

# Part Goals Management

Extensions

V1 (March 2020)

# Overview

- The purpose of this add-on package is to extent the Part Goals functionality of Product Engineering.
- Target values are now decoupled from the other goal values (separate rollups).
- Thus Target values can be maintained on parts where applicable (likely on higher and top levels of the BOM).
- Other goal values now have a precedence of: actual\_value --> estimated\_value --> calculated\_value
- Goal rows can no longer be added or deleted manually. Actions for Administrators are to be used instead.
- An action to recalculate the rollup within a BOM structure is available
  - (replaces the "Rollup all parts in DB" action)
- Rollup calculations are also triggered automatically from events on "Part Goal" and "Part BOM".
- A method to rollup all Part Goals in DB is available for Administrators.
- Two new reports are added for target costing and target weight.
  - The new reports apply color coding to indicate when target values are met or missed.
- Generic rollup utilities are used.
  - These allow a "Rollup Definition" by a structure relationship type . Here "Part BOM"
  - A tested configuration of the "Rollup Definition" used for "Part BOM" is part of the package
- Future enhancements:
  - Currently rollups are done regardless whether parts are released or not. (as done in OOTB Product Engineering)
  - For released parts values should not be changed, but a "not current flag" should be set.  
Or a separeate "released\_goal" value should be maintained. That is not changed on released parts

# Part Goals Principals

Target goal values are rolled up separately from the actual „goal“ values

The „basis“ labels identify how the values were determined. Clicking on a label will display the “Goals” tab.

On the „Part“ itself the rollup values and target rollup values for each „goal“ are displayed. These are „readonly“ fields. They get calculated by the goals rollup logic.

On the „Goals“ tab the goal values of the Part can be entered

MP0101

Edit

Part

Part Number

MP0101

Revision

B

State

Preliminary

Assigned Creator

Name

Makerbot Replicator

Designated User

Type

Assembly

Make / Buy

Make

Unit

EA

Long Description

The MakerBot Replicator by MakerBot. Published on March 12, 2012. www.thingiverse.com/thing:18813

Effective Date

Release Date

Changes Pending

☒

Currency

USD

Cost/Unit

(Calculated)

W-Unit

kg

Weight/Unit

(Calculated)

Target Cost/Unit

(Calculated)

Target Weight/Unit

(Calculated)

BOM

BOM Structure

Alternates

AML

Documents

CAD Documents

Goals

Changes

Part Submission Warrants

Requirements

Requirements Documents

Goals

Hidden

Goal ↑	Goa...	Target	Target (Calculated)	Actual	Estimated	Calculated	Comments	Indexed On [...]
Cost								2/18/2020
Weight	kg							

< Prev

Next >

Page: 1 of 1

2 Results

The calculated value is calculated from the values on Parts of the next level in the BOM (rollup)

If an estimated value is entered, it will override the calculated value on the Part → the basis label on part value with show „Estimated“

If an actual value is entered, it will override the calculated and the estimated value on the Part → the basis label on part value with show „Actual“

If an actual target value is entered, it will override the calculated target value on the Part → the target basis label on part value with show „Target“

# Part Goals Principals

The screenshot displays the 'Part Goals Principals' interface. At the top, there's a header bar with a gear icon, 'P-10000', a star, and a flag. Below this is a toolbar with buttons for 'Save', 'Done', 'Discard', and various icons. The main area is divided into two sections. The left section is a form for 'Part' details, including fields for 'Part Number' (P-10000), 'Revision' (A), 'State' (Preliminary), 'Assigned Creator' (Innovator Admin), 'Designated User', 'Effective Date', 'Release Date', 'Type' (Assembly), 'Make / Buy' (Make), 'Unit' (EA), and 'Long Description'. The right section shows a table with columns for 'Cost/Unit', 'Target Cost/Unit', 'Weight/Unit', and 'Target Weight/Unit'. A dropdown menu is open, showing options like 'Create New Part', 'Properties', 'Permissions', 'Delete', 'Manual Release', 'Create New Revision', 'Add Item(s) To Change...', 'Change Discussion Definition', 'Add Item to Bookmarks...', 'Show Graph', 'Add PartGoals to Structure (down)', 'Delete PartGoals From Structure (down)', and 'Calculate All Part Goals in BOM'. The 'Goals' tab is selected, showing a table with columns: 'Goal', 'Goa...', 'Target', 'Target (Calculated)', 'Actual', 'Estimated', 'Calculated', 'Comments', and 'Indexed On [...]'. The 'Goal' column has a plus icon and a minus icon. The 'Goa...' column has a search icon. The 'Target' column has a dropdown menu. The 'Target (Calculated)' column has a dropdown menu. The 'Actual' column has a dropdown menu. The 'Estimated' column has a dropdown menu. The 'Calculated' column has a dropdown menu. The 'Comments' column has a dropdown menu. The 'Indexed On [...]' column has a dropdown menu. The table is currently empty.

Part Number: P-10000, Revision: A, State: Preliminary, Assigned Creator: Innovator Admin, Designated User, Effective Date, Release Date, Type: Assembly, Make / Buy: Make, Unit: EA, Long Description.

Goals Table:

Goal	Goa...	Target	Target (Calculated)	Actual	Estimated	Calculated	Comments	Indexed On [...]
------	--------	--------	---------------------	--------	-----------	------------	----------	------------------

These actions will not only add or delete goals to/from this Part. They will also add or delete the goals to/from all child parts down, if a BOM structure exists. The „delete“ action only works for „Administrators“

Tracking „goals“ only makes sense, when tracked on all parts of an entire BOM (product) structure.

The calculate action will manually trigger the calculation of all rollups within the BOM structure. For large BOMs this can take some time !

When a new Part is created, the „goals“ are empty.

Adding a new Part without goals to a BOM with goals will create the goals rows of goals inherited from the parent part.

Adding a Part with goals to a BOM with goals will merge the goals rows of goals inherited from the parent part. And it will trigger a recalculation of the goals from parent part up

Manually deleting goals is disabled. Instead use this action

Manually adding goals is disabled. Instead use this action

# Part Goals Rollup Reports

Two new reports to show goal actuals vs. target values.  
With color coding when targets are met or missed.

MP0101

Edit

Part

Part Number

MP0101

Name

Makerbot Replicator

Type

Assembly

Long Description

The MakerBot Replicator by MakerBot. Published on March 12, 2012. www.thingiverse.com/thing:18813

Multilevel BOM Report

BOM Quantity Rollup Report

BOM Costing Report

BOM Cost Goals Report

BOM Weight Goals Report

PE\_SearchPartCircularReferences

Parts and Docs

Currency

USD

Cost/Unit

(Calculated)

Target Cost/Unit

(Calculated)

W-Unit

kg

Weight/Unit

(Calculated)

Target Weight/Unit

(Calculated)

Extended Classification

Assigned Creator

Assigned User

Effective Date

Release Date

Changes Pending

BOM

BOM Structure

Alternates

AML

Documents

CAD Documents

Goals

Changes

Part Submission Warrants

Requirements

Requirements Documents

Parts

Hidden

	Seq...	Part Number	Revl...	Name	Type	State	Quantity	Cost / Qty	Weight / Qty	Cost/Unit	Cost Basis	Curr...	Target Co...	Cost Target B...	Weight/U...	Weight Basis	W-Unit	Targ
	5	MP2942	B	Body	Assembly	Preliminary	1	443.5369	0	443.5369	Calculated	USD		Calculated		Calculated	kg	
	10	MP2954	B	Extruder	Assembly	Preliminary	1	0	0		Calculated	USD		Calculated		Calculated	kg	
	15	MP2961	A	Shipping	Assembly	Released	1	117.8100	0	117.8100	Calculated	USD		Calculated		Calculated	kg	
	20	MP2956	A	Gantry	Assembly	Released	1	395.4800	0	395.4800	Calculated	USD		Calculated		Calculated	kg	
	25	MP2968	A	XY Stage	Assembly	Released	1	284.3900	0	284.3900	Calculated	USD		Calculated		Calculated	kg	
	30	MP2943	A	Build Platform	Assembly	Released	1	0	0		Calculated	USD		Calculated		Calculated	kg	
	35	MP2952	B	Electronics	Assembly	Preliminary	1	0	0		Calculated	USD		Calculated		Calculated	kg	
	40	MP2967	A	Wiring	Assembly	Released	1	73.8000	0	73.8000	Calculated	USD		Calculated		Calculated	kg	
	45	MP2938	A	Additional Parts	Assembly	Released	1	0	0		Calculated	USD		Calculated		Calculated	kg	


< Prev

Next >

Page: 1 of 1

9 Results

# Part Goals Rollup Reports – no Targets set

MP0101 x BOM Cost Goal... x									
 <a href="#">Print</a>									
<b>Bill of Materials Costing Goals Report</b>							Generated on: 3/18/2020, 7:35:19 PM		
BOM Level	Part Number	Name	Quantity	Cost/Qty	Cost/Unit	Cost Basis	Cost Target	Target Basis	Currency
0	MP0101	Makerbot Replicator	1			Calculated		Calculated	USD
1	MP2942	Body	1	443.5369	443.5369	Calculated		Calculated	USD
2	MP2667	Spacer Black 5-16 in length .14in ID .25in OD	1	0.0600	0.0600	Calculated		Calculated	USD
2	MP2322	RGB LED Strip Common Anode	1	3.8000	3.8000	Calculated		Calculated	USD
2	MP2660	Spacer Black 1-2 in length .14in ID .25in OD	2	1.3000	0.6500	Calculated		Calculated	USD
2	MP2939	Body Fan Assembly	1	9.9000	9.9000	Calculated		Calculated	USD
3	MP2347	Fan 24V 40x40x10 1m leads	1	9.0000	9.0000	Calculated		Calculated	USD
3	MP2685	Spacer Black 16.5mm length 3.2mm ID 7mm OD	2	0.9000	0.4500	Calculated		Calculated	USD
2	MP2940	Body Hardware	1	5.6800	5.6800	Calculated		Calculated	USD
3	MP2295	M3 Square Nut	44	0.6600	0.0150	Calculated		Calculated	USD
3	MP0370-004	M3x16 Socket Cap Bolt	38	3.0400	0.0800	Calculated		Calculated	USD
3	MP0370-006	M3x25 Socket Cap Bolt	4	0.6000	0.1500	Calculated		Calculated	USD
3	MP2728	Support Blind Hole Mount	5	1.0600	0.2120	Calculated		Calculated	USD

# Part Goals Rollup Reports – with Targets set

Bill of Materials Costing Goals Report									
Generated on: 3/18/2020, 7:40:48 PM									
BOM Level	Part Number	Name	Quantity	Cost/Qty	Cost/Unit	Cost Basis	Cost Target	Target Basis	Currency
0	MP0101	Makerbot Replicator	1	4760.7859	4760.7859	Calculated	4910.9750	Calculated	USD
1	MP2942	Body	1	443.5369	443.5369	Calculated	450.4650	Calculated	USD
2	MP2667	Spacer Black 5-16 in length .14in ID .25in OD	1	0.0600	0.0600	Actual	0.0600	Target	USD
2	MP2322	RGB LED Strip Common Anode	1	3.8000	3.8000	Actual	3.7500	Target	USD
2	MP2660	Spacer Black 1-2 in length .14in ID .25in OD	2	1.3000	0.6500	Actual	0.6500	Target	USD
2	MP2939	Body Fan Assembly	1	9.9000	9.9000	Calculated	11.3500	Calculated	USD
3	MP2347	Fan 24V 40x40x10 1m leads	1	9.0000	9.0000	Actual	10.4500	Target	USD
3	MP2685	Spacer Black 16.5mm length 3.2mm ID 7mm OD	2	0.9000	0.4500	Actual	0.4500	Target	USD
2	MP2940	Body Hardware	1	5.6800	5.6800	Calculated	6.0350	Calculated	USD
3	MP2295	M3 Square Nut	44	0.6600	0.0150	Actual	0.0150	Target	USD
3	MP0370-004	M3x16 Socket Cap Bolt	38	3.0400	0.0800	Actual	0.0800	Target	USD
3	MP0370-006	M3x25 Socket Cap Bolt	4	0.6000	0.1500	Actual	0.1800	Target	USD
3	MP2728	Support Blind Hole Mount	5	1.0600	0.2120	Actual	0.2430	Target	USD
3	MP0370-008	M3x35 Socket Cap Bolt	2	0.3200	0.1600	Actual	0.2000	Target	USD
2	MP2941	Body Panels	1	48.4400	48.4400	Calculated	48.4400	Calculated	USD
3	MP2194	Thing-O-Matic 2 Front Panel	1	6.5000	6.5000	Actual	6.5000	Target	USD
3	MP2196	Thing-O-Matic 2 Back Panel	1	4.7500	4.7500	Actual	4.7500	Target	USD
3	MP2199-2	New Thing-O-Matic 2 Right Panel	1	5.3500	5.3500	Actual	5.3500	Target	USD
3	MP2193	Thing-O-Matic 2 Top Panel	1	4.7400	4.7400	Actual	4.7400	Target	USD

# Part Goals Rollup Reports – with Targets set

Q	MP	Thing-O-Matic 2 Left Panel	1	5.3500	5.3500	Actual	5.3500	Target	USD
3	MP2198	Thing-O-Matic 2 Left Panel	1	5.3500	5.3500	Actual	5.3500	Target	USD
3	MP2195	Thing-O-Matic 2 Bottom Panel	1	12.5000	12.5000	Actual	12.5000	Target	USD
3	MP2965	Test Electronics Side	1	5.7500	5.7500	Actual	5.7500	Target	USD
3	MP2964	Test Electronics Cover	1	3.5000	3.5000	Actual	3.5000	Target	USD
2	MP2963	Stepper Motor Assembly	1	264.6100	264.6100	Calculated	265.1600	Calculated	USD
3	MP1872	Stepper Motor NEMA17	1	230.4000	230.4000	Actual	230.4000	Target	USD
3	MP2664	Spacer Black 22 mm length .14in ID 516in OD	4	2.0000	0.5000	Actual	0.0600	Target	USD
3	MP2405	83 Tooth GT2 Timing Belt	1	13.7300	13.7300	Actual	15.0000	Target	USD
3	MP1868	Pulley 5mm shaft	1	17.9600	17.9600	Actual	19.0000	Target	USD
3	MP0370-007	M3x31 Socket Cap Bolt	4	0.4400	0.1100	Actual	0.1100	Target	USD
3	MP2690	Washer 0.355 46mm Thk 3.175mm ID 7.95mm OD	4	0.0800	0.0200	Actual	0.0200	Target	USD
2	MP2453	Thing-O-Matic 2 Radial Ball Bearings	4	102.0000	25.5000	Actual	25.5000	Target	USD
2	MP2944	Cable Hardware	1	4.1469	4.1469	Calculated	8.3700	Calculated	USD
3	MP2580	Cable Holder Adhesive Backed Self Closing	16	0.4144	0.0259	Actual	0.2600	Target	USD
3	MP2683	Clamp Hinged Blind Hole Mount Black	4	1.8800	0.4700	Actual	0.4900	Target	USD
3	MP2684	Cable Clamp Blind Hole Mount	3	1.8525	0.6175	Actual	0.7500	Target	USD
2	MP0979	Mechanical Endstop	2	3.6000	1.8000	Actual	2.0000	Target	USD
1	MP2954	Extruder	1	692.9600	692.9600	Calculated	710.1050	Calculated	USD
2	MP1705	MK7 Thermal Core	2	9.0000	4.5000	Actual	3.7500	Target	USD
2	MP2607	Cartridge Heater 40W 24V Right Angle Exit	2	10.7800	5.3900	Actual	6.2300	Target	USD
2	MP2966	Wire-Filament Extruder Guide	1	4.7500	4.7500	Actual	4.7500	Target	USD
2	MP2959	Nylon Spacer with Flange	1	0.0600	0.0600	Actual	0.0650	Target	USD
2	MP2505	MK7 Nozzle 0.3mm	2			Calculated		Calculated	USD
2	MP2506	MK8 Nozzle 0.4mm	2	19.4800	9.7400	Actual	8.7500	Target	USD
2	MP1708	MK7 Heatsink	2	14.9000	7.4500	Actual	7.7500	Target	USD
2	MP2685	Spacer Black 16.5mm length 3.2mm ID 7mm OD	4	1.8000	0.4500	Actual	0.4500	Target	USD
2	MP2675	Tube Fitting .45in Tube	2	8.4600	4.2300	Actual	4.5000	Target	USD
2	MP2350	Fan 24V 40x40x10 Hi Performance	2	9.0800	4.5400	Actual	4.7500	Target	USD
2	MP2953	Extruder Hardware	1	2.3500	2.3500	Calculated	2.3500	Calculated	USD

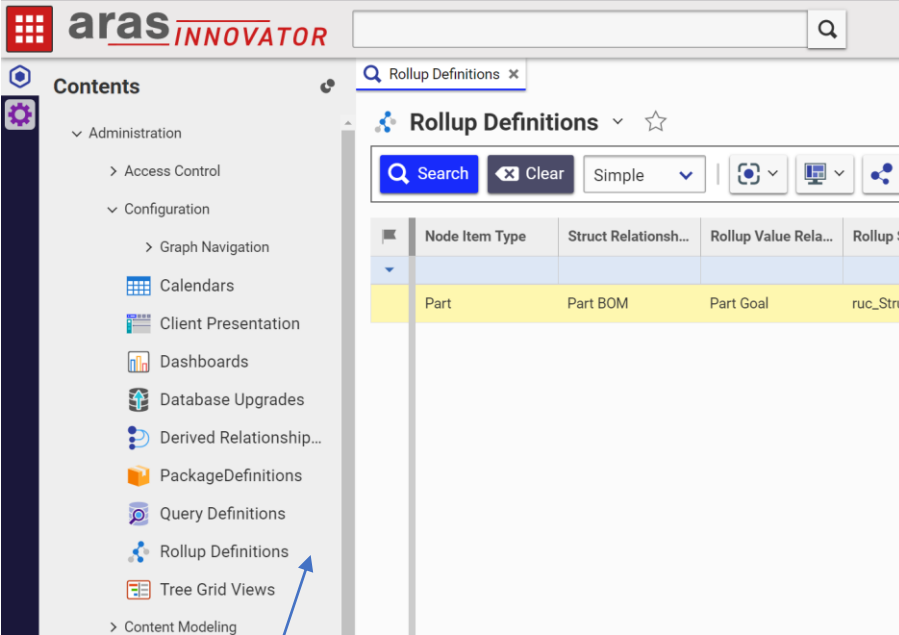
This situation shows a leaf level part with no goals set. For a complete rollup scenario this should be corrected.



# Part Goals Management

Rollup Configuration

# Rollup Definition – Configurations for Administrators



Newly added configuration section

Part Part BOM

Edit

Rollup Definition

Node Item Type

Part

Struct Relationship Type

Part BOM

Rollup Value Relationship Type

Part Goal

Rollup Service

ruc\_StructResolutionRunCallba

Description

Part Goals rollup scenarios (cost and weight ). Actuals and Target rollup

Rollup Types List

Part Goals

Rollup Type Property (On Rollup Rel)

goal

Rollup Relship Unit Property Name (On RollupRel)

goal\_unit

Rollup Types

ruc\_TypeDefinition

Hidden

Rollup Type	Rollup Unit Property Name (on ...	Rollup Unit	Rollup Node Filter Condition [...]	Rollup Struct Filter Condition [...]
Cost	cost_unit	USD	<OR> <cost_basis>Calculated</c...	
Weight	weight_unit	kg	<OR> <weight_basis>Calculated...	

< Prev Next > Page: 1 of 1 | 2 Results

This "Method" is called to do the structure resolution based on these definitions

A default method is provided and should serve most rollup purposes.

Must match the values in this List

# Rollup Definition – Configuration for Administrators

Part Part BOM ☆

Edit

Rollup Definition

Node Item Type

Part

Struct Relationship Type

Part BOM

Rollup Value Relationship Type

Part Goal

Rollup Service

ruc\_StructResol

Description

Part Goals rollup scenarios (cost and weight ). Actuals and Target rollup

Rollup Types List

[Part Goals](#)

Rollup Type Properties

goal

Rollup Types

ruc\_TypeDefinition ☆

Hidden

Rollup Type	Rollup Unit	Rollup Node Filter Condition	Rollup Unit	Rollup Node Filter Condition
Cost	cost_unit	<OR> <cost_basis>Calculated</cost_basis>	USD	<OR> <weight_basis>Calculated</weight_basis>
Weight	weight_unit			

< Prev

Next >

Page: 1 of 1

Open

Edit

Replace

Remove

Actions >

Permissions >

Rollup Types >

Copy Row

Show Clipboard

Promote

ruc\_TypeDefinition

Rollup Type

Cost

Rollup Unit Property Name (On Node)

cost\_unit

Rollup Unit

USD

Rollup Node Filter Condition

<OR>  
<cost\_basis>Calculated</cost\_basis>  
<cost\_basis condition="is null" />  
</OR>

Rollup Struct Filter Condition

Calculated Value Definition

ruc\_TypeCalculatedValue ☆

Hidden

Calculation Name	Rollup Value Property (on Node)	Rollup Basis Property (on RollupRel)	Rollup Calculated Value Property (on RollupRel)	Rollup Calculated Basis Label	Quantity Property Name (on Str...	Rollup Single Node Calculation ...
Actual cost values rollup	cost	cost_basis	calculated_value	Calculated	quantity	RollupSinglePartGoals
Target cost values rollup	cost_target	cost_target_basis	target_calculated_value	Calculated	quantity	RollupSinglePartGoals

These definitions must reflect the existing data model

This "Method" is called to do the rollup calculations on a single level

# Rollup Definition – Configuration for Administrators

^ ruc\_TypeDefinition

Rollup Type

Cost

Rollup Unit Property Name (On Node)

cost\_unit

Rollup Unit

USD

Rollup Node Filter Condition

<OR>  
<cost\_basis>Calculated</cost\_basis>  
<cost\_basis condition='is null' />  
</OR>

Rollup Struct Filter Condition

^ ruc\_TypeCalculatedValue

Calculation Name

Actual cost values rollup

Rollup Value Property (On Node)

cost

Rollup Calculated Value Property (On RollupRel)

calculated\_value

Quantity Property Name (On Struct)

quantity

Rollup Single Node Calculation Method

RollupSinglePartGoals

Rollup Calculated Basis Label

Calculated

Rollup Basis Property (On RollupRel)

cost\_basis

^ Calculated Value Definition

ruc\_TypeCalculatedValue

Open

Edit

Replace

Remove

Open

Actions

Permissions

Calculated Value Definition

Copy Row

Show Clipboard

Promote

Calculation Name	Rollup Value Property (on Node)	Rollup Calculated Value Property (on RollupRel)	Rollup Calculated Basis Label
Actual cost values rollup	cost	calculated_value	Calculated
Target cost values rollup	cost_target		

< Prev   Next >   Page: 1 of 1   2 Results

^ Manual Rollup Values Definition

ruc\_TypeManualValues

Hidden

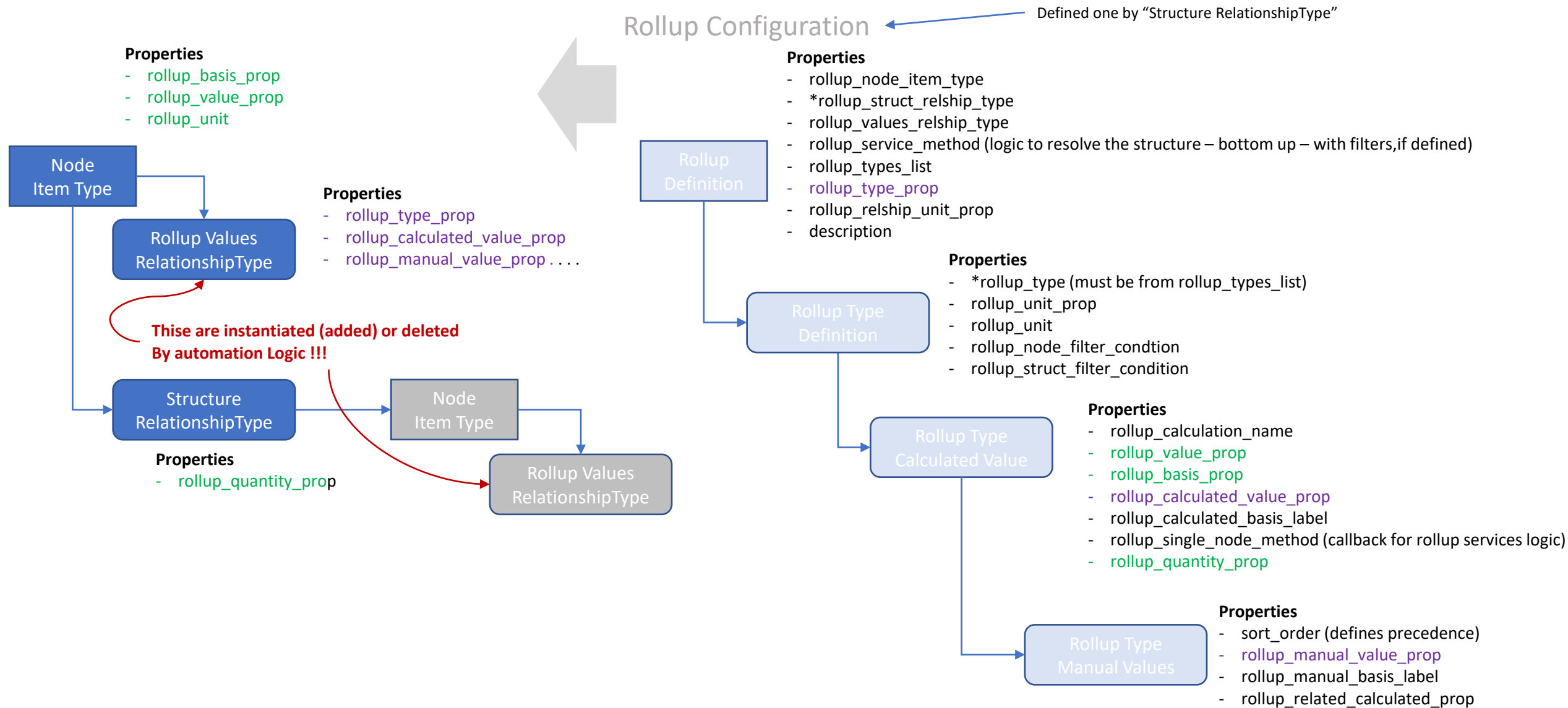
Preceden...	Manual Rollup Value Property (o...	Manual Rollup Basis Label Prop...	Related Calculated Property
10	estimated_value	Estimated	calculated_value
20	actual_value	Actual	calculated_value

These definitions must reflect the existing data model

# Part Goals Management

Implementation Details

# Data Model – for „calculated Rollup“ within a Structure



# Data Model: Applied for „Part Goals Management“

## Example: additional Part Properties

- ,cost\_basis'; ,cost'; ,cost\_has\_goals'
- ,cost\_target\_basis'; ,cost\_target';
- ,weight\_basis'; ,weight'; ,weight\_has\_goals'
- ,weight\_target\_basis'; ,weight\_target';

„Part“

„Part Goal“

## Example: Part Goal Properties

- ,goal'; ,calculated\_value'; ,estimated\_value'; ,actual\_value'
- ,target\_value'; ,target\_calculated\_value'

**These are instantiated (added) or deleted  
by automation Logic !!!**

„Part BOM“

## Example: Part BOM Properties

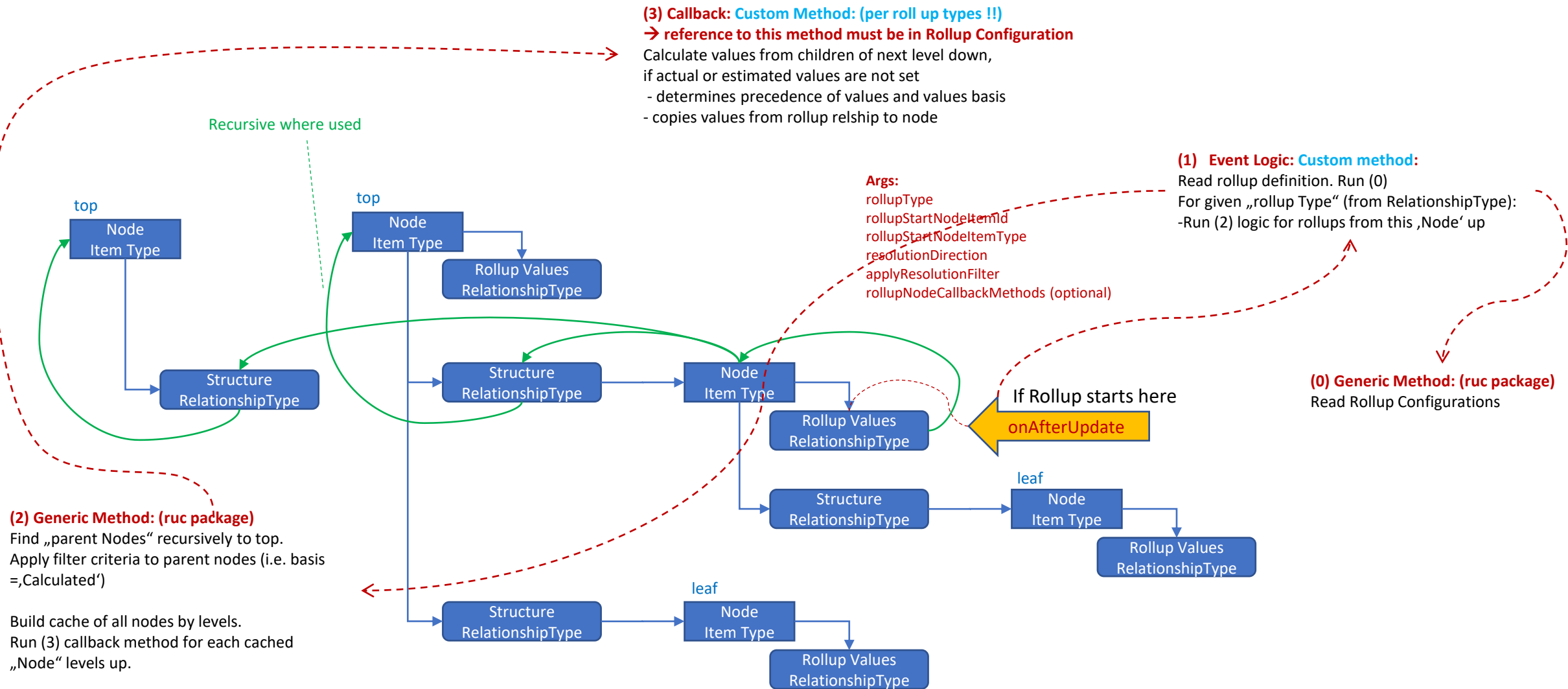
- quantity

„Part“

„Part Goal“

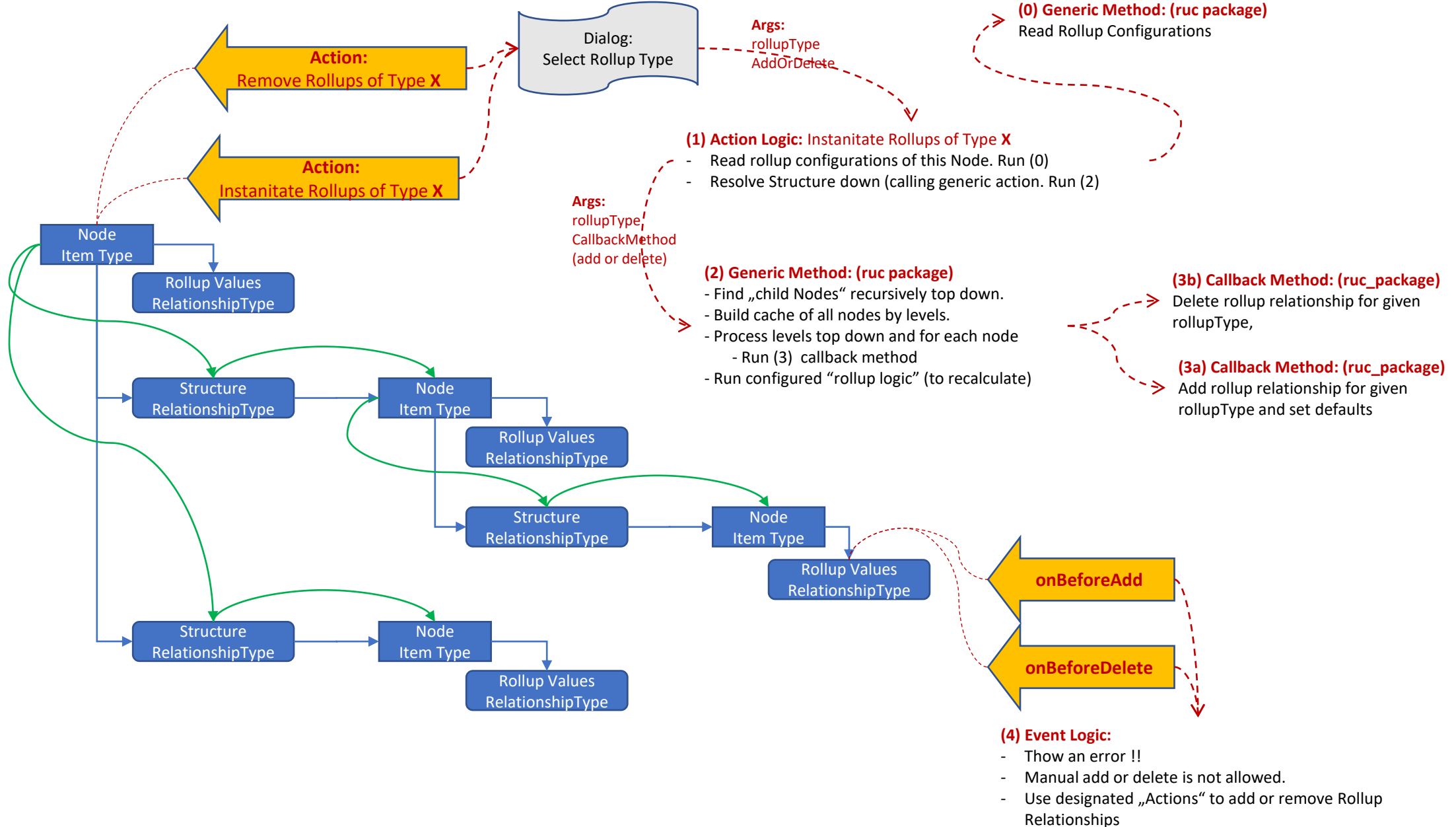
# Rollup – Services (Generic Methods & Custom Methods)

bottom up Strategy





# Add/Remove Rollup Type to Structure (down)



# Add /Remove Part to/from BOM

## (0) Generic Method: (ruc package)

Read Rollup Configurations

### onBeforeDelete

#### (1a) Event Logic:

- Run rollup logic from Parent Part up

### onAfterAdd

#### (1b) Event Logic:

- Read rollup configurations of this relationship ItemType. Run (0)
- Get Parent Node and determine its „rollup types“
- Get Child Node and add „Rollup Relationships“ for ALL „rollup types“ Run (2a)
- Run rollup logic from Parent Part up, if Child Part has rollup values set

## (2a) Callback Method: (ruc\_package)

Add rollup relationship for given rollupType and set defaults

