

The SFCA and the NRM

Introduction

The SFCA and NRM are:

- Standard Form of Cost Analysis: Principles, Instructions and Definitions (SFCA)ⁱ.
- New Rules of Measurement for order of cost estimating and elemental cost planning (NRM)ⁱⁱ.

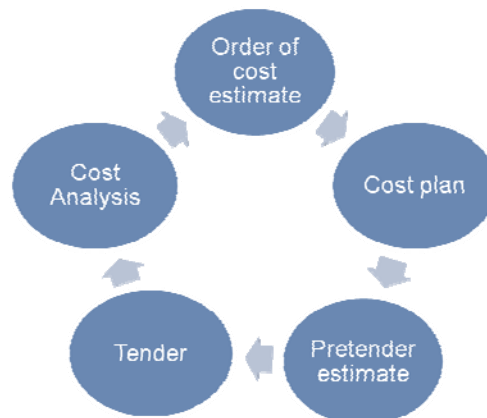
The titles of these documents indicate their purpose.

- The SFCA sets out how to analyse the cost of a project into elements.
- The NRM sets out how to present and develop a cost plan as the design develops.

These two processes are the beginning and the end of the cycle of cost information that flows through a procurement process. There is clearly a chicken and egg relationship.

- The starting point for an elemental order of cost estimate is cost analyses of previous projects.
- The starting point for a cost analysis is the costing documents from a procurement process.

Which came first? Well, presumably, when Eve suggested to Adam that she could do her spinning in a building while he delved outside they had no basis for assessing the cost of a building, but since then we have been in a cycle, we analyse costs of a project in order to provide information for giving cost advice on future projects.



The SFCA

The SFCA, and indeed BCIS, were developed to facilitate elemental cost planning and allow the industry to move from 'costing a design' to 'designing to a cost'.

For this you need elemental costs. An element is '*A major physical part of a building that fulfils a specific function, or functions, irrespective of its design specification or construction.*'

The SFCA defines the Elements, provides instructions for analysing the costs of a project into Elements, and defines the ancillary project information needed to interpret it.

It defines the purpose of a cost analysis as '*to provide data that allows comparisons to be made between the costs of achieving various building functions in a project with those of achieving equivalent functions in other projects. It is the analysis of a building in terms of its elements.*'

The key point is that the content of the functional Elements, as defined in the SFCA, should not change with the design or specification.

Elemental cost analyses form the basis for providing a client with a robust estimate based on very little information so that he can make key business decisions before commissioning a design.

This early cost advice, or 'order of cost estimate' can be based on a schedule of accommodation, functional requirements or sketch design. It must be accompanied by the assumptions on which it is based.

The NRM

The objective of the NRM initiative was to produce a suite of measurement rules for construction by reviewing the rules that existed and filling in the gaps.

The existing rules for buildings, elements and in-place work were embodied in the Code of Measuring Practice (Code)ⁱⁱⁱ, the Standard Form of Cost Analysis (SFCA) and the Standard Method of Measurement (SMM7). All these documents were under review.

The missing rules were for designed elements, sub-elements and components (composite rates) and for the maintenance and operation of the building.

The requirement for measurement for construction projects therefore fell into three stages.

- Early cost advice and cost planning.
- Detailed estimating, procurement and contract management.
- Estimating, procurement and contract management of maintenance and operation.

The revisions to the building measurement rules and the element measurement rules were consulted widely with the industry and issued in the latest editions of the Code and the SFCA.

The NRM provides a structured basis for preparing 'order of cost estimates' and 'elemental cost plans' including all the costs and allowances forming part of the cost of the building to the client but which are not reflected in the measurable building work.

It defines 'order of cost estimate' as: *'The determination of possible cost of a building early in design stage in relation to the employer's fundamental requirements. This takes place prior to preparation of full set of working drawings or bill of quantities and forms the initial build up to the cost planning process.'*

It defines 'elemental cost plan' as: *'the critical breakdown of the cost limit for the building into cost targets for each element of the building. It provides a statement of how the design team proposes to distribute the available budget among the elements of the building, and a frame of reference from which to develop the design and maintain cost control.'*

SFCA and NRM

The structure of the NRM evolved from the Elemental structure in the SFCA, so elemental analyses can be used as a basis for the order of cost estimate and an elemental analysis can be prepared from a contract sum analysis presented in accordance with the NRM.

The practical issues in drafting and presenting the NRM rules required and expanded and enhanced structure and the NRM uses the term 'element' to describe the cost breakdown structure, ie the headings and levels within the NRM.

The NRM data structure therefore reflects the following:

- The non-physical aspects of a project that the client may require as part of his overall budget for the project.
- Pragmatic changes to presentation and allocation of the elements and sub-elements.
- Different coding system.

Non-physical aspects of a cost plan:

The NRM expands the functional Elements to offer guidance on the pricing of the non-physical aspects of a project that the client may require as part of his overall budget for the project eg:

- Main contractors' preliminaries.
- Contractors' overheads and profit.
- Project/design team fees.
- Other development/project costs, eg insurance, planning fees, decanting and Section 106 agreement contributions.
- Risk allowances.
- Inflation.
- Value Added Tax.
- Other considerations eg Capital Allowances, Land remediation allowances and Grants.

Presentation and allocation

NRM also introduces some pragmatic changes to the familiar SFCA list of elements:

- The purely presentational issues.
- Introduction of designed elements and sub-elements.
- Splitting External works.
- Introducing non-element cost category for off-site constructed buildings.
- Practical pricing issue relating to procurement that moves the structure away from elements towards packages.
- Editorial changes.

The purely presentational issues: NRM presents the rules in a table with three levels and to reducing the white space in the tables some sub-elements are presented at level 2 rather than level 3. For example in the SFCA Substructure is an element but is also a group element. In NRM the sub-elements are presented at level 2 and further broken down at level 3.

Introduction of designed elements and sub-elements: At level 3 the NRM structure is expanded to incorporate design and specification. For example frame is divided into steel frame, concrete frame etc (see example). It is at this level, ie designed elements, sub-elements and components that the NRM provides new measurement rules.

NRM Example of levels

Level 1	Level 2	Level 3
Superstructure	Frame	Steel frame
		Space decks
		Concrete casings to steel frames
		Concrete frames
		Timber frames
		Specialist frames
	Upper floor	Concrete floors
		Precast/composite decking systems
		Timber floors
		Structural screeds
		Balconies

External works: NRM divides the SFCA 'External Works' into 'Work to existing buildings', 'Facilitating works' and External works.

Off-site construction: The NRM introduces a category for 'Complete buildings and building units', which is divided into: 'Prefabricated buildings – complete building' and 'Prefabricated buildings – building units'.

Practical pricing issues: To facilitate the measurement and pricing of some work they have been moved from elements towards a package classification as follows.

- 'Façade retention' is included with 'Demolitions' as it will be procured as part of the demolition package. In a cost analysis this should be allocated to 'External walls'.
- 'Work to existing buildings' covers all 'work to existing', both work to adjacent buildings and work to the building being refurbished. In a cost analysis all work to the building being analysed should be allocated to the building elements.
- Podium slabs forming roofs to basements are included in 'Upper floors'. In a cost analysis, this should be allocated to the 'Roof' element.
- Drainage under the building is in 'Substructure' in NRM, but in 'Drainage' in SFCA.
- Testing and commissioning of individual service installations is separated from installations

Editorial changes: The NRM has used slightly different terminology for some elements and sub-elements, although these have the same definition as the SFCA. For example, the NRM Level 2 category ‘Stairs and ramps’ is the same as the SFCA element ‘Stairs’. A full list is given in Appendix A.

Coding system: The SFCA has a numeric/alpha/numeric coding, eg ‘2F1 External Windows’. The NRM structure uses a numeric/numeric/numeric coding, eg ‘2.6.1 External windows’.

NRM - SFCA concordance

Elemental cost analyses provide the initial costs to inform an elemental order of cost estimate before the design exists. This can be developed following the NRM guidance as the design develops and, where the resultant cost plan forms the basis of the contract sum analysis, it can be re-analysed into functional Elements.

A concordance that maps the NRM structure to the SFCA Elements is in Appendix 2.

ⁱ Standard Form of Cost Analysis: Principles, Instructions and Definitions, Third Edition, 2008.

ⁱⁱ New Rules of Measurement: Order of cost estimating and elemental cost planning, 2009.

ⁱⁱⁱ Code of Measuring Practice, Sixth Edition, 2007.

APPENDIX A



SFCA/ NRM terminology concordance Building Elements

SFCA		NRM	
Elements		Level 2	
2D	Stairs		Stairs and ramps
4A	Fittings and Furnishings		Fittings furnishings and equipment
5I	Fuel Installations		Gas and other fuel installation
5L	Communications and Security Installations		Communications security and control systems
5O	Management of the Commissioning of Services		Testing and commissioning of services
Sub-Elements		Level 2/3	
1A3	Lowest Floor Bed/Slab	1.4.1	Ground floor slab/bed and suspended floor construction
2C4	Rooflights and Openings	2.3.5	Rooflights, skylights and openings
2D1	Stairs Structure	2.4.1	Stair/ramp structures
2D2	Stairs Finishes	2.4.2	Stair/ramp finishes
2D3	Stairs Balustrades and Handrails	2.4.3	Stair/ramp balustrades and handrails
2E1	External Enclosing Walls	2.5.1	External walls above ground floor level
2E4	Basement Walls	2.5.2	External enclosing walls below ground level
2E5	Façade Access	2.5.6	Façade access/cleaning systems
2G1	Internal Walls/Partitions	2.7.1	Walls and partitions
3A1	Wall Finishes	3.1.1	Finishes to walls
5A1	Sanitaryware	5.1.1	Sanitary appliances
5C1	Internal Drainage	5.3.1	Foul drainage above ground
5C3	Chemical and Industrial Waste Disposal	5.3.2	Laboratory and industrial liquid waste drainage
5D1	Mains Supply	5.4.1	Mains water supply
5D2	Cold Water Services	5.4.2	Cold water distribution
5D3	Hot Water Services	5.4.3	Hot water distribution
5D4	Steam and Condensate	5.4.5	Steam and condensate distribution
5G2	Smoke Ventilation	5.7.2	Smoke extract/control
5H1	Electric Source and Mains	5.8.1	Electrical mains and sub-mains distribution
5H2	Electric Power Supplies	5.8.2	Power installation
5H3	Electric Lighting	5.8.3	Lighting installation
5H5	Specialist Lighting	5.8.4	Specialist lighting installation
5H6	Local Electricity Supply	5.8.5	Local electricity generation systems
5H7	Earthing Systems	5.8.7	Earthing and bonding systems
5J6	Car Lifts, Turntables and the Like	5.10.9	Car lifts, car stacking systems, turntables and the like
5L3	Security Installation	5.10.2	Security systems
5M2	Building Management Control Installations	5.12.3	Central control/building management systems
5N1	Builder's Work in Connection (BWIC)	5.14.1	General builders work
5O1	Management of the Commissioning of Services	5.15.1	Testing and commissioning of services

APPENIX B

Mapping NRM level 3 to SFCA



Group Element	Element	Sub-Element	NRM Level 3 reference	
1 Substructure	1A Substructure	1A1 Standard Foundations	1.1.1 Standard foundations	
		1A2 Special Foundations	1.1.2 Piled foundations	
		1A3 Lowest Floor Bed/Slab	1.1.3 Underpinning	
		1A4 Basement Excavation	1.4.1 Ground floor slab/bed and suspended floor construction	
		1A5 Basement Retaining Walls	1.2.1 Basement excavation 1.3.1 Basement retaining walls 1.3.2 Embedded basement retaining walls	
2 Superstructure	2A Frame	2A1 Structural Frame	2.1.1 Steel frames 2.1.2 Space decks 2.1.3 Concrete casings to steel frames 2.1.4 Concrete frames 2.1.5 Timber frames 2.1.6 Specialist frames	
		2B1 Upper Floors	2.2.1 Concrete floors (allocate podium slabs forming roofs to basements to 2.C.1 Roof Structure) 2.2.2 Precast /composite decking systems 2.2.3 Timber floors 2.2.4 Structural screeds 2.2.5 Balconies 2.2.6 Drainage to balconies	
		2C1 Roof Structure	2.3.1 Roof structure	
		2C2 Roof Coverings	2.3.2 Roof coverings	
		2C3 Roof Drainage	2.3.3 Glazed roofs	
		2C4 Rooflights and Openings	2.3.4 Roof drainage	
	2D Stairs	2D1 Stairs Structure	2D1 Stairs Structure	2.3.5 Rooflights, skylights and openings
			2D2 Stairs Finishes	2.3.6 Roof features
			2D3 Stairs Balustrades and Handrails	2.4.1 Stair/ramp structures 2.4.4 Ladders/chutes/slides 2.4.2 Stair/ramp finishes 2.4.3 Stair/ramp balustrades and handrails

	2E External walls	2E1 External Enclosing Walls 2E2 External Wall Finishes 2E3 Solar/Rain Screening 2E4 Basement Walls 2E5 Façade Access 2F1 External Windows 2F2 External Doors	2.5.1 External walls above ground floor level 2.5.4 External soffits 2.5.5 Subsidiary walls, balustrades, handrails, railings and proprietary balconies 7.4.1 Façade retention Included in 2.5.1 and 2.5.2 2.5.3 Solar/rain screening 2.5.2 External enclosing walls below ground level 2.5.6 Façade access 2.6.1 External windows 2.6.2 External doors
	2G Internal Walls and Partitions	2G1 Internal Walls/Partitions 2G2 Balustrades and Handrails 2G3 Movable Room Dividers 2G4 Cubicles	2.7.1 Walls and partitions 2.7.2 Balustrades and handrails 2.7.3 Movable room dividers 2.7.4 Cubicles
3 Finishes	2H Internal Doors 3A Wall Finishes 3B Floor Finishes 3C Ceiling Finishes	2H1 Internal Doors 3A1 Wall Finishes 3B1 Finishes to Floors 3B2 Raised Access Floors 3C1 Finishes to Ceilings 3C2 Suspended Ceilings	2.8.1 Internal doors 3.1.1 Finishes to walls 3.2.1 Finishes to floors 3.2.2 Raised access floors 3.3.1 Finishes to ceilings 3.3.2 False ceilings 3.3.3 Demountable suspended ceilings
4 Fittings	4A Fittings and Furnishings	4A1 Fittings, Fixtures and Furniture 4A2 Soft Furnishing 4A3 Works of Art 4A4 Equipment	4.1.1 General fittings, furnishings and equipment 4.1.2 Domestic kitchen fittings and equipment 4.1.3 Signs/notices 4.2.1 Special purpose fittings, furnishings and equipment 4.3.1 Internal planting 4.4.1 Bird and vermin control included in 4.1.1 4.1.4 Works of art 4.1.5 Equipment
5 Services	5A Sanitary Appliances	5A1 Sanitaryware 5A2 Pods	5.1.1 Sanitary appliances 5.1.3 Sanitary fittings 5.1.2 Pods

5B Services Equipment	5B1 Services Equipment	5.2.1 Services equipment
5C Disposal installations	5C1 Internal Drainage 5C2 Refuse Disposal 5C3 Chemical and Industrial Waste Disposal	5.3.1 Internal drainage 5.3.3 Refuse disposal 5.3.2 Laboratory and industrial liquid waste drainage
5D Water Installations	5D1 Mains Supply 5D2 Cold Water Services 5D3 Hot Water Services 5D4 Steam and Condensate 5E1 Heat Source	5.4.1 Mains water supply 5.4.2 Cold water distribution 5.4.3 Hot water distribution 5.4.4 Local hot water distribution 5.4.5 Steam and condensate distribution 5.5.1 Heat source
5F Space Heating and Air Conditioning	5F1 Central Heating 5F2 Local Heating 5F3 Central Cooling 5F4 Local Cooling 5F5 Central Heating and Cooling 5F6 Local Heating and Cooling 5F7 Central Air Conditioning 5F8 Local Air Conditioning 5F9 Instrumentation and Controls for More than One System	5.6.1 Central heating 5.6.2 Local heating 5.6.3 Central cooling 5.6.4 Local cooling 5.6.5 Central heating and cooling 5.6.6 Local heating and cooling 5.6.7 Central air conditioning 5.6.8 Local air conditioning included in 5.6.1 - 5.6.2
5G Ventilation Systems	5G1 Central Ventilation 5G2 Smoke Ventilation 5G3 Local and Special Ventilation	5.7.1 Central ventilation 5.7.2 Smoke extract/control 5.7.3 Local and special ventilation
5H Electrical Installations	5H1 Electric Source and Mains 5H2 Electric Power Supplies 5H3 Electric Lighting 5H4 Electric Light Fittings 5H5 Specialist Lighting 5H6 Local Electricity Supply 5H7 Earthing Systems 5I1 Fuel Installations	5.8.1 Electrical mains and sub-mains distribution 5.8.6 Transformation devices 5.8.2 Power installation 5.8.3 Lighting installation included in 5.8.3 5.8.4 Specialist lighting installation 5.8.5 Local electricity generation systems 5.8.7 Earthing and bonding systems 5.9.1 Gas distribution 5.9.2 Fuel storage and piped distribution systems

<p>5J Lift and Conveyor Installations</p>	<p>5J1 Lifts and Enclosed Hoists</p> <p>5J2 Escalators</p> <p>5J3 Conveyors</p> <p>5J4 Dock Levellers and Scissor Lifts</p> <p>5J5 Cranes and Unenclosed Hoists</p> <p>5J6 Car Lifts, Turntables and the Like</p>	<p>5.10.1 Lifts</p> <p>5.10.2 Enclosed hoists</p> <p>5.10.3 Escalators</p> <p>5.10.4 Moving pavements</p> <p>5.10.5 Powered stairlifts</p> <p>5.10.6 Conveyors</p> <p>5.10.7 Dock levellers and scissor lifts</p> <p>5.10.8 Cranes and unenclosed hoists</p> <p>5.10.9 Car lifts, turntables and the like</p> <p>5.10.11 Other lift and conveyor installations (allocate by function)</p>
<p>5K Fire and Lightning Protection</p>	<p>5K1 Automatic Fire Suppression Systems</p> <p>5K2 Fire-fighting Installations</p> <p>5K3 Lightning Protection</p>	<p>5.11.1 Fire fighting systems (allocate at level 4)</p> <p>5.11.1 Fire fighting systems (allocate at level 4)</p> <p>5.11.2 Lightning protection</p>
<p>5L Communications and Security Installations</p>	<p>5L1 Warning Installations</p> <p>5L2 Visual, Audio and Data Installations</p> <p>5L3 Security Installations</p>	<p>5.12.1 Communication systems (allocate at level 4)</p> <p>5.12.1 Communication systems (allocate at level 4)</p> <p>5.12.2 Security systems</p>
<p>5M Special installations</p>	<p>5M1 Mechanical and Electrical Systems</p>	<p>5.13.1 Specialist Piped Supply Systems</p> <p>5.13.2 Radio and Television Studios</p> <p>5.13.3 Specialist Refrigeration Systems</p> <p>5.13.4 Water Features</p> <p>5.13.5 Other Specialist Installations</p> <p>5.10.10 Document handling systems</p> <p>5.12.3 Central control/building management systems</p>
<p>5N Builder's work in connection (BWIC)</p>	<p>5N1 Builder's Work in Connection (BWIC)</p>	<p>5.14.1 General builders work</p>
<p>5O Management of the Commissioning of Services</p>	<p>5O1 Management of the Commissioning of Services</p>	<p>5.15.1 Testing and commissioning of services (Testing and commissioning of individual systems to be allocated to the appropriate element)</p>
<p>Note: Costs in NRW section 7 that apply to the building being analysed should be allocated to the appropriate elements. Costs that apply to adjacent or other buildings should be allocated to section 7.</p> <p>Buildings largely manufactured off site see Principles of Analysis 2.23</p>		
<p>6.1.1 Prefabricated - complete buildings</p> <p>6.1.2 Prefabricated - building units</p>		

6 External Works	6A Site Works	<p>6A1 Site Preparation</p> <p>8.1.1 Site clearance 8.1.2 Preparatory ground works 9.1.3 Eradication of plant growth 9.3.2 Soil stabilisation measures 9.5.1 Archeological Investigation 9.5.2 Reptile/Wildlife Migration Measures 9.5.3 Other Extraordinary Site Investigation</p> <p>6A2 Site Remediation and Decontamination</p> <p>9.1.1 Toxic or hazardous material removal 9.1.2 Contaminated land 9.3.1 Site dewatering and pumping 9.3.3 Ground gas venting measures 8.2.1 Roads, paths and pavings 8.2.2 Special surfacings and pavings 8.3.1 Seeding and turfing 8.3.2 External planting 8.6.4 Land drainage 8.7.10 Irrigation systems</p> <p>6A3 Surface Treatments</p> <p>8.4.1 Fencing and railings 8.4.2 Walls and screens 8.4.3 Retaining walls 8.4.4 Barriers and guardrails 8.8.3 Underpinning to external site boundary walls 8.7.8 External security systems (gates and access controls) see also 6C2 and 6C3</p> <p>6A4 Site Enclosure and Division</p> <p>8.5.1 Site/street furniture and equipment 8.5.2 Ornamental features</p>
	6B Drainage	<p>6A5 Fittings and Furniture</p> <p>8.6.1 Surface water and foul water drainage 8.6.2 Ancillary drainage systems 8.6.3 External laboratory and industrial liquid waste drainage 9.4.1 Temporary Diversion Works (drainage) see also 6C1 8.6.5 Testing and Commissioning Ext Drainage included in 8.6.1, 8.6.2 and 8.6.3</p> <p>6B1 Drainage Under the Building 6B2 Drainage Outside the Building 6B3 Ancillary Works to Drainage</p>

	6C External Services	6C1 Service Mains	8.7.1 Water mains supply 8.7.2 Electricity mains supply 8.7.3 External transformation devices 8.7.5 Gas mains supply 8.7.6 Telecommunications and other communication system connections 8.7.7 External fuel storage and piped distribution 9.4.1 Temporary Diversion Works (services) see also 6B2 8.7.8 External security systems (security lighting) see also 6A4 and 6C3
		6C3 Other Site Services	8.7.4 Electricity distribution to external plant and equipment 8.7.8 External security systems (surveillance systems) see also 6A4 and 6C1
		6C4 Ancillary Works to Services	
		6C5 BWIC with External Services	
	6D Minor building works	6D1 Ancillary Buildings and Structures	8.7.11 Local/District Heating Installations 8.7.12 Builder's work in connection with external services 8.8.1 Minor building works 8.8.2 Ancillary buildings and structures
		6D2 Alterations to Existing Buildings	7.2.1 Repairs to Existing Services 7.3.1 Damp Proof Courses 7.3.2 Fungus/Beetle Eradication 7.5.1 Cleaning Existing Surfaces 7.5.2 Protective Coating to Existing Surfaces 7.6.1 Masonry Repairs 7.6.2 Concrete Repairs 7.6.3 Metal Repairs 7.6.4 Timber Repairs 7.6.4 Plastic Repairs
		6D3 Other Buildings and Works Included in the Contract	Included in the analysis to reconcile contract and analysis totals
	6E Demolition and Work Outside the Site	6E1 Demolition	7.1.1 Minor Demolition and Alterations Work 9.2.1 Demolition works
		6E2 Work Outside the Site	NRM requires that works outside the curtilage of the site be identified separately