CHAPTER 6

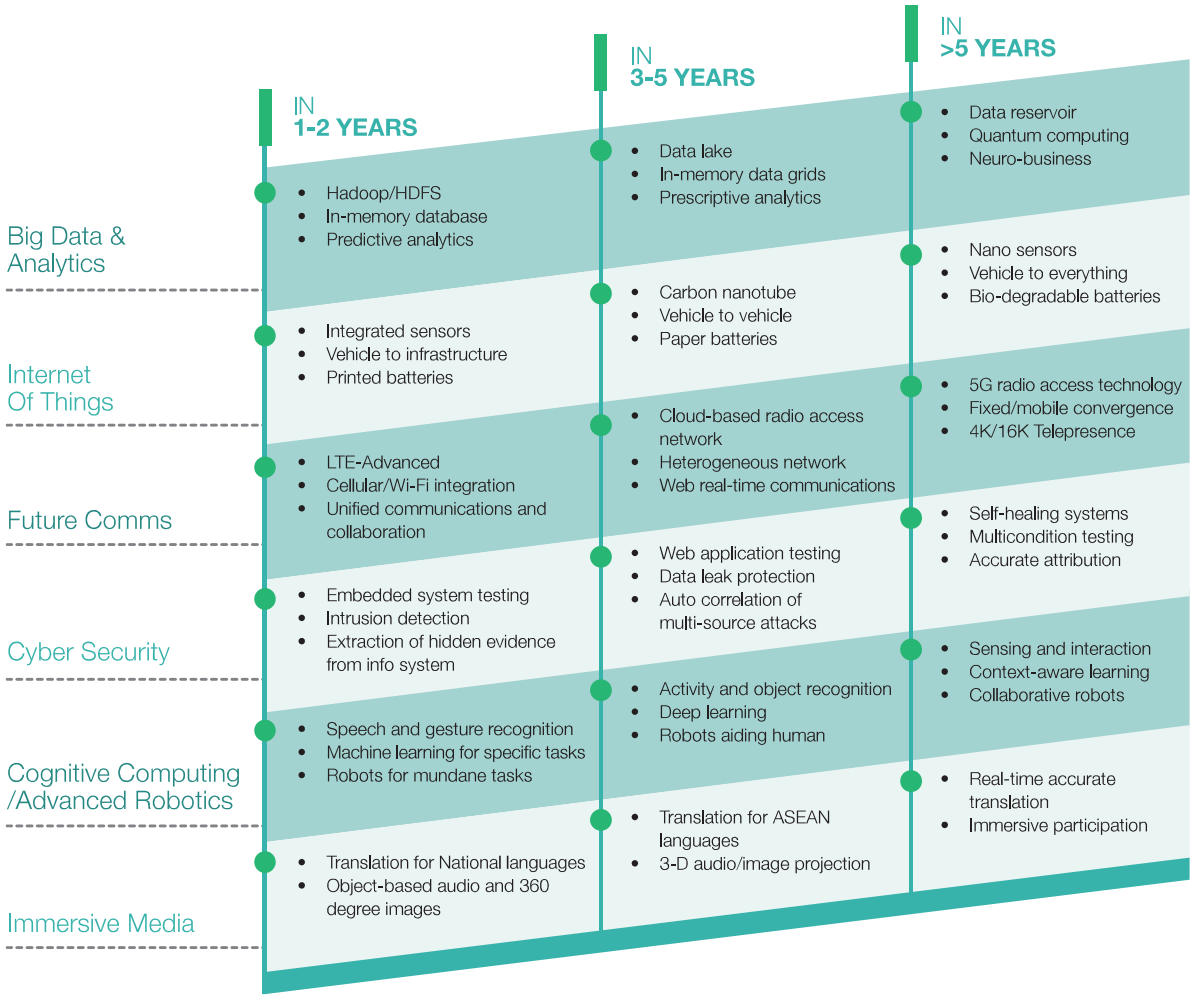
Making It Possible: Technologies To Power Us Ahead

6.1 Not all the ideas in this Report are immediately implementable. The state of technology is a key constraint. In some cases, the technology is not yet sufficiently mature in order to be cost-effective. In others, several of the component technologies are already available, but until the last component is ready, the solution cannot be implemented.

6.2 In the next decade, we believe that new technological discoveries will provide fresh insight to existing problems. New research directions may also open up surprising new pathways to solve our national challenges.

6.3 We cannot predict in advance the exact sequence in which various research directions will bear fruit. Navigating the next decade will thus require an agile infocomm media sector – one that is poised to take advantage of new breakthroughs as they are uncovered.

6.4 We believe that advances in six technology areas will play a significant role in facilitating the emergence of many of the solutions we envisage in this Report. These six areas constitute our infocomm media technology roadmap. The roadmap is delineated into three timeframes, namely, short- (one to two years), mid- (three to five) and long-term (greater than five). We have a fairly good idea of what may emerge in the next one to two years. Beyond this time horizon, we are less certain about the time frame in which they become possible.



6.5 For each of these six technology areas, we have developed sub-roadmaps that reflect the industry's view of the likely trajectory in terms of the evolution and mainstream adoption prospects of component technologies.

6.6 The confluence of one or more of these six technology areas will also open up many opportunities for innovation. Cognitive Computing and Cyber Security are enablers across many sectors. Cognitive Computing enhances the intelligence of systems to learn and improve their capabilities over time, while Cyber Security technologies enhance the trustworthiness of systems and protect us against evolving cyber threats. The different technologies can also work together to help us transform our sectors. For example, Future Communications, the Internet of Things, and Big Data & Analytics can help us improve healthcare by enabling the development of Tele-health, Personalised Healthcare, and Optimised Healthcare Delivery. These same technologies also make possible the Last Mile Delivery in Urban Logistics, International Trade and Logistics, and E-Commerce.

Improving the Link between Research and Industry

6.7 The technology roadmap outlines what is possible based on technology breakthroughs in Singapore and the world. However, the technology intellectual property (IP) that emerges from research institutes and universities still have to be translated into commercial products and services. We think that this is an area where Singapore can do better.

6.8 There is currently considerable information asymmetry between companies seeking technologies solutions, and the institutions owning the IP. Initiatives like the Tech Challenge described in Chapter 4 (para 4.14) can help to draw more technologies out of universities and research institutes. By providing a focus on big challenges, we can build new capabilities that we desire and solve interesting and significant real world problems in radical and beneficial ways. This can enable greater public and private collaboration, and encourage the development of more innovative technology products.

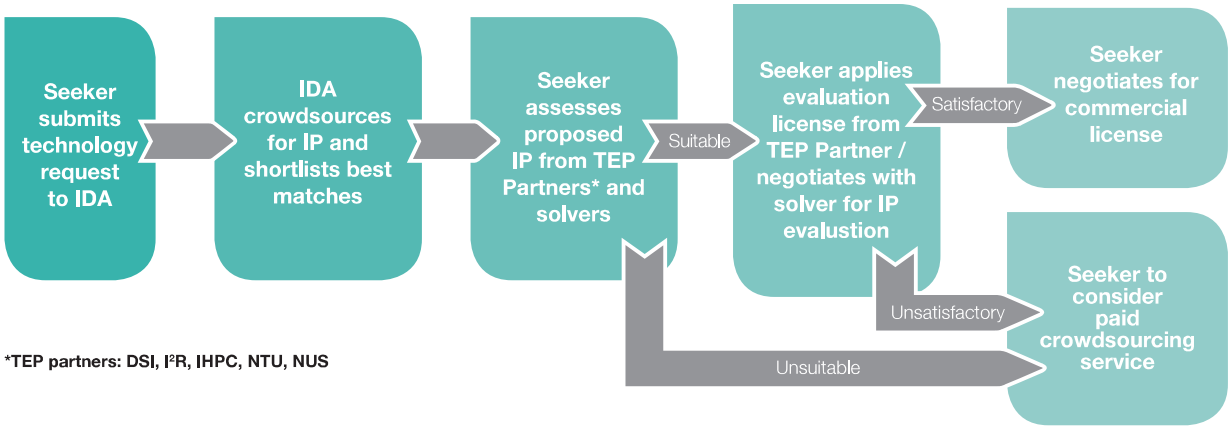
6.9 Having a focus on big challenges is insufficient to engender quality research outcomes, we must also identify the right companies and start-ups with the ambition to scale, grow quickly and ultimately build a strong presence on the world stage. A process that helps to identify industry partners that give better value-capture outcomes from research is needed to refine current processes of IP translator platforms and research assistance schemes. For example, IDA has set up Accreditation@IDA, a programme that evaluates and accredidates tech companies in their technical products, commercial viability (e.g. cost of offering versus other competitors), legal and financial suitability, etc.

6.10 We propose that IDA contiune to work closely with tech companies and user organisations to develop innovative tech solutions leveraging on IPs available locally and overseas through its Technology Evaluation Programme. The programme simplifies the process of sourcing for IP, mitigates the risks in IP adoption, and complements existing in-house R&D efforts.

6.11 To achieve these objectives, IDA has partnered with and made available IPs by the Data Storage Institute (DSI), the Institute for High Performance Computing (IHPC), the Institute for Infocomm Research (I2R), Nanyang Technological University (NTU), and the National University of Singapore (NUS). Technology crowdsourcing is also conducted to source for IPs from other local and overseas technology owners ("solvers").

6.12 Under this programme, tech companies and user organisations ("seekers") source for matching IPs by submitting their technology requests to IDA. This is one more type of quality assistance that IDA provides to accredited companies that can also serve to connect promising growth companies to efforts within the research community domestically and abroad. When a suitable IP is found, they may apply for a short term no-fee evaluation licence from Technology Evaluation Programme partners, or negotiate with other local and overseas solvers to evaluate the IP. Upon satisfactory evaluation, they may seek a commercial licence of the IP with its owner.

6.13 If no suitable IP is found, or the outcome of IP evaluation is unsatisfactory, IDA will help refer the seekers to appropriate intermediaries who are able to help source for suitable IPs globally.



6.14 We also strongly recommend that industry development agencies continue to exercise strong leadership linking upstream R&D efforts to industry outcomes. These agencies are best placed to do so as they are close to the market and the industry. This will catalyse the creation of economic or social value for companies that take on technology commercialisation roles. Relevant industry development agencies need to also consider allocating sufficient resources to promote Singapore's research capabilities and the productisation of our R&D discoveries.

On Our Wish List: Technology Capabilities That Singapore Will Want to Build

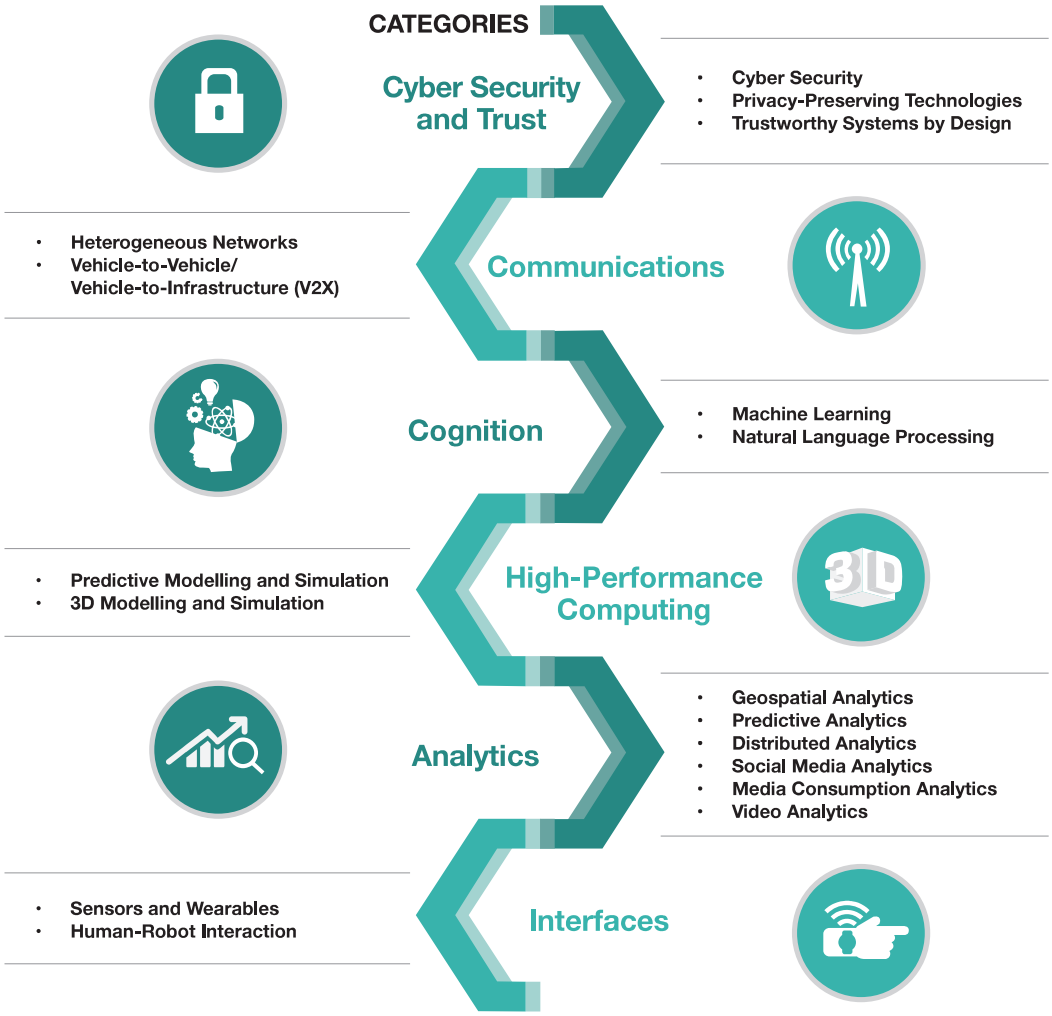
6.15 We believe that innovations in the infocomm media sector should be powered by technological IP developed both locally and abroad. This is the only way for companies to maintain their distinctive competitive edge.

6.16 We strongly support the development of a strategic research programme to build research and engineering capabilities in areas that can help advance Singapore's Smart Nation and Infocomm Media objectives. The Strategic Research Programme in Interactive Digital Media[40] is an encouraging example. Since its launch in 2006, the programme has built good research capabilities in areas such as social media analytics, and modelling and simulation.

6.17 There is potential to further align upstream R&D efforts with the industry and sector development directions identified in this Report. Recommended initiatives in this Report can lead demand, and identify the cross-cutting capabilities (capabilities that will benefit more than one area or sector) needed for infocomm media infrastructure development and sectoral transformation.

6.18 We recommend developing these capabilities ourselves in cases where R&D strengths exist locally[41]. Critically, these are the capabilities, when built, are likely to significantly spur the innovation and invention of technologies that will differentiate Singapore's industries from others. Building such capabilities will also help us address some of our national challenges. The following diagram shows the cross-cutting technology capabilities recommended for national R&D investment.

Cross-Cutting Technology Capabilities Recommended For National R&D Investment



6.19 The finalised list of targeted capabilities, associated R&D roadmap for each capability, and recommended approach for capability development will be submitted to Singapore's Research, Innovation and Enterprise Council (RIEC) later this year. These recommendations will then be considered for inclusion under the Research, Innovation and Enterprise (RIE) 2020, which is Singapore's R&D plan for the next five years, covering infocomm and media as well as other scientific domains.

Summary

The technology roadmap outlines six technology areas that will be vital for many of the ideas in the Infocomm Media 2025 plan to become possible in the future.

(1) There is a need for stronger linkages between research and industry:
- The industry development agencies should take the leadership role to ensure that upstream R&D is linked to industry outcomes.
- It is important to identify challenging problem statements, identify the right companies to partner for value capture through structured programmes (e.g. through Accreditation@IDA), provide real world project opportunities to bridge R&D and industry, and connect better local and overseas IPs to industry partners (e.g. through IDA's Technology Evaluation Programme).

(2) There is a need for a Strategic Research Programme to help advance Singapore's Smart Nation and Infocomm Media objectives. The cross-cutting technology capabilities recommended for national R&D investment are in:
- Cyber Security and Trust
- Communications
- Cognition
- High Performance Computing
- Analytics
- Interfaces