The Rota Period

It begins with the pattern of valence of the first two periods: 1+ 2+ 3+ 4+ 3- 2- 1- 0

You can see there is a natural gap between the 4+ and the 3-. It turns out that (in every period):

There is always a	2+ 3+ 4+ 3- 2- 1- 0	(period ends)
Followed by a	1+ 2+ 3+ 4+	(period begins)

These 2 patterns represent the 2 halves of the period, from a valence perspective. You can see it in the medium long form of the periodic table, but it is not obvious. It is very obvious in the Rota Period.

Please note: I do not consider H + He as a period because they do not show the above characteristic. They are special.

Once you see the Rota Period (http://www.rotaperiod.com), the improvements to the periodic table are obvious, even at first glance. For example, this 18-column structure is confusing:

Old IUPAC:	Ia	IIa	IIIb	IVb	Vb	VIb	VIIb	VIIIb	(3 columns)		Ib	IIb	IIIa	IVa	Va	VIa	VIIa	VIIIa
New IUPAC:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Valence:	1+	2+	3+	4+	5+	6+	7+	8+			1+	2+	3+	4+	-3/5+	-2/6+	-1/7+	0

If you look closely at the above medium long form, it is really 2 stacks of I II III IV V VI VII VIII (short form) lined up side by side:

I II III IV V VI VII VIII
\+ I II III IV V VI VII VIII
= I II III IV V VI VII VIII(3 columns) I II III IV V VI VII VIII
= 18 columns

It looks like "they" ran out of space at VIII (VIIIa (European) or VIIIb (American), which eventually became Groups 8, 9, 10) and had to use 3 columns to describe how these various elements behaved. Hence we inherited the new IUPAC version (but it does not solve the problem). Of the following: Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt, Hs, Mt, Ds, only two of them show 8+ characteristics (Ruthenium and Osmium). The valences of Hs, Mt and Ds are unknown. The others range from 2+ to 6+.

So why are these elements all grouped under VIIIb (American) or IUPAC 8, 9, 10, as a 3x4 column block? There are no 9+ or 10+ valences. Quite simply because they ran out of room using a flawed method of building the periodic table (design), and then theorized their way out of this problem. Hence, we inherited the concept of a staircase in the periodic table (division between metals and non metals), and to make this idea more convincing, there had to be semi metals. Not only are these two concepts questionable, we also had to adopt the sub-classifications a and b. This was an earlier mistake (subgroups a &b), but at least it attempted to show valence. The current version does not even attempt to show valence.

The Solution

Here is what I propose:

----------Metals----------								----------Non Metals----------			
I	II	III	IV					V	VI	VII	VIII
1+	2+	3+	4+	5+	6+	7+	8+	3-	2-	1-	0

Although similar to the short form of the periodic table, there are two main distinctions:

1. It does not classify the 5+, 6+, 7+, and 8+ metals into groups V, VI, VII and VIII (or IUPAC 5, 6, 7, 8).
2. It uses the horizontal and vertical of the page to displace elements (vertical gap) in a new way.

It also differs from the medium long form:

3. It uses 12 groups instead of 18.
4. It puts the horizontal gap after 4+ (Temperature, Organic Chemistry, plus it is symmetrical).
5. It incorporates the Lanthanide and Actinide Series.

The main benefit is that you are able to easily see valences and most relationships between elements. You can still see orbitals; even better, you can see the relationship between orbitals. Rota's Period simplifies valence, and, since this is vital to understanding how elements combine, chemistry is less of a mystery for the novice.

Emphasizing the strength of the 4+ elements, Rota's Period changes the group classifications of the 5+, 6+, 7+ and 8+ metals, redraws the line between metals and non-metals, classifies Carbon and Silicon as metals, and, questions the need for semi-metals.

The Rota Period (12 columns) is a compromise/solution between the medium long form and the short form. You can see how the 5+6+7+8+ elements (metals) are related to the 4+ elements and NOT related to the 3- elements (non-metals). There is a natural separation between positive and negative (primary) valences, just as there is a natural separation between metals and non-metals.

Whether to group the above columns using the Group I, II, III, IV, V, VI, VII, VIII nomenclature is up to you, but quite clearly there are 3 groups of 4 columns here (12 columns in total), and these groups (either grouped by one column and/or by 4 column families) have similar chemistry/physical characteristics, i.e.,

Families	----------	----------	----------
Groups	I II III IV	V VI VII VIII	
Valence	1+ 2+ 3+ 4+	5+ 6+ 7+ 8+	3- 2- 1- 0

Since (after the first 2 periods) the Roman numerals (groups, valence), are super-ceded by 4 more columns of metals, I am thinking of changing my group nomenclature to:

Families	----------	----------	----------
Groups	I II III IV	V VI VII VIII	IX X XI XII
Valence	1+ 2+ 3+ 4+	5+ 6+ 7+ 8+	3- 2- 1- 0

Or even better:

Families	----------Metals ----------	----Non Metals---
Groups	I II III IV V VI VII VIII	IX X XI XII
Valence	1+ 2+ 3+ 4+ 5+ 6+ 7+ 8+	3- 2- 1- 0

I have not done this yet (changed the Roman Numerals), because I want the reader to see how this new model relates to the original short form model. There may be no reason to keep the Roman numerals, but I like them.

Benefits of the Rota Period

- Single page, 2 dimensional, can be shown as text (Rota Diagram)
- Very easy to see valence (oxidation state)
- Less confusing to the novice/student of chemistry
- The design continues what Mendeleev and Newlands started
- Based more upon valence than orbitals
- Uses both the horizontal and the vertical to displace elements
- Flexible - you can create your own version, depending upon your data (atomic number + valence)
- Allows for multi-valence versions (see http://www.rotaperiod.com)
- One cohesive model (includes the Lanthanide and Actinide Series)
- Better able to handle new elements: no longer need separate tables
- You can see how the 5+6+7+8+ metals are not related to the 3-2-1-0 non-metals
- Is a valid representation of the elements
- Is consistent with temperature graphs (boiling and melting points) of the elements
- Is consistent with ionization energies of the elements
- Is consistent with the original Group I, II, III, IV, V, VI, VII and VIII nomenclature
- Displays the d and f orbitals in a new way that shows the chemical similarity and relationship of those elements
- Combines the best of the short form and the medium/long form
- It is easy to teach someone how it works and may give students/chemists an edge in being better able to remember the elemental properties