

Example: *Cycle constraints*



Rule: *A payment may be issued only to a claimant who makes the claim for which the payment compensates.*

Note: The fact types “is issued to,” “makes,” and “compensates for” form a cycle.

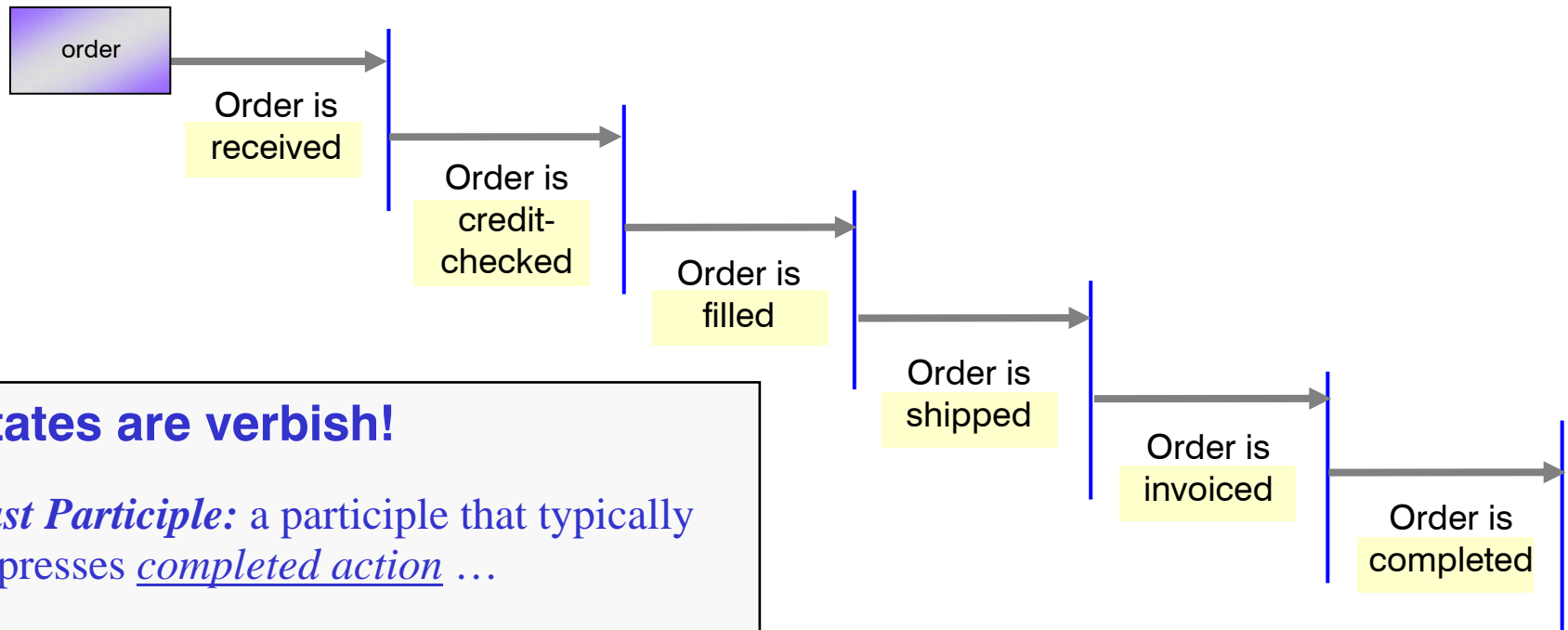


Express cycle constraints as business rules!



➤ A Closer Look at Past Participles

States in the life cycle ('happy life') of orders ...



States are verbish!

Past Participle: a participle that typically expresses completed action ...

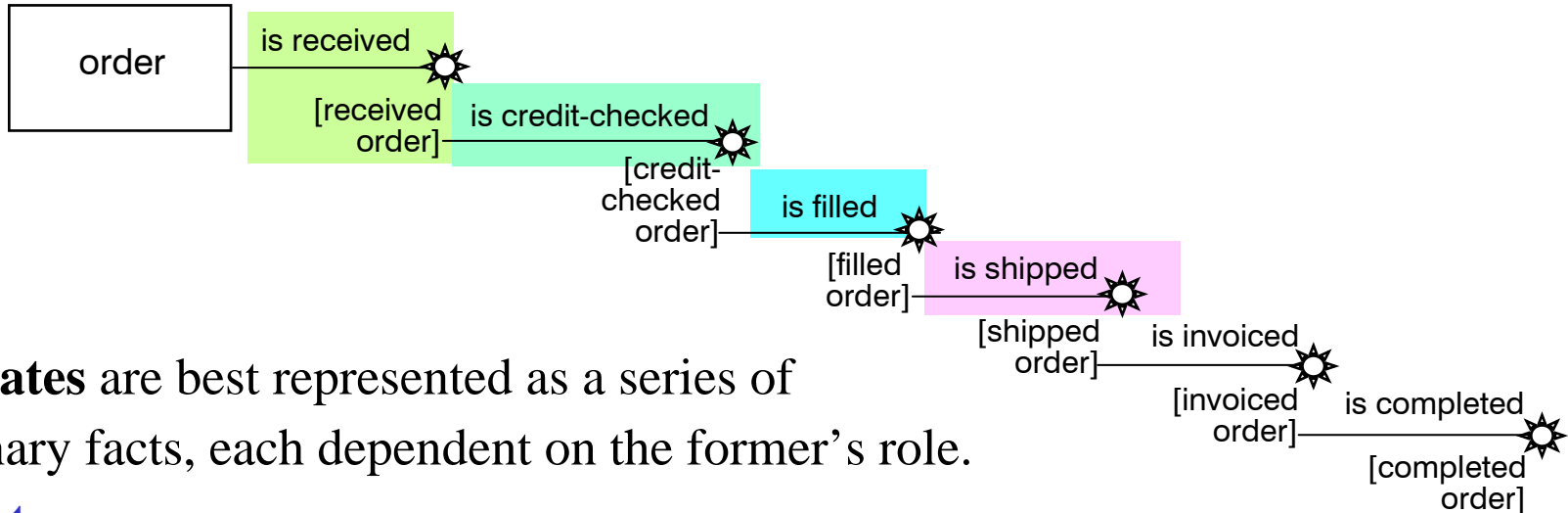
Participle: [1]: a word having the characteristics of both verb and adjective; especially: the English verbal adjective ending in -ing or in -ed, -d, -t, -en, or -n

From: Merriam-Webster Unabridged Dictionary (emphasis added)

➤ A Closer Look at Past Participles

Modeling states verbishly

Order Status



States are best represented as a series of unary facts, each dependent on the former's role.

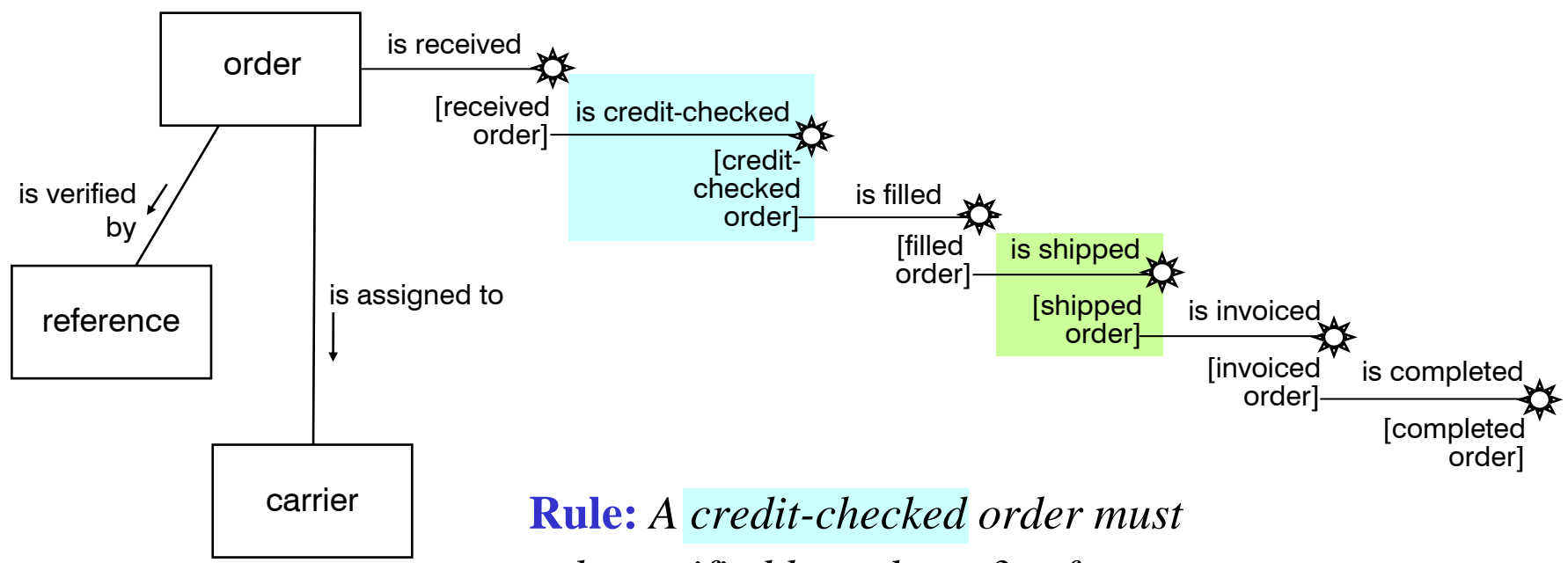
Notes:

- ◆ “is credit-checked” requires that an order “is received” ... that is, is dependent on the role “received order”.
- ◆ “is shipped” implies ... “order is received and is credit-checked and is filled and is shipped”.



Business Rules About States

Ask about *state-specific constraints*



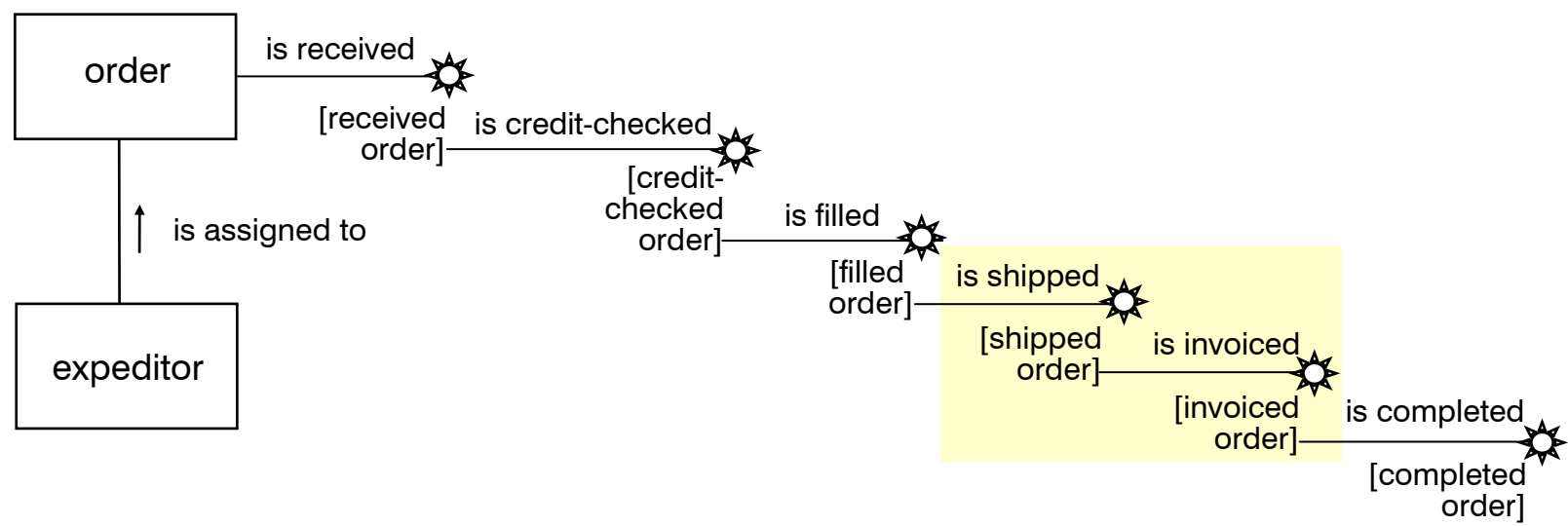
Rule: A *credit-checked* order must be verified by at least 3 references.

Rule: A *shipped* order must be assigned to a carrier.

Express state-specific constraints as business rules!

Business Rules About States

Ask about *suspense criteria*

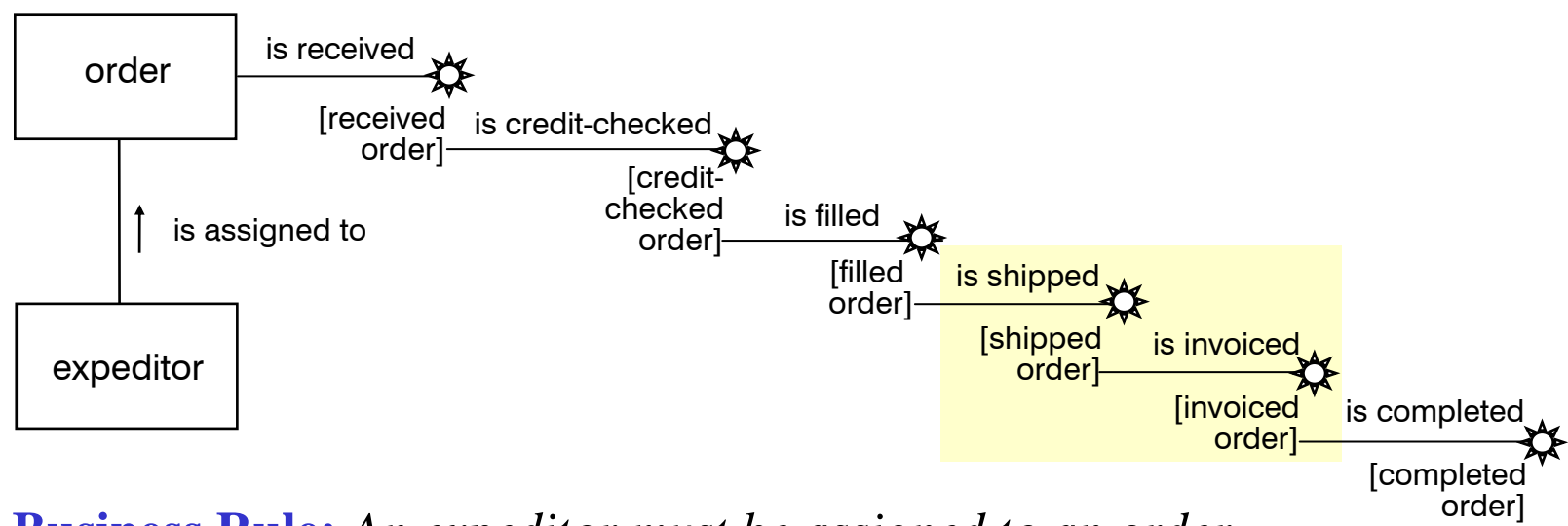


Rule: *An expeditor must be assigned to an order shipped but not invoiced for more than a week.*

Express suspense criteria as business rules!

Business Rules About States

Business rules vs. data rules – *one more time!*



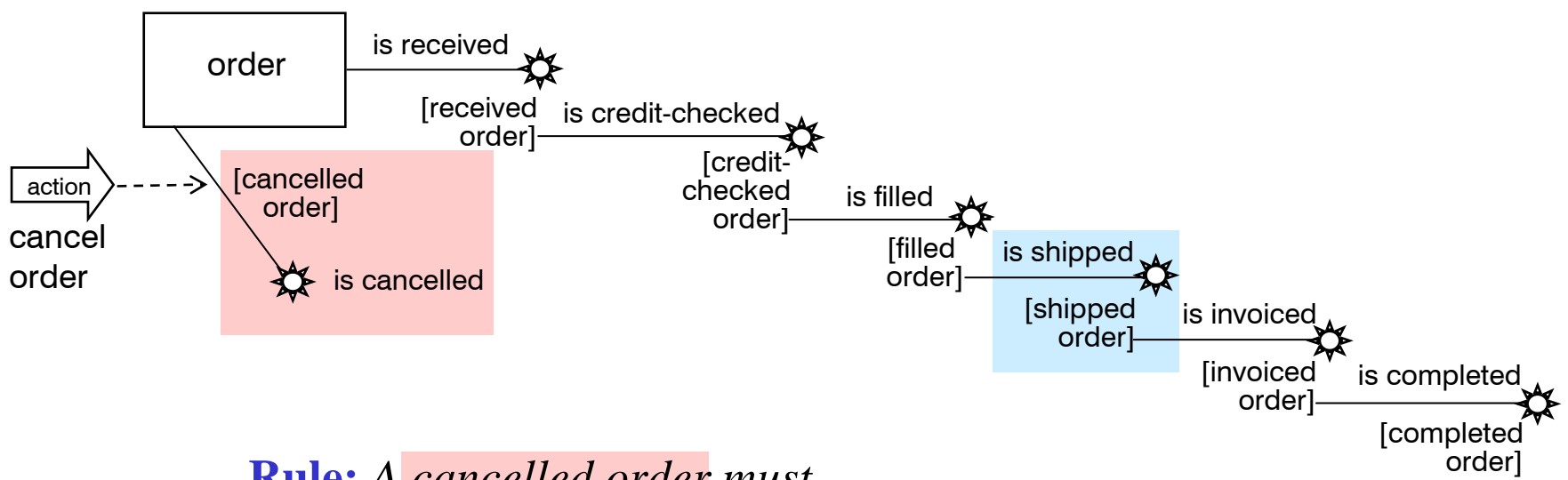
Business Rule: *An expeditor must be assigned to an order shipped but not invoiced for more than a week.*

Data Rule: *If system date-time minus shipping date-time is greater than 1 week and invoicing date-time = null, then post ...*

 **Business rules and system/data rules are not the same!**

Business Rules About States

Ask about *prohibited antecedents*

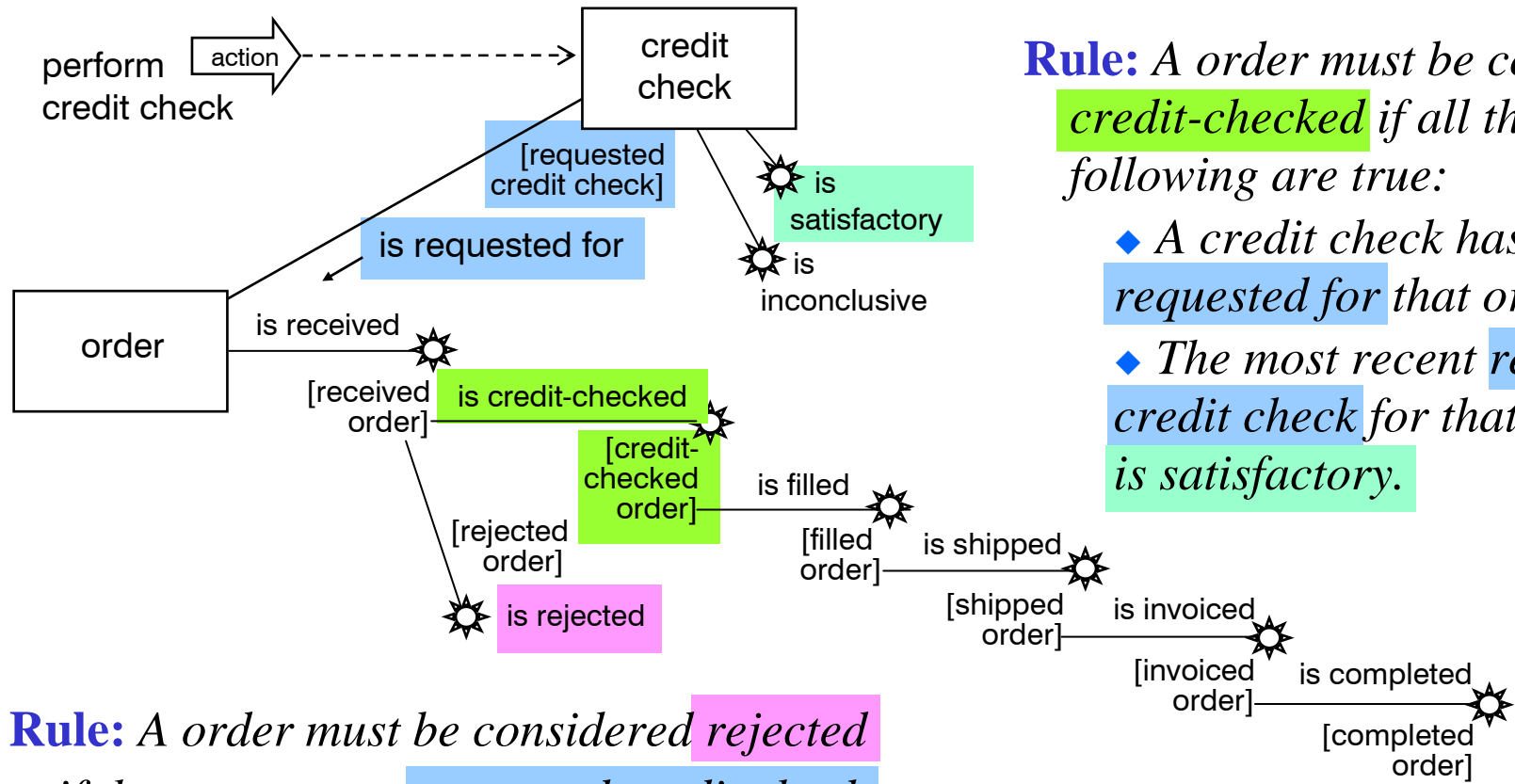


Rule: A *cancelled order* must not have been *shipped*.

Express prohibited antecedents as business rules!

Business Rules About States

Ask about *coordination with processes*



Rule: A order must be considered **credit-checked** if all the following are true:

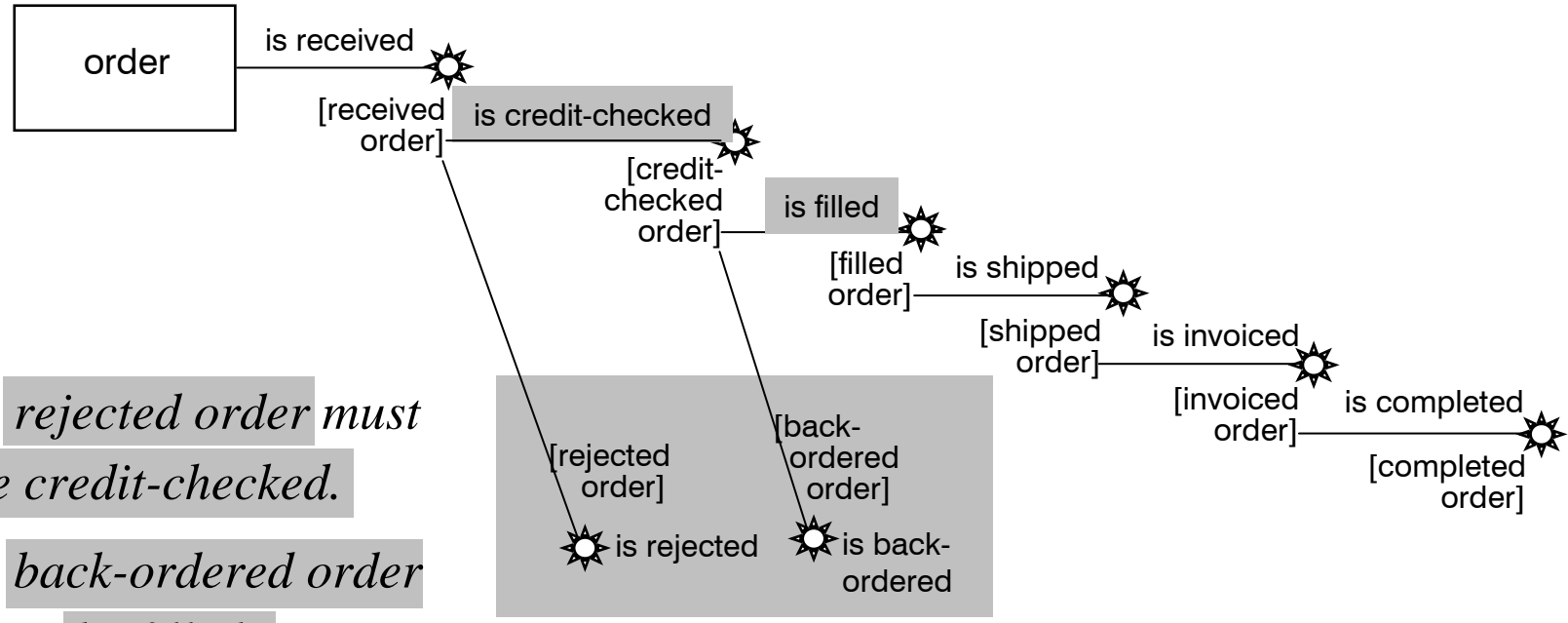
- ◆ A credit check has been requested for that order
- ◆ The most recent requested credit check for that order is satisfactory.

Rule: A order must be considered **rejected** if the most recent requested credit check for that order is not satisfactory.

Express processing constraints as business rules!

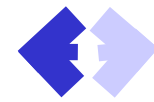
Business Rules About States

Ask about *further activity*



Rule: A *rejected order* must not be *credit-checked*.

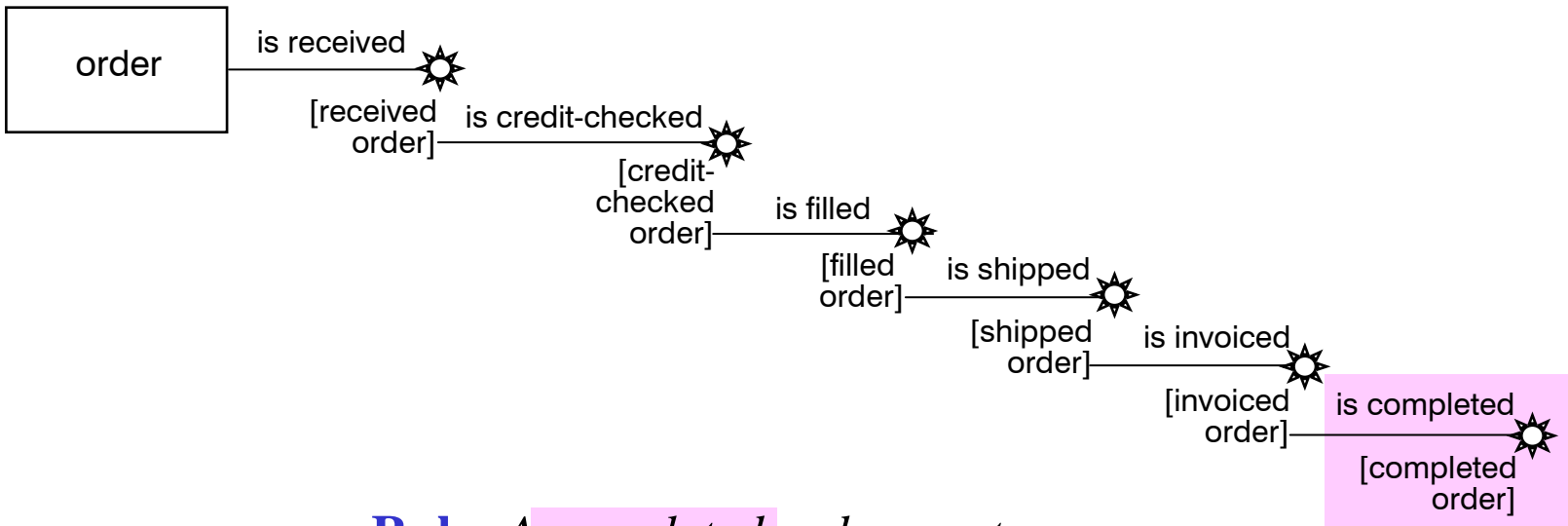
Rule: A *back-ordered order* must not be *filled*.



Express aging constraints as business rules!

Business Rules About States

Ask about *after life*



Rule: A *completed* order must be retained for 7 years.



Express retention constraints as business rules!



What I have said ...

- ◆ You need verbish models to make *complete sentences*.
- ◆ Complete sentences are how you *make sense*.
- ◆ Making sense is how you *communicate with people ...*
... and in the not too distant future, how you will
communicate with machines(!).

Our journey today ...

- ↪ Business rules pertain to knowledge.
 - ↪ Knowledge requires communication.
 - ↪ Communication is based on sentences.
 - ↪ Sentences need verbs.
 - ↪ Verbs underlie facts.
 - ↪ Facts imply semantics.





Fact models are for ...

- ◆ *Communicating with business people and ...*
- ◆ *Expressing business rules and ...*
- ◆ *Designing structures to manage data.*

~~

Thank you!

