

A Bidirectional Model-driven Spreadsheet Environment

Jácome Cunha, João Paulo Fernandes, Jorge Mendes, João Saraiva

Project SSaaPP – SpreadSheets as a Programming Paradigm
(FCT – PTDC/EIA-CCO/108613/2008)

MDSheet is a framework for spreadsheet model and spreadsheet data co-evolution, providing several transformations that can be applied to models or data, ensuring that they are always kept synchronized.

The user can update both the Model or the Data.

	A	B	C	D	E	F
1	Budget	Year	year=2010			
2	Category	Qty	Cost	Total		Total
3	name=""	qty=0	cost=0			total=SUM(total)
4	...	...	...			...
5				total=SUM(total)		total=SUM(year.total)

conforms to

	A	B	C	D	E	F	G	H	I
1	Budget	Year	2010	Year	2011				
2	Category	Qty	Cost	Total	Qty	Cost	Total		Total
3	Travel	2	320	640	7	420	2940		3580
4	Accommodation	5	140	700	8	185	1480		2180
5	...	...	...	...	...	...	...	...	...
6				1340			4420		5760

Model

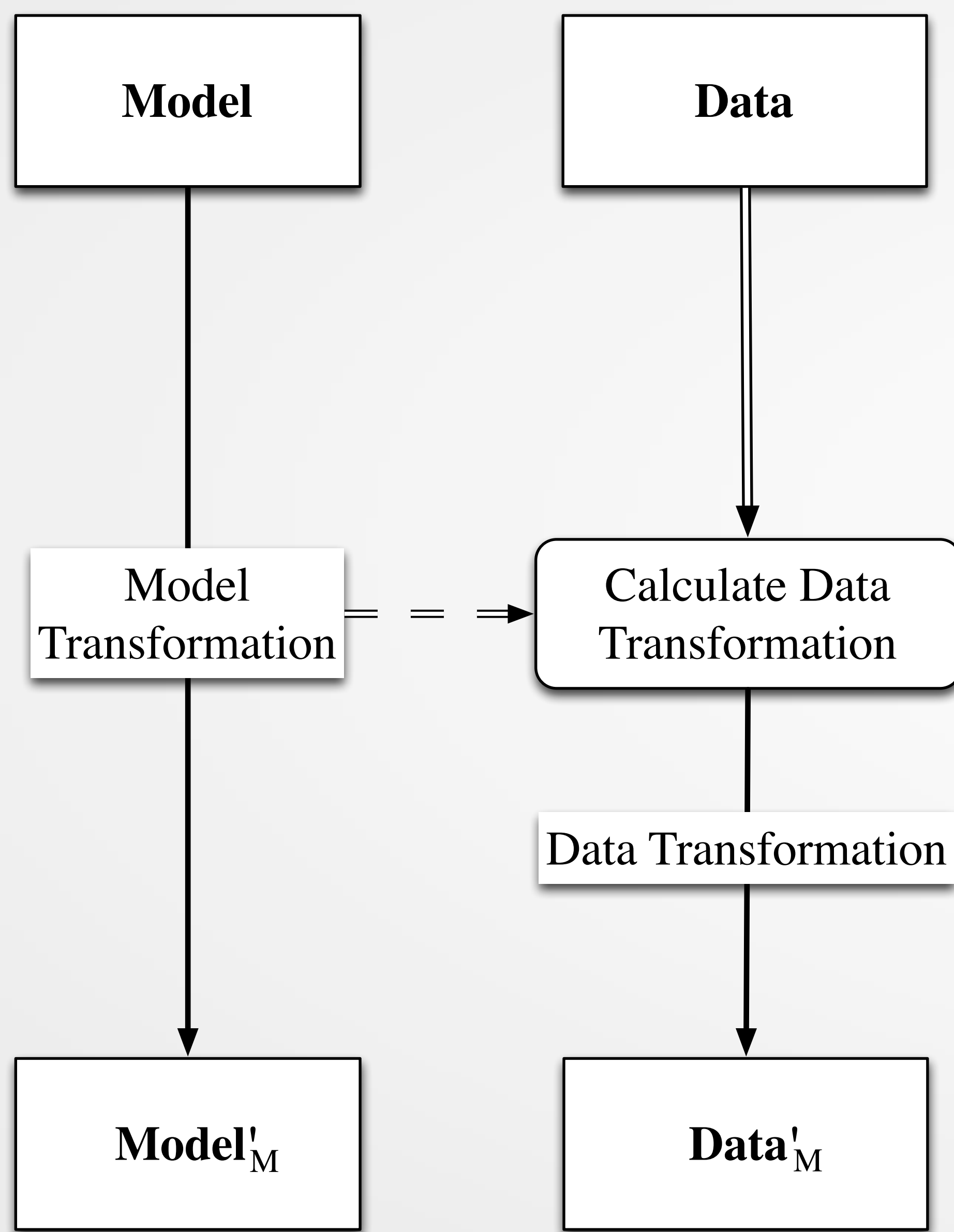
Data

The user presses a button on the spreadsheet system to evolve the object in the current worksheet, i.e., the Model or the Data.

Both Model and Data are sent to the MDSheet back end. If the user updates the Model, a Model Evolution step is performed; otherwise, a Data Evolution step is performed.

Model Evolution

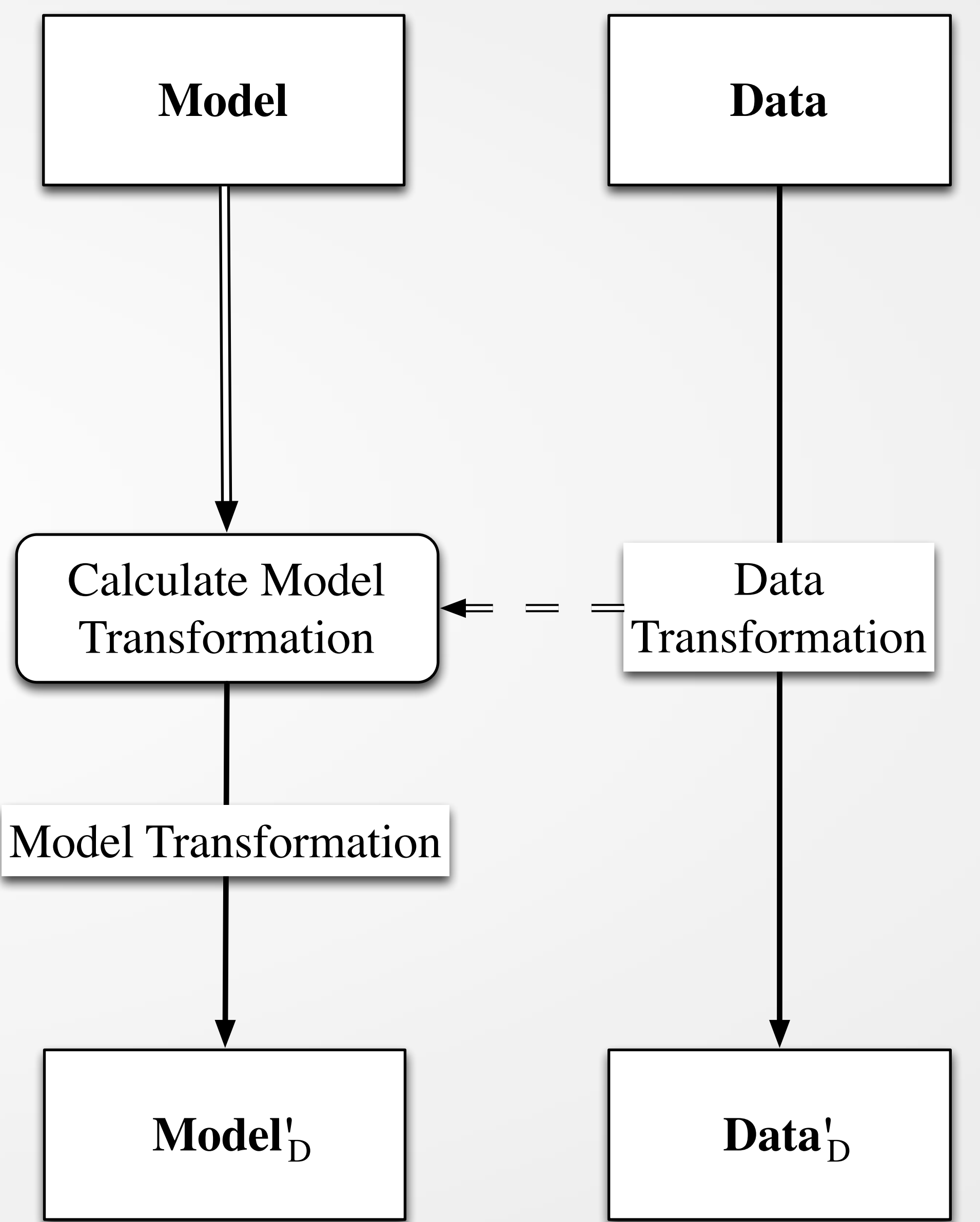
Data Evolution



The transformation is applied to the Model (Model Evolution) or to the Data (Data Evolution).

The transformation for the other artifact is calculated using the previous transformation.

The calculated transformation is applied.



Both the Model and the Data are sent back to the spreadsheet system.

Evolutions are guaranteed to be safe.

The user may perform more evolution steps on the evolved Model and Data.

	A	B	C	D	E	F	G	H	I	J	K
1	Budget	Year	year=2010	Year	year=2010	Discount	Total				Total
2	Category	Qty	Cost	Total	Qty	Cost	Discount	Total			total=SUM(total)
3	name=""	qty=0	cost=0		qty=0	cost=0	disc=0				total=SUM(total)
4	...	...	...		...	...	...				total=SUM(year.total)
5				total=SUM(total)				total=SUM(year.total)			total=SUM(year.total)

conforms to

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Budget	Year	2010	Year	2011	Year	2012							
2	Category	Qty	Cost	Total	Qty	Cost	Discount	Total						Total
3	Travel	2	320	640	7	420	0.1	378						3958
4	Accommodation	5	140	700	8	185	0	1480						3660
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6				1340				4420						1858
7														7618

	A	B	C	D	E	F	G	H	I	J	K
1	Budget	Year	year=2010	Year	year=2010	Discount	Total				Total
2	Category	Qty	Cost	Total	Qty	Cost	Discount	Total			total=SUM(total)
3	name=""	qty=0	cost=0		qty=0	cost=0	disc=0				total=SUM(total)
4	...	...	...		...	...	...				total=SUM(year.total)
5				total=SUM(total)				total=SUM(year.total)			total=SUM(year.total)

conforms to

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Budget	Year	2010	Year	2011	Year	2012							
2	Category	Qty	Cost	Total	Qty	Cost	Discount	Total						Total
3	Travel	2	320	640	7	420	0.1	378						3958
4	Accommodation	5	140	700	8	185	0	1480						3660
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6				1340				4420						1858
7														7618

Model Evolution

Data Evolution

...

...

Model Evolution

Data Evolution

...

...

Scripted OpenOffice Front End

Bidirectional Haskell Evolution Engine

Scripted OpenOffice Front End