

Virtual Centre of Excellence in Mobile and Personal Communications - Mobile VCE - CORE 5 Research Area: Enabling Flexible Networking

Flexible Networks: Context & Requirements

The vision of an *'It Just Is' Network* anticipates that user demands are met invisibly by an evolving ecosystem of service and facility providers, each operating with their own business needs and their own solution to satisfy their customers.

Such a networking environment will need to cope with conflict of interest among players in a particular scenario, in a way as yet largely unseen in today's environments - so-called 'tussles'. A collaborative negotiation approach that enables simple and flexible arrangement of the components to fulfill end user needs is required; any changes and configuration of the network and of the delivery environment must be transparent from the perspective of the end users.

Research Challenges

The Flexible Networking research programme will investigate methodologies and technologies to support this increasing need for network flexibility. The drivers for this will be:

- The socio-economic environment in which the future networks need to operate
- The characteristics and requirements for flexible, agile, dynamic, and self-evolving networks
- The technologies that may permit the construction and operation of such networks.

The results will form the basis of a design methodology for the evolution of future networks that considers the needs of the different actors, including infrastructure and technology providers, the socio economic aspects of different service provision models and service agreements, and the users' needs and expectations.

Traditionally a prescriptive approach to designing and architecting networks has been used. This has often led to an over-specification of networks that can constrain their ability to support new services as end users' modes of use evolve.

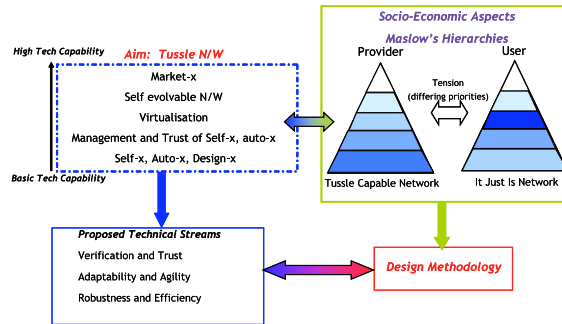


Figure 1 Project Interactions

The traditional design cycle time results in solutions which, on reaching the marketplace, do not meet current end user expectations - the market drivers which motivated the initial design approach have changed by the time the network is deployed. The market is increasingly seeing a tussle between the users, the providers of services, and, where the roles are separated, the providers of the underlying communication infrastructure.

Future networks have to be designed and operated with techniques that provide and support flexibility at each stage of the lifecycle

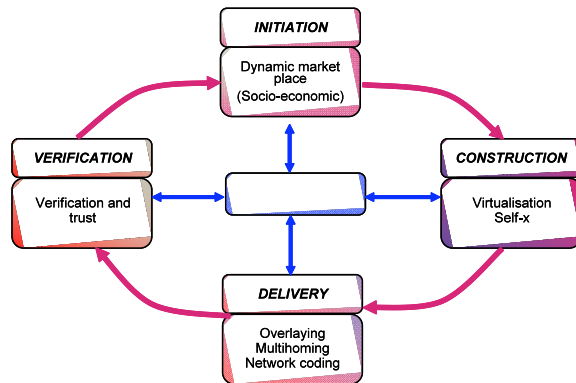


Figure 2: Interaction between design methodologies and the operation of future flexible, agile, dynamic and self-evolving networks

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Technical Approaches

In order to enable such network flexibility a number of key technologies are foreseen:

- virtualization, self-x, network coding and multi-homing, which can provide the requisite *structural flexibility*
- Overlaying, auto-configuration and dynamic market approaches, which can provide the requisite *control flexibility*

The flexible, agile and dynamic network of the future must be trustworthy, in terms of its network composition and future self-evolution. This motivates us to explore dynamic network verification techniques.

The ensemble technologies will come together in this programme to support a design methodology for future flexible, agile, self-evolving, robust and efficient networks that enable IJI to support the evolving needs of future society, 'liquid life'.

Technical Scope

The aim of this programme is to define and enable the networking paradigm for flexible self-evolving networks.

The emergence of this new network paradigm is likely to arise from the combination of technologies to form property sets. These property sets are groupings of basic or essential attributes that are shared by future networks. A given technology can contribute to more than one property set. A diagram illustrating the project technology areas and their relationship to property sets is given in Figure 3 (where the property sets are contained within the ovals).

This programme is composed of activities on the combination of the property sets and technologies given, complemented by the socio-economic drivers and design methodology studies.

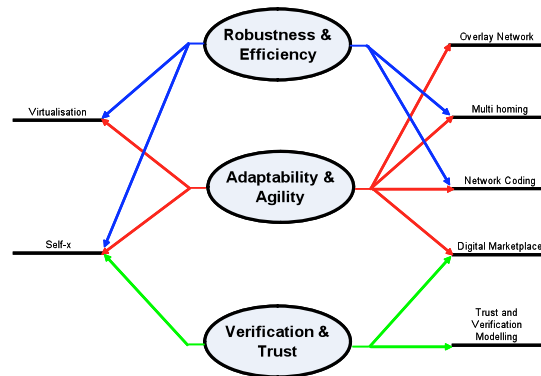


Figure 3 Relationship between technologies and the property sets of a future network

Key Deliverables

The key deliverables from this programme are:

- Architecture documentation for the design of future tussle-agile networks.
- Architecture documentation on combinations of technology that promote future network verification, adaptability and agility, robustness and efficiency.
- Design methodologies for future tussle-agile networks
- Mechanisms that permit the initiation, construction, delivery and verification of self-design tussle-agile networks.
- Proof of concept through demonstration of a tussle-agile network.

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