Nuclear Data needs which could trigger theoretical developments

There are areas where nuclear data needs can potentially trigger theoretical developments. A few examples:

1) Radioactive decay (beta, gamma, alpha) data of intermediate mass nuclei (in particular fission products) and higher mass actinides, are relevant to assess the decay heat of irradiated fuel, which is a crucial feature of the fuel cycle (from reactor shut-down to heat deposition in a geological storage). Data are available, but discrepancies between calculation and experiments are still outstanding, even for standard reactor systems. In the case of more innovative systems, like the ABR of GNEP, the presence in the fuel of relatively high amounts of higher mass actinides (Am, Cm…) represents a new challenge in that respect. Are there theoretical developments which could help to meet the new needs and accuracy requirements?
2) Photon-production data. A sizable part of the power released in a reactor is due to photons produced in neutron interactions. Specific features of innovative reactors (e.g. the presence of reflectors adjacent to the core regions), will require more extensive and improved data bases. Could theoretical developments help?
3) Nuclear reaction model codes, applicable in the energy range from thermal (i.e. sub-eV) to 20 MeV, are an essential tool for nuclear data evaluation. Impressive progress have been made in the last two decades. However, the present trend towards reactor system simulation “from first principles”, could suggest further improvements to meet new requirements.
4) The relevance of uncertainty data has already been pointed out. Are there theoretical developments to be expected?