Two questions, two answers:

1 Which functionalities do you think are most likely to make the transition from the laboratory to market readiness?

2 What major hurdles have to be overcome in order to integrate new functionalities into existing coating systems?

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1 The term "functional coating" covers a huge variety of possible surface functions. We consider "functional coatings" to be coatings having novel surface functions beyond classical decoration, corrosion protection, and surface protection.
There are a huge number of approaches being pursued for developing functional coatings and some have very promising properties and functions on a lab scale. It is, for instance, not very difficult to create a surface that is extremely hydrophobic with a water contact angle of 150°. The major challenge is to make these approaches feasible for industrial use, which means consideration of aspects such as price, durability, commercial availability of the ingredients, and in some cases optical appearance.
Some functionalities that seemed exotic a couple of years ago are already in the marketplace today. One example is a self-healing coating for wood protection based on microcapsules, which is now commercially available. It is very likely that other applications based on microcapsules will follow in the near future, such as coatings for heavy-duty corrosion protection and for damage indication.
Other new surface functions that are on the threshold of commercialisation are coatings for icing protection, coatings for drag reduction for aircraft and wind turbines as well as elastomeric erosion resistant coatings having dirt-repelling or easy-to-clean properties.

2 As already pointed out, it is often possible to create fascinating surface properties on a demonstrator in research projects within one to two years. The challenge then is to take that to industrial maturity and this usually requires several years of intensive development work. Industrial coatings often have to fulfill a variety of requirements in addition to the desired new functions. In return for the new functions (such as self-healing, ice protection and dirt repellence), there must be no loss of performance level with respect to traditional surface properties (scratch resistance, colour, gloss, appearance, corrosion protection, etc.).
For existing coating systems, simply mixing in a wonder-additive is very unlikely to create a new functional coating. The development of a coating system with new functions normally requires substantial modification of the formulation which means that such coatings typically have to be developed from scratch. As a consequence, these new systems need to be qualified before they can be used in industrial applications having high-quality requirements.
The major hurdles for the integration of new functionalities into existing coating systems are:

- Incompatibility of the functional ingredients (additives, fillers) with existing formulations
- Poor durability of novel surface functions if they are achieved by adding additives instead of formulating from scratch using functional binders
- The commercial availability and price of the new ingredients

Nevertheless, there is a huge demand for new functional coatings, creating new business opportunities for the coatings industry.

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Book tip

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