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Challenges Faced by Communication Providers in Meeting Regulatory Requirements: Analysis of Equivalence of Input and Functional Separation

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Abstract

Regulatory authorities, governing markets and industries around the world, aim to develop a fair and equivalent competitive market with low entry and exit barriers that provide customers with sufficient knowledge and information to enable them to switch between products, services and suppliers at will. Equivalence of Input (EOI) and Functional Separation (FS) are mechanisms used by telecommunications regulatory authorities to achieve this objective. This paper discusses and analyses legislations mandating the use of EOI and FS, in various geographies, and the challenges that the mechanisms impose on Significant Market Power (SMP) Telco organisations. Furthermore, this paper provides a solution framework for Telco organisations to comprehensively address these challenges in their transformation programmes.

Keywords: Equivalence of Input, Functional Separation, Telecom Regulation, Transformation

1. Equivalence of Input and Functional Separation

The emergence of new technology has been seen to be the main driver for change in the communications industry. The advent of mobile means of communication, the internet, the advent of Next Generation Networks, as well as regulatory changes and increasing liberalisation and convergence have radically changed the world of telecommunications. As market liberalisation continues to spread and technologies continue to evolve, the pace of change will continue to increase and people tasked with making strategic decisions will be presented with an ever-increasing list of complex issues to resolve.

Research in the communications industry has established that telecoms regulatory authorities around the world are widely different, in the way that they operate, the composition of the regulatory board membership and external influences that impact upon them (ZABER, 2012). Some of them are independent, some are semi-independent and some work as dependent organisations within their governmental bureaucracy. Decisions made by the regulators can be influenced by the very framework that they work within and the constituent members making up the regulatory board, the regulatory approach being driven by the background and experience of those individual members.

Equivalence of Input (EOI)

Equivalence of Input is defined by Ofcom as follows: “EOI is the concept established by the Ofcom undertakings in which British Telecom (BT) provides, in respect of a particular product or service, the same product or service to all Communication Providers (CP’s) (including BT) on the same timescales, terms and conditions (including price and service levels) by means of the same systems and processes, and includes the provision to all CP’s (including BT) of

the same commercial information about such products, services, systems and processes” (OFCOM, 2005b). This definition will be used across all geographic boundaries and regulatory authorities for the purposes of this paper.

Functional Separation (FS)

In WEBB (2008: 3), functional separation is defined as:-

- the establishment of a new business division, which is kept separate from the incumbent’s other business operations;
- this separate business division providing wholesale access to the incumbent’s non-replicable (or bottleneck) assets, which are required by competitors in order to compete with the incumbent in downstream retail markets; and
- the separate access services division being required to supply wholesale access to competitors, and the incumbent’s own retail divisions, on a non-discriminatory basis

CAVE (2006: 94) defines six degrees of functional or operational separation that lie between accounting separation and ownership separation.

Ownership separation (in whole or part)

6 - Legal separation (separate legal entities under the same ownership)

5 - Business separation with separate governance arrangements

4 - Business separation with localised incentives

3 - Business separation (BS)

2 - Virtual separation

1 - Creation of a wholesale division

Accounting separation

An opinion on functional separation, what it is and why it may be required is provided by THE EUROPEAN REGULATORS GROUP (2007). It describes the key elements, its governance and concludes that functional separation can be a supplemental remedy to issues where other measures have been ineffective in dealing with problems of equivalence. They further conclude by saying that functional separation should not be imposed without first considering the full costs and implications of doing so across all products in the wholesale market, taking into account the organisational structure of the incumbent SMP operator.

Fundamental questions to assess the current communications arrangements

A series of questions, as listed below, put forward by OFCOM (2002a) outlined the typical concerns of a regulatory authority:

- In relation to the interests of citizen-consumers, what are the key attributes of a well-functioning telecoms market?
- Where can effective and sustainable competition be achieved in the UK telecoms market?

- Is there scope for a significant reduction in regulation, or is the market power of incumbents too entrenched?
- How can Ofcom incentivise timely and efficient investment in next generation networks?
- At varying times since 1984, the case has been made for the structural or operational separation of BT, or the delivery of full functional equivalence. Are these still relevant questions?

Most of these questions are relevant for regulatory authorities in other geographies as well and when pondered can help in formulating strategic roadmap for achieving a well-functioning telecom market.

Qualities of a telecoms market that is serving customers well

The most effective way of delivering a telecoms market that serves the needs of its customers well is through competition between communications providers running their own networks. OFCOM (2002a) go on to explore the expectations and needs of residential and business users of the telecoms market, concluding that their requirement is for reliable service at lowest cost, but that they also want the ability to choose new products and services, to change their provider at will, and to have their choices/decisions fulfilled quickly. To achieve these requirements the competition has to be shown to be efficient, effective and long-lasting which then means that the regulatory legislation existing in a particular country, at that point in time, may no longer be a sustainable option.

The introduction of competition into the telecoms market doesn't, on its own, mean that the above requirement will be met. Customers should be able to easily understand the pricing structures and packages available to them from the various suppliers, along with the product attributes and facilities available. The ability of the customer to switch suppliers easily based on their needs and requirements is fundamental to ensure fair competition.

Crandall suggests that the requirement for service/communication providers to integrate their operations and share equipment and infrastructure, to create an environment facilitating fair and effective competition between suppliers, in itself, creates incentive issues encouraging incumbent operators to discriminate against 'the competition' (CRANDALL, 2013).

For example, consider an incumbent service provider, providing a range of narrow and broadband services where there is no alternate access network (such as cable) available. Without appropriate regulatory terms and conditions governing access rights to the network assets, there would be nothing to inhibit the incumbent from discriminating in favour of its own retail or business divisions.

The bottlenecks preventing effective competition from being introduced need to be identified and, where possible, resolved.

Is it then sufficient to leave the resolution of the issues above to 'The Industry' or are changes in regulatory policy to mandate the changes considered necessary? – this decision will be dependent upon many factors based on buyer strength, potential entrants to the industry and government policies as can be derived from Porter's 5-forces model (PORTER, 1980).

Convergent regulation

In the continually evolving communications market there is a need to re-assess the regulatory approach to the telecoms market and the impact upon international boundaries. The interdependency of telephone, television,

mobile communications and the internet has not only blurred the boundaries of demarcation between the various mediums but has also effectively made the boundaries between countries almost insignificant or even irrelevant.

In a country's internal market the regulatory framework needs to promote free and fair, effective, long-lasting competition between communications providers. This will, in turn, create a strong telecoms industry that is encouraged to take advantage of those rights to boost the overall quality of the products and services that they offer to end-users and be forced to provide those products and services in the most economical and efficient way that they can.

By default the above suggests that legislation be introduced to eliminate bureaucracy that hinders a service provider starting up business in a new market. In order to support the free provision of communication services, regulators must relax rules regarding business start-up to the bare minimum. CRANDALL (2013: 495) puts forward the hypothesis that the introduction of regulation to minimise the effects of non-discriminatory access to 'bottlenecks' is difficult to monitor and police, the results being costly and far from perfect. OFCOM (2006a) confirms the view that the results of the introduction of EOI and FS are difficult to monitor indicating that, whilst it is relatively easy to monitor requirements to the letter of the Undertakings it is far more difficult to measure whether the spirit of the Undertakings are being adhered to. Whilst measures and milestones monitor the former, the latter is more about confidence and levels of trust between suppliers and customers.

In most cases interpreting the results of the measures will be based on the need to infer conclusions. Comparison of the results over time along with a comparison of the results from other countries (assuming a similar regulation model exists) may prove more fruitful along with surveys of stakeholders and other interested parties.

THE EUROPEAN COMMISSION (2009) has extensively researched these issues publishing their findings in an EU Directive.

2. The Telecommunications Review in the United Kingdom

In April 2004 Ofcom, the communications regulator in the UK, launched its Strategic Review of Telecommunications (TSR).

The main driver for the review was perception by BT's competitors that they were being unfairly discriminated against because of the different systems that BT used to supply services to them and to its own company divisions (CADMAN, 2010). Ofcom concluded that there were long-standing barriers to competition and investment and that it was necessary to provide communication providers with equality of access to those parts of BT's network that represented a bottleneck (OFCOM, 2002a).

Legal definition of discrimination in this context is given below:

“....a condition requiring the dominant provider not to discriminate unduly against particular persons, or against a particular description of persons, in relation to matters connected with network access to the relevant network or with the availability of the relevant facilities” (UK LEGISLATION, 2003)

"Non-discrimination does not necessarily mean that there should be no differences in treatment between undertakings, rather that any differences should be objectively justifiable, for example by:

a) differences in underlying costs,

b) no material adverse effect on competition" (OFCOM, 2002b)

At the time of the TSR, BT had SMP in 14 wholesale markets and 16 retail markets (SPC NETWORK, 2009). The result of the review was that BT was extensively regulated.

Therefore, in 2005 Ofcom and BT signed a set of Undertakings, OFCOM (2005a), in Lieu of a Reference under the Enterprise Act 2002 (UK LEGISLATION, 2002). Essentially, the undertakings specify that BT provides the same product or service to all communication providers (including BT) to the same timescales, terms and conditions, by the same systems and processes. It also includes clauses referring to pricing, service levels and commercial information but essentially the message is quite plain – whatever products or services BT supplies have to be supplied in EXACTLY the same manner as it supplies them to other parts of BT.

The responses to the Ofcom TSR consultation document also indicated that BT's competitors were unhappy about what they perceived to be BT's ability to discriminate on pricing where BT had significant market power. The ensuing debate led to BT agreeing to reorganise its business to comply with the requirement to functionally separate certain functions and implement Equivalence of Input, the changes being designed to reduce discrimination and make 'behaviours' more transparent.

These agreements, listed in OFCOM (2005a: 15), mandated that:-

- certain products, both then and when products were developed in the future, had to be provided/serviced under the EOI rules
- a stand-alone address matching service be provided for all CP's
- access by CPs' to BT engineering appointment books be improved
- from a specific date, BT employees use the Service Provider Gateway to transfer Wholesale Line Rental (WLR) lines
- line migration requests be handled in an equivalent manner and meet agreed migration targets
- provide transparency for Partial Private Circuits, Carrier Pre-Select and DataStream products
- establish the Access Services (AS) division of BT (latterly renamed Openreach)
- pass control and operational responsibility to AS for all assets contained within the Physical Layer of BT's Access Network and the Physical Layer of BT's Backhaul Network
- transfer field engineers associated with providing and maintaining the above to AS
- move the AS management team to separate access controlled accommodation
- design and implement physically separate Operational Support Systems for AS (designed as separate from the rest of BT)
- migrate BT's customers to physically separate (from AS) systems

The Undertakings also led to the creation of the Equality Access Board and a separate employee code of practice.

The objective of the 'Undertakings' was to influence BT's behaviour so that BT's wholesale customers' perception of how BT behaved was radically changed. Functional separation was a means to that end.

According to definition by CAVE (2006: 94), UK separation is degree 4, i.e. "Business separation with localised managerial incentives". The BT Undertakings deliver Equality of Access by means of two main remedies:

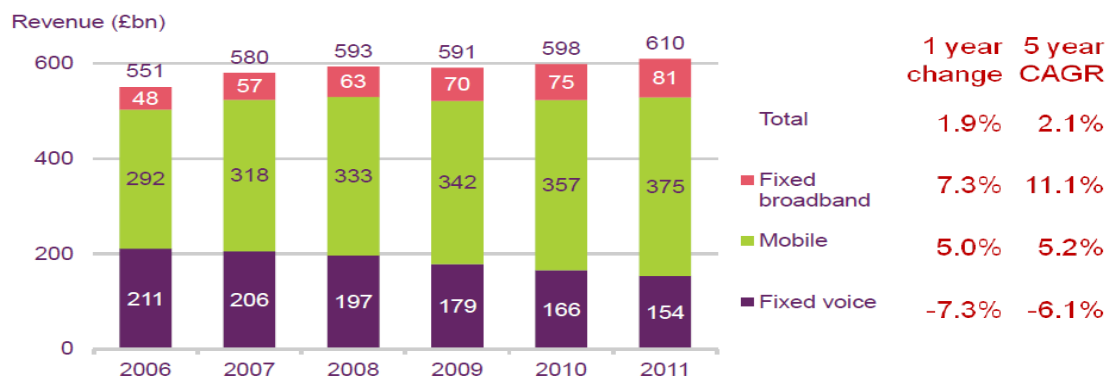
- Equivalence of inputs at product level;
- Functional/operational separation.

The OFCOM (2009a) review of TSR implementation assesses the impact that the Undertakings have had on residential and business customers giving an overview on progress made to implement the Undertakings and the effect on evolution of the industry, take-up of wholesale products, levels of investment, customer and supplier satisfaction and other criteria. It also establishes that Undertakings have so far provided an appropriate and comprehensive solution to competition concerns, but need to be re-evaluated on a continual basis as per key market and technological changes.

Market performance since the introduction of the Undertakings

Total retail telecom service revenue has increased since TSR has been introduced, as given below (OFCOM, 2012b: 29):

Total retail telecoms service revenues increased



Source: IDATE / industry data / Ofcom

The UK has seen the largest fall in incumbent's (British Telecom's) share of fixed voice volumes since EOI and Functional Separation requirements were introduced (OFCOM, 2012b: 33):



3. Regulation in various countries

“The Body of European Regulators for Electronic Communications” has examined the experience of Communication Providers and their customers in the European Union in light of the introduction of functional separation (BEREC, 2010).

Australia

In 2005, in an effort to increase competition, the Australian government ordered Telstra to submit a plan for operational separation (AUSTRALIAN GOVERNMENT COMLAW, 2005). The driver for the change was allegedly Telstra’s wholesale division favouring Telstra’s retail division at the expense of wholesale customers. Approval was given for a plan to create separate Retail, Wholesale and Network Service divisions.

“Telstra is required to establish and maintain within the company separate wholesale, retail and key network services business units. This is designed to prevent the internal functions that Telstra’s wholesale customers rely upon to compete effectively with Telstra from being operated in a way that systematically advantages Telstra’s retail business.” (Minister for Communications, Information Technology and the Arts, 2006a)

Telstra’s retail employees were banned from working in Telstra’s wholesale unit and vice versa. Constraints were imposed preventing Telstra’s business units from exercising control over marketing, contracting or supply of services to wholesale customers.

Italy

THE BODY OF EUROPEAN REGULATORS for ELECTRONIC COMMUNICATIONS (BEREC, 2010) sets out the context and legal basis for the 2007 AGCOM consultation (AGCOM, 2007) on the effectiveness of existing regulatory measures in Italy. AGCOM had already tried to resolve the issues in 2002 by imposing (vertical separation) organisational measures on Telecom Italia (TI) aimed at improving the access to the local network and removing discriminatory practices between Telecom Italia’s network and retail divisions and the alternate communications providers. These measures were however unsuccessful. AGCOM concluded that additional regulatory measures were required to guarantee equality of access to the local network and to avoid litigation. These were:-

- *integrate and strengthen the administrative separation measures previously imposed*
- *functional separation of the access network*
- *structural separation of the access network*

TI proposed a set of commitments, many behavioural, aimed at promoting competition and enforcing TI's existing obligations that AGCOM accepted. Essentially TI was offering to implement functional separation on a voluntary basis. The degree of TI's separation doesn't fall neatly into one of the classifications of CAVE (2006: 94). However, TI has been subject to administrative separation for some years and before offering commitments to AGCOM had already created its Open Access division, a completely autonomous division completely separate from TI's other commercial operations, with similar responsibilities to Openreach in the UK. The main difference between TI and BT (British Telecom) is that TI's Open Access division provides products to TI Retail, TI Wholesale and Other Operators on an Equivalence of Outcomes basis, i.e. the prices and functionality are the same but the systems and processes used to process service requests can be different. In reality though, most of the systems and procedures accessed by TI Retail are the same as those used by the other CP's. The other difference is that Open Access division does not have a separate and independent board.

Poland

BEREC details the functional separation imposed on the Polish Telecom incumbent Telekom Polska (TP) from 2008 (BEREC, 2010). Because of frequent discriminatory behaviour and ineffective regulatory action, the Polish Regulator commissioned a report (ROP, 2008) on the legitimacy of the Polish SMP operator's separation. The results were basically the same as the findings in Italy and the UK in that there were bottlenecks accessing the local network and discriminatory practices inhibiting the provision of fair and equal competition in the communications market. The underlying issues however were significantly different from those in Italy and the UK. The Polish market was plagued by low quality of service and low accessibility coupled with a lack of alternatives to the TP infrastructure. The Polish regulator favours functional separation and, just as in the UK and Italy, TP proposed an Equivalence of Access Programme based upon Equivalence of Products, Equivalence of wholesale service handling and Equivalence of Information. This document fell short of the Polish Regulators requirements and after negotiations a solution was found that addressed the issues adequately. The solution is very similar to the solution implemented in the UK.

New Zealand

Functional separation in New Zealand quickly followed BT's reorganisation in the UK. TNZ agreed to split into three separate divisions, Retail, Wholesale and Network (NEW ZEALAND LEGISLATION, 2006). The main driver for the change was again the imposition of non-discriminatory access to wholesale products and services for TNZ's competitors.

USA

The US is no stranger to Structural Separation (CRANDALL, 2013). AT&T was structurally separated in 1984 and from 1970 to 1986 structural separation was imposed on AT&T and Bell Operating Companies (FCC, 1996). Neither of these impositions was successful. The break-ups slowed the development of competition and imposed costs that can only be put down to inefficiencies (MACAVOY, 1998). Ultimately, Vertical Integration was re-introduced (CRANDALL, 2005).

4. Challenges faced by CPs

Once the regulatory regime has decided that changes are necessary and has published both its requirements and the timeline by which its requirements need to be implemented, the incumbent CPs and suppliers need to understand the exact detail behind the regulator's thinking and to map that to their company's strategic goals and requirements. They need to take into consideration their stakeholders' requirements and priorities and mutually agree the product prioritisation levels for each division of the company and the level of customer migrations that each division needs to achieve. Part of this discussion will include the need to innovate and improve current products, processes and working practices, to ease the customer/asset data migration targets to meet the

requirements. A significant amount of information needs to be gathered and assessed at this point. The roadmap developed should consider the following challenges, organisational readiness for them and effective strategies to address them. These challenges, either on an individual basis or collectively, can become so imperative that they can derail the migration process and become a significant impediment in meeting the regulatory requirements, leading to the peril of legal and brand issues.

Challenge 1. Product / portfolio rationalisation: Legacy systems hold portfolio data on many obsolete products, some of which are still in use by customers. As part of the transformation for meeting regulatory requirements, CPs get the opportunity to offer the customer newer, more up-to-date products and to cleanse the portfolio at the same time – or to perhaps up-sell to alternative products with more/better facilities and pricing options. This also will ease the migration process, as migrations become increasingly challenging when both the number and variety of products is large. It is common practice for account managers to sell bespoke maintenance contracts to valued customers. These customised maintenance agreements are recorded on legacy systems using ‘local products’ with ‘work-arounds’ and have specific arrangements built into the legacy systems to manage and deliver the customer requirements. Migration of these records to the ‘new’ stack without a mechanism to support them will result in an inability to support the agreements, a loss of revenue and an adverse effect on customer satisfaction.

Challenge 2. Sorting multiple product combinations for Migration: The complexity of certain products cannot be under estimated. It is not valid to assume that a process to provide PSTN service to a customer will work for ISDN. Fundamentally the requirement is the same, however the reality and functionality needs in back-offices and front-offices are completely different. Wherever ‘new’ systems and processes are being developed, it is impossible to develop, deliver and deploy each and every product in the portfolio on the same date. This then means that the customer estate that is migrated to the ‘new’ system stack has to be in line with functionality existing on the ‘new’ system stack. Hence, migration can only happen for the product combinations that the new system stack can directly support and the product combinations for which there are work-around processes that link the new and old system stacks. The product combinations must be chosen to mitigate any adverse risk or effect on customer satisfaction and current billing arrangements. Product combinations chosen for the migration run will affect the size of the migration batch and hence will impact upon the migration timeline

Challenge 3. System and Data Architecture: Business and System Architects face the challenge of defining architecture models that will fulfil both EOI and functional separation obligations whilst enabling platform developments for future product/portfolio and transformational requirements. Some examples of architecture models are cloud-based architecture, software-as-a-service architecture, client-server architecture.

Challenge 4. Training Agents: Front-line and back-office agents should be able to clearly identify which system stack the customer is on when they receive a call or when they handle a work-request. They should be able to identify the differences in agent functionality and capability between the old and new system stacks. Also, if managed services are to be provided in new system stacks, appropriate processes or intermediate workarounds need to be available.

Challenge 5. Launch of New Offerings: In a constantly evolving market, new products and services will inevitably be developed for launch during the period that the EOI compliant systems are being developed and customers migrated to them. There is then a call that the communication provider should take, based on projected customer uptake volumes, as to whether the new product/service is launched on the new system stack, the old system stack or both. This decision, then, can impact on agent training, prioritisation of migration capabilities, access to historic data, call handling times and customer satisfaction. Additionally, if the new products and services are only available in the new stack there is the added challenge of enabling access to the new stack for all functions consuming the new products and services.

Challenge 6. Availability & Quality of Data in New Systems in New Data Format: Data in the new system stack may have changed format compared to that of the old stack. Migrations therefore need to involve appropriate algorithms to convert data to the new format and place it in the correct fields in the new

systems. Work-arounds may have been in place on the old system stack to cope with customer or asset data that is not current, these work-arounds may have to be replicated in the new system stack or they may need to ensure that the customer or asset data is brought up to date. There is also the need to consider the effect on the customer of multiple bills generated as accounts are ceased on the legacy stack and provided on the 'new' stack. Migrating the customer records at the wrong time in the billing cycle can lead to disputes caused by broken billing cycles.

Challenge 7. Running the Migration Engine on track: Migration is an iterative process involving feeding the records to be migrated into the migration process, validating and cleansing the rejected records and feeding them in again. The process involves pilot migrations of a small subset of a customers assets and data records based on functionality available in the new system stack. Once a level of confidence has been built up, around the migration process and quality of data, migrations can start 'for real'. After monitoring both process and progress for a while a tipping point is reached where volume migrations can begin for products and service functionality that exists on the new system stack. The challenge here is to determine the right tipping point, without any detrimental effect on customer experience, front-office agent experience or back-office agent experience, balancing the effects against the migration targets that the organisation or organisational division has committed to. Other challenges in the migration process are the need to migrate clean records, need to migrate records with no current orders, need to migrate records with no current faults and the need to consider the effect on the customer of multiple bills generated as accounts are ceased on the legacy stack and provided on the 'new' stack. Migrating the customer records at the wrong time in the billing cycle can lead to disputes caused by broken billing cycles. Any defects in the systems can be a significant hurdle for the migration engine

Challenge 8. New requirements based on regulatory acts and fair competition acts: Whilst the EOI and FS compliant systems are being developed, the government may role out other new regulatory and/or fair competition acts which also have to be incorporated into the new system stack.

Challenge 9. New workaround requirements: Workaround processes will be required to address unforeseen gaps in system functionalities and to resolve issues caused by 'unplanned facilities' in the new stack or any gaps or faults in system deliveries and fall-outs from the software delivery lifecycle

Challenge 10. New System Issues: New systems can bring about their own challenges, such as varying response times across centres, low response times, requirements for PC and memory upgrades, availability and resilience issues, access to historic data (for example, for addressing complaints), data capacity issues, call handling time issues caused by tasks not being driven to the correct front or back-office agents, and prioritisation of new development requests versus maintenance releases to correct 'problems'.

Challenge 11. Aligning across multiple organisational divisions in prioritising requirements: This is the need to arrive at, based on the volume of customers and products and services offered by the various organisational divisions, a cross divisional agreement to get the most value out of software developments and deliveries by prioritising the developments and deliveries to maximise the migration capabilities and align to the migration targets of each division.

Challenge 12. (Out of Transformation Framework Scope) Creation of separate organisational units: This requirement creates many challenges in terms of customer bills, HR issues, new security requirements, new access profiles and a separate management hierarchy

Challenge 13. (Out of Transformation Framework Scope) Duct & Equipment Sharing: If the regulatory requirement covers the need for CPs to share underground ducts or equipment, appropriate security measures, access permissions and restrictions need to be formulated and implemented.

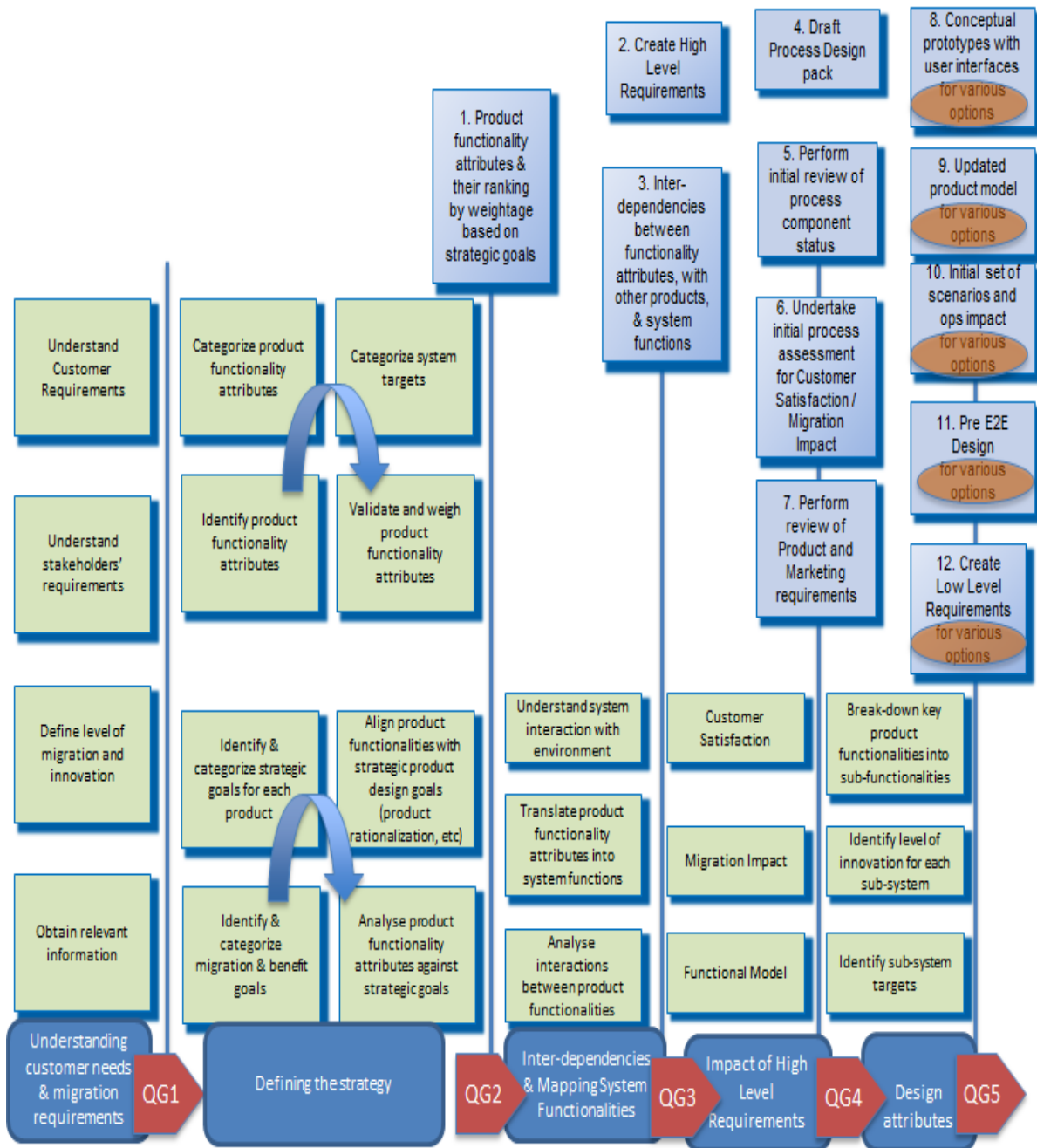
Challenge 14. (Out of Transformation Framework Scope) Ability to provide tactical solutions: This is the need to create back-up plans should the development of EOI and FS compliant systems and their associated processes look likely to fail to reach migration targets committed to the regulatory authority.

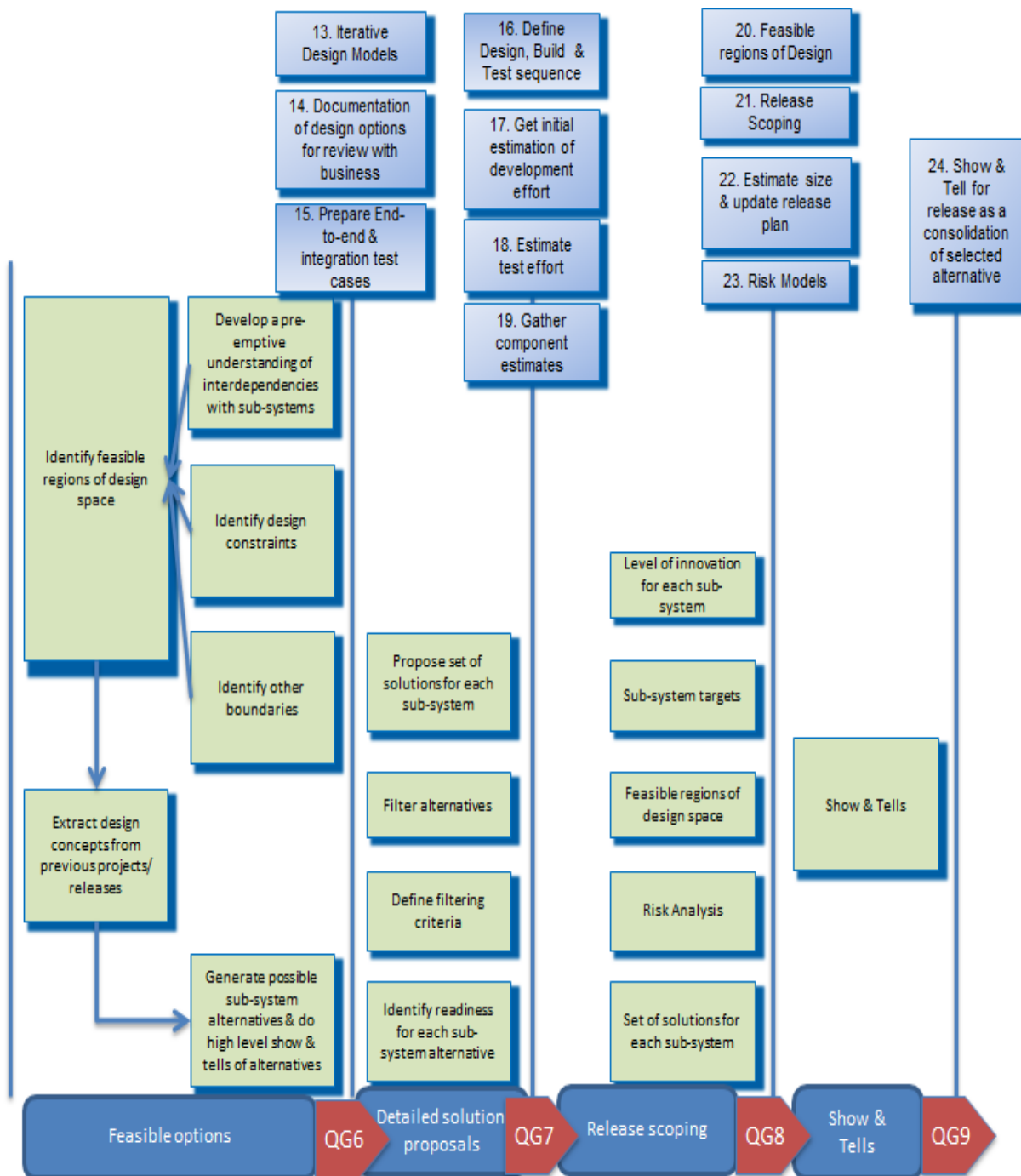
Challenges 12, 13 and 14 are out of transformation framework scope, even though they have to be addressed by individual Telco's to meet EOI and functional separation obligations. Due to the peculiar nature of these challenges and the context of this paper in addressing a transformation framework solution, these challenges have not been considered.

5. A Transformation Framework to address Telco Challenges for EOI and functional separation transformation programme

The following diagrams provide a step-by-step approach for a functional separation transformation programme. The framework, is developed from a paper published by (AL-SHAAB, et al, 2013: 6 & 8) and applies the SBCE and SD&I Integration concepts outlined to the Telecoms Industry. The diagrams also incorporate concepts based on Sobek, Ward and Likers "Set-based Concurrent Engineering" model (SOBEK, WARD and LIKER, 1999) and address the following challenges:

- | | |
|---------------|--|
| Challenge 1. | Product / portfolio rationalisation |
| Challenge 2. | Sorting multiple product combinations for Migration |
| Challenge 3. | System and Data Architecture |
| Challenge 4. | Training Agents |
| Challenge 5. | Launch of New Offerings |
| Challenge 6. | Availability & Quality of Data in New Systems in New Data Format |
| Challenge 7. | Running the Migration Engine on track |
| Challenge 8. | New requirements based on regulatory acts and fair competition acts |
| Challenge 9. | New workaround requirements |
| Challenge 10. | New System Issues |
| Challenge 11. | Aligning across multiple organisational divisions in prioritising requirements |





EOI and Functional Separation Transformation Approach

The following paragraphs provide a step-by-step approach to the transformational changes to achieve EOI and Functional Separation:

Separation Step 1. Understanding customer needs & migration requirements – What are the expectations?

Step 1 is to understand the customer and stakeholder requirements. Different types of customers and products tend to have a different significance for each individual division of a company. Residential PSTN single lines are relatively insignificant to a global multinational company but very important to the retail consumer market. This step also aims to understand the migration requirements, in detail, in terms of commitments made by senior management to the regulatory authority, the timelines to achieve these commitments and the penalties/incentives related them.

Separation Step 2. Defining the strategy – What should we do?

The migration strategy of the company needs to be assessed, understood and agreed. By identifying migration targets and assessing the benefits that can be achieved by prioritising the customers and products in the migration algorithm, it is possible to agree the priorities of different products and their position in the migration hierarchy.

By identifying the product attributes, categorising them and then categorising the system targets, product functionality attributes can be validated and prioritised. By identifying and prioritising the benefits that can be achieved by migrating the various customers and their asset bases, strategic goals can be mapped and analysed for each product, product-functionality or generic-functionality. This then allows the product attributes to be analysed against the migration strategic goals to allow product and migration realisation decisions to be made in subsequent separation steps.

Separation Step 3. Inter-dependencies & Mapping System Functionalities – How is it all linked?

We now know the products, their attributes, the numbers of customers using each product and the types of customer. We now need to understand the systems interactions with their environments (other system stacks that exist in the organisation and supplier/customer systems) and the interdependency between attributes like products, product functionalities and generic functionalities. These attributes needs to be mapped to system functionalities and any interactions between the attributes needs to be analysed and understood. At this point, High Level Requirements can be defined that will allow further work to progress.

Separation Step 4. Impact of the High Level Requirements - How will the solution perform?

The impact of the chosen requirements needs to be assessed now from a migrations and customer satisfaction perspective. This step will have three work-streams: to review and analyse the impact of high level requirements including product and marketing requirements, to identify the impact on customer experience based on cycle time, service quality, service availability and service reliability, and to create an initial functional model for each high level requirement. Work on the functional model can begin. Processes can be drafted and an initial review of the business process designs can be performed focusing on re-usable capabilities.

Separation Step 5. Design Attributes – What are the solution options?

It is now possible to break down the key product functionalities into sub-functionalities, identify the level of innovation for each sub-system and identify sub-system targets. This will give a list of product functionalities and attributes to be fed into the next phase of the work.

For each solution option identified, conceptual design frameworks can now be constructed along with prototype storyboards. Individual product models and initial process documents can be constructed,

taking into account operational impacts and possible workarounds. The result of this step in the process is a cohesive basket of options highlighting which options can exist simultaneously, which cannot and what the various constraints are.

Separation Step 6. Feasible options – What is possible now?

The next phase of the work analyses the feasible solution options and the maximum benefits that can be achieved by the adoption of the individual choices. By understanding the interdependencies of systems and sub-systems, identifying design, capability and strategic constraints, the design area that needs to be focussed upon can be identified. By using design concepts from previous work, it is possible to identify the need for new sub-systems or alternate processing requirements. By going iteratively through the design models, design options can be produced for comment and review by the business and operational stakeholders. The basics of an end-to-end design can be put together for presentation to stakeholders who will decide the most appropriate option(s) to take forward to development. At this point, End-to-End and Integration Test cases can be documented.

Separation Step 7. Detailed solution proposals - What needs to be done?

This step assesses the solutions proposed for each sub-system and any alternative ways of achieving the same end. It allows the software design, build and test activities to start, to arrive at rough cost estimates for the software build/changes, for an estimate to be made for the resources to test the resultant development and for various component teams to submit their costing estimates.

Separation Step 8. Release scoping – When it needs to be done?

We now know the design areas that need to be concentrated upon. Releases can be scoped, size and cost of the development can be factored into the business expenditure, and release plans, risk analysis and risk modelling can be undertaken. This will result in a 'Plan A' and fall-back 'Plan B', i.e. by taking option X for product Y what are the impacts on the business, the customers and the regulatory rules that we need to conform to?

Separation Step 9. Show & Tells – What is due to come?

Finally we have "Show and Tell" sessions where stakeholders and operational representatives are given a demonstration of the **solution(s) chosen/in-development, along with a mock-up of the** screens and hence functionality that will be delivered to them. The expectations of the stakeholders need to be managed during these sessions.

Transformation Challenges and Transformation Solutions

The following diagram attempts to show the relationships between the "challenges" and the "separation steps".



6. Conclusion

Functional separation, no matter what country or regime is not straightforward. The bottlenecks and the frustrations, mistrust and anger that they cause are there because without a radical change in the organisational hierarchy of a company and its funding, reporting and accountability, it is extremely difficult to implement solutions to bypass them. As has been the experience with British Telecom in UK, separation has been complex, difficult and painful, for all concerned. Although the EU sees the creation and operation of Openreach as a success there has not been (so far) wide adoption of the paradigm throughout the EU. This is not surprising really as each country will have different market conditions, characteristics, laws, regulatory rules and local conditions. There are clearly several functional separation models that can be applied to fit individual needs and circumstances. This paper identified various challenges that a Telco organisation will have in terms of migration, products and service offerings, training, processes and functionalities. The transformation programme framework that this paper has suggested is aimed at providing a set of solution components to address these challenges.

As further work, different functional separation, EOI models and market conditions can be studied to find the best fit between the functional separation and EOI models and the incumbent market conditions. Challenges outside the scope of the transformation programme, such as the challenges in setting up a separate organisational entity, can be studied and analysed in detail. The impact of EOI and functional separation on investment in access services can be investigated and there is an opportunity to investigate the possibilities and challenges of imposing EOI and functional separation on next-generation networks including optical networks and other high speed networks.

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