

STRATEGIC WORKSHOP

Benefits of Research Infrastructures beyond Science

The Example of the Square Kilometre Array (SKA)

Parallel Break-Out Group:

Information and Communication Technology





Take-Away Points

- ICT is the backbone of the SKA
- SKA will challenge ICT to innovate
 - market-adjacent ICT in interesting and important ways
- Benefits to society
 - ICT training, attraction of new talent to ICT
 - astronomy interest spans all cultures, SKA is an iconic project
 - globalization standards
 - engineering, construction, and innovation in hardware and software will drive common standards
 - global sensor networks
 - invention of a model for global sensor networks with high communication and computational needs
 - smart, world-wide communication
 - invention of new models, protocols, and microelectronics for smart world-wide communication with enormous data rates

Opportunities to Influence ICT



- SKA challenges and opportunities to drive ICT innovation
 - Performance of SKA
 - HW: signal processing and data manipulation
 - LNAs, ADCs, digital electronics, microelectronics
 - » distinctive requirements for SKA lead to collaborations with industry
 - » general applicability for commercial use
 - demand for low failure rates, ability to predict failure
 - » Reliability, Availability, Integrity, Maintainability (RAIM)
 - SW: front end and backend
 - computation versus streaming
 - development of SKA SW stack through worldwide contributions
 - synchronization of antennas
 - SW qualification
 - RAIM

Opportunities to Influence ICT



- Algorithms
 - Active RFI mitigation, transient detection, flagging
 - streaming data analysis, intelligent classifications
 - mathematical innovations
- Communication (data transport)
 - interfacing (front end to back end)
 - high bandwidth, high reliability
- Power and cooling
- Systems Integration: performance, power, integrity
- Station resistance to lightning, environmental effects
- Access by scientists: maximizing science return
 - cyber infrastructure:
 - remote facilitation of resources at the source
 - remote facilitation of resources at the user side
 - global middleware: data cloud
 - global use of resources
- Different influence for Small-Medium Enterprise vs Global Corporations