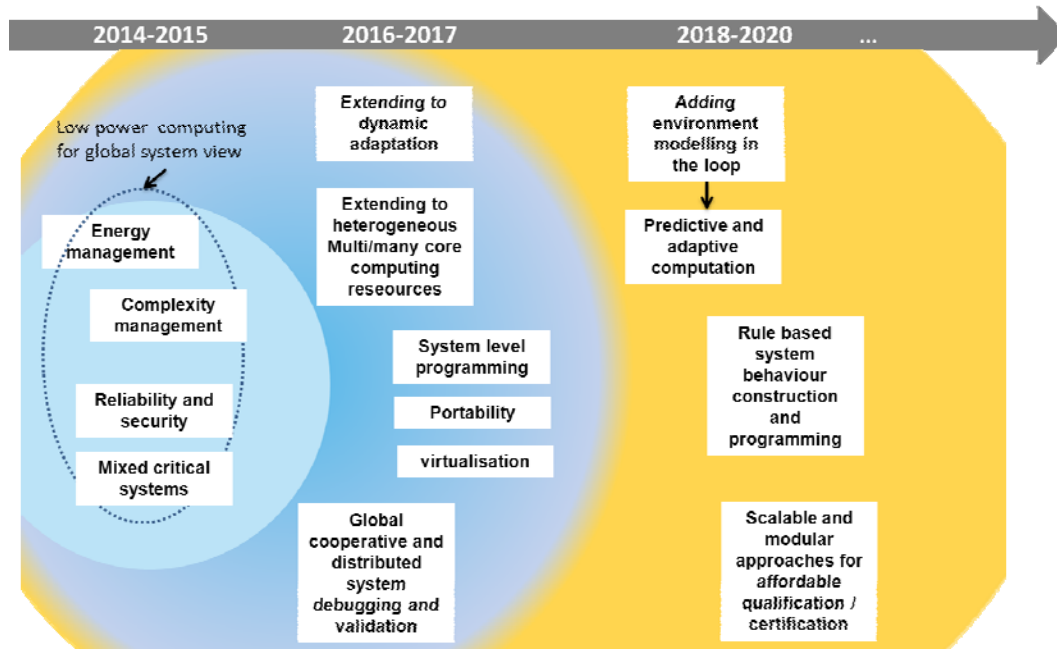


## D- Computing Platforms and energy management

- **Short term:** for addressing low power computing systems for global system view for energy management, while managing the complexity, reliability and security for mixed critical systems.
- **Medium term:** for extending to dynamic adaptation/selection of heterogeneous multi/many core computing resources to application needs. Focusing on “System level programming” with emphasis on portability, virtualization. Supporting global cooperative and distributed system debugging and validation.
- **Long-term:** for adding environment modelling in the loop (for predictive and adaptive computations). Adopting rule-based system behaviour construction and “programming”. Proposing scalable and modular approaches for affordable qualification and certification.



| Research Challenge  | Expected Impact (Sub-Challenges)   | Ph1<br>2014 -<br>2015 | Ph2<br>2016 -<br>2017 | Ph3<br>2018 -<br>2020 | Cross<br>reference to<br>Annex1 |
|---|--|-----------------------|-----------------------|-----------------------|---------------------------------|
| <b>D - Computing Architecture and energy management</b>   |  |                       |                       |                       |                                 |
| D.1 Low power computing systems: <ul style="list-style-type: none"> <li>• Heterogeneous and specialized</li> <li>• From energy management at system level to energy harvesting devices</li> </ul>   | Global system view for energy management ( Ph1)<br>Dynamic adaptation/selection of heterogeneous multi/many core computing resources to application needs ( Ph2)<br>Environment modeling in the loop (for predictive and adaptive computations) (Ph3)  |                       |                       |                       |                                 |
| D.2 Collaborating computational elements – managing complexity <ul style="list-style-type: none"> <li>• Distributed computations -&gt; computation AND communications together</li> <li>• Processing according to the data/ data reduction (for taming the data deluge)</li> <li>• Decoupling hw/sw: portability, task migration, dynamic adaptation at system level</li> </ul> | -Standard interfaces and synergies between computing segments, reuse, TTM (Time to Market), including link with existing OSes and new OSes. (Ph1)<br>-Data driven processing, extracting the relevant data at each level, data fusion (Ph1)<br>-Full system debugging and validation (Ph1)<br>-“System level programming”, AaaS (Application as a Service), portability, virtualization (Ph2)<br>-Global cooperative and distributed system debugging and validation(Ph2)<br>-Platform implementing Global Model of Computation and Communication (-> from FET) (Ph3)<br>-“Declarative”, rule based system behavior construction and “programming” (Ph3) |                       |                       |                       |                                 |
| D.3 Interfacing with sensors and actuators- including Human Interfaces) <ul style="list-style-type: none"> <li>• Various real-time requirements</li> <li>• Time and latency as first class citizen</li> </ul>   | -Data driven processing, extracting the relevant data at each level(Ph2)<br>-Mixed criticality systems (Ph2)<br>-Environment modeling in the loop (for predictive and adaptive computations) (Ph3)   |                       |                       |                       |                                 |
| D.4 Reliable trustable computing platforms <ul style="list-style-type: none"> <li>• At hardware, system, programming levels</li> <li>• Qualification and certification               <ul style="list-style-type: none"> <li>○ For multi/many cores</li> <li>○ For distributed systems</li> <li>○ For virtualized systems</li> </ul> </li> </ul>                                 | -QoS management at all level (from HW to algorithms)<br>-Online bug detection and correction, isolation of faults, resilient and self-healing systems<br>-Affordable qualification and certification (lobbying, regulation)<br>-Scalable and modular approach (Ph1)<br>-Reduction of effort for revalidation/ recertification (Ph2)<br>-Virtual hardware to increase time in   |                       |                       |                       |                                 |

| Research Challenge                                 | Expected Impact (Sub-Challenges)                      | Ph1<br>2014 -<br>2015 | Ph2<br>2016 -<br>2017 | Ph3<br>2018 -<br>2020 | Cross<br>reference to<br>Annex1 |
|--|---|-----------------------|-----------------------|-----------------------|---------------------------------|
|  | market (Ph3)  |                       |                       |                       |                                 |
| D.5 Securing and tamper proofing at platform level | -Securing and tamper proofing at platform level (Ph1) |                       |                       |                       |                                 |