

A Concept Model for the UK Public Sector

Introduction

This paper is produced by the CTO Council Information Domain to scope and propose a 'concept model' that universally applies to public sector information.

What is a Concept Model?

Wikipedia describes a concept model as

... a conceptual model represents 'concepts' (entities) and relationships between them ... explicitly chosen to be independent of design or implementation concerns

The conceptual model attempts to clarify the meaning of various, usually ambiguous terms, and ensure that problems with different interpretations of the terms and concepts cannot occur. Such differing interpretations could easily cause confusion amongst stakeholders, especially those responsible for designing and implementing a solution, where the conceptual model provides a key artefact of business understanding and clarity.

Wikipedia.org/Conceptual_model_(computer_science)

For the purposes of the Public Sector Concept Model (PSCM), we shall add:-

- Contains a small number of concepts, which can be applied to any part of the public sector;
- Is immune to future government reorganisations
- Is simple, easy to read and well understood by the audiences

The models are shown graphically here as simple 'Directed Graphs'

(http://en.wikipedia.org/wiki/Directed_graph) and are available as simple ontology expresses as rdf-schema (http://en.wikipedia.org/wiki/RDF_Schema).

The concept models should not be confused with process models; they simply introduce a series of concepts and propose how those concepts may be related. The relationships in these models should all be considered to be 'many to many'.

A definition for each concept in the model is proposed later in this document. Attributes for each concept are not defined at this stage.

The Purpose of a Public Sector Concept Model

The Government ICT Strategy¹, published March 2011, emphasises the need and role of a Public Sector Information Architecture.

Managing information effectively and appropriately is essential to the delivery of secure, seamless and efficient operational services. It provides the basis for informed decision making and the platform upon which performance can be measured. Modern, knowledge-based service delivery underpinned by effective information architecture and open standards will support government to build more transparent, trusted and efficient information exchange

¹ Government ICT Strategy - <http://www.cabinetoffice.gov.uk/resource-library/uk-government-ict-strategy-resources>

processes. The Government will develop an information strategy that is supported by an architecture framework which will underpin the design of government's new information systems.

A public sector concept model can be used to:-

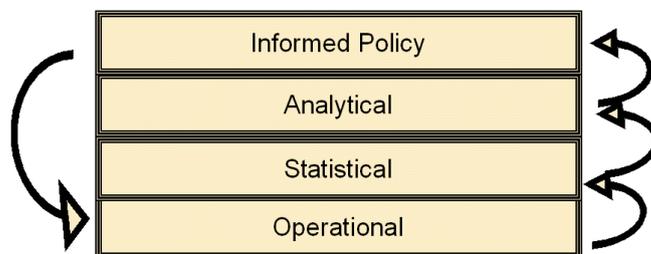
- Underpin logical models within public sector solutions;
- Avoid misinterpretations of data as it is shared and re-used;
- Catalogue public sector data holdings leading to improved discovery and re-use;
- Reduce 're-collection' of data that already exists in the public sector;
- Re-use patterns and components that act on a concept;
- Enable re-use of data, services and solutions between public sector agencies;
- Promote a 'master data' approach where definitive and authoritative information is published for each concept;
- Reduce the time and resources required to produce public sector solutions;
- Support requirements definition and procurement.

Contexts of Public Sector Information

This paper builds on previous work by the CTO Council Information Domain to define an Information Architecture for public sector information.

Public Sector Information may be in contexts of:

- **Operational** – about real people and places, with real circumstances, needing real services, i.e. Case Work
- **Statistical** – aggregated operational information, organized using common classifications and segmentations.
- **Analytical** – the conclusions drawn from the analysis of statistics. i.e. patterns, predictions, inferences, opinions.
- **Political** – the decisions taken to shape services.



When information flows across each context, we can demonstrate that:-

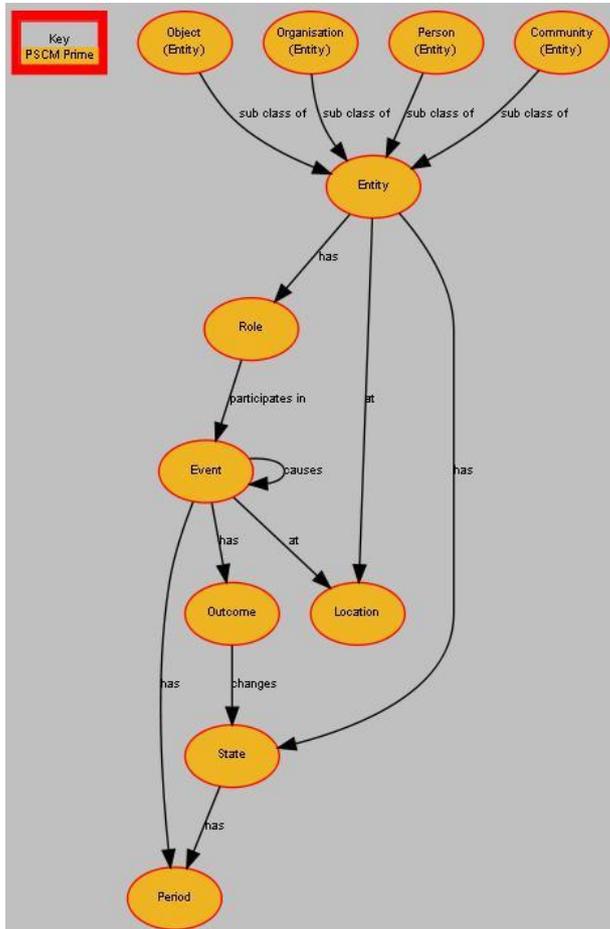
*The **decisions** that we take, are based on the **conclusions** that we reach, from the **statistics** that we gather, from the **data** that we handle.*

A series of concept models is proposed that underpin how information is exploited in each of these contexts.

Concept Models for Operational Information.

Events

Much of the information handled by the public sector includes recording an 'Event'.



Events occur irrespective of whether they trigger, or are contained in, public sector services. For instance

- A person may exceed the speed limit in a car
- A person may get a job
- A person may have a fall and injure themselves
- A business may open a new shop
- A tree may be blown down in a gale.

Some of these events may lead to a public sector service being initiated, in which case, they are likely to be recorded within a 'Case'.

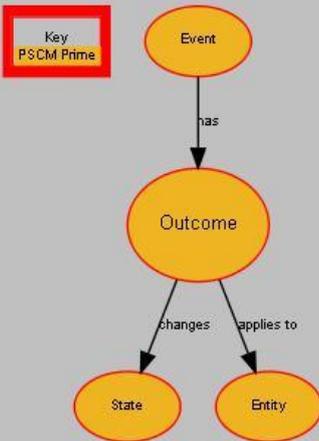
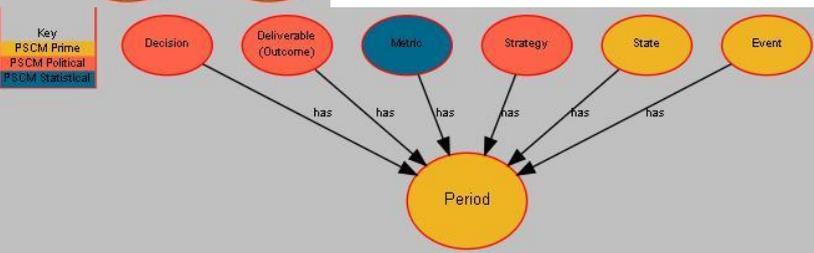
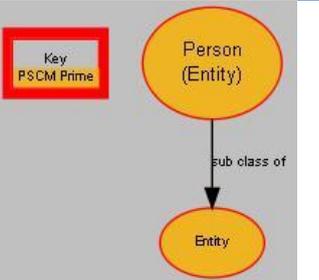
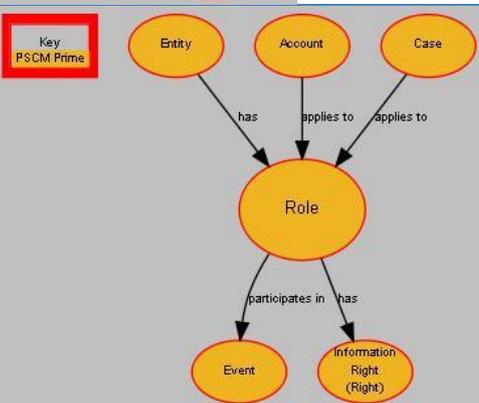
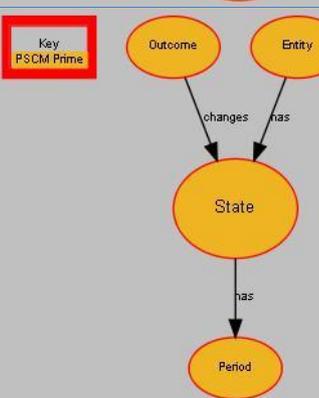
As well as introducing some key concepts, this model shows a usage for recording 'Events', in particular:-

- The participants to an event may be Objects, People, Organisations, and Communities. As they participate they take on 'Roles' such as driver, passenger, keeper, road, obstruction, employer, claimant, informant, residents, pedestrians etc
- An 'Event' may have 'Outcomes' which cause changes of 'State' to the characteristics of a series of 'Entities'. These may affect more than just the participants to the 'Event', so for instance, a fallen tree may affect commuters between a village and a town.

Concepts introduced by the 'Events' view.

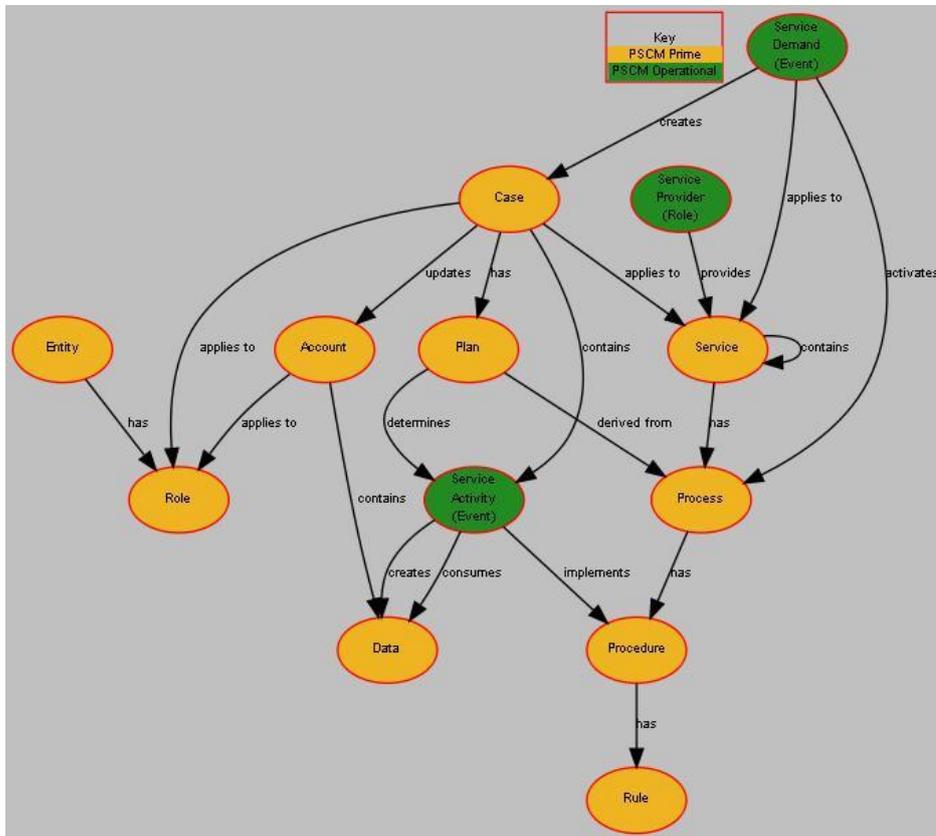
Concept	Definition	Relationships
Community	A group of interacting people that share common values and/or location.	

Entity	Something that has a distinct, separate existence.	<pre> graph TD Metric((Metric)) -- applies to --> Entity((Entity)) Outcome((Outcome)) -- applies to --> Entity Entity -- has --> Role((Role)) Entity -- at --> Location((Location)) Entity -- has --> State((State)) </pre>	
Event	A happening, that has occurred, or is due to occur.	<pre> graph TD Role((Role)) -- participates in --> Event((Event)) Event -- causes --> Event Event -- at --> Location((Location)) Event -- has --> Period((Period)) Event -- has --> Outcome((Outcome)) </pre>	
Location	A fixed point, area, or volume	<pre> graph TD StakeholderGroup((Stakeholder Group)) -- at --> Location((Location)) Entity((Entity)) -- at --> Location Event((Event)) -- at --> Location </pre>	
Object	A physical item.	<pre> graph TD ObjectEntity((Object (Entity))) -- sub class of --> Entity((Entity)) </pre>	
Organisation	A social group which distributes tasks for a collective goal.	<pre> graph TD Data((Data)) -- governed by --> Organisation((Organisation (Entity))) Organisation -- contains --> Organisation Organisation -- has --> Agreement((Agreement)) Organisation -- takes --> Decision((Decision)) Organisation -- sub class of --> Entity((Entity)) Organisation -- provides --> Service((Service)) Organisation -- commissions --> Service Organisation -- has --> Objective((Objective)) Organisation -- has --> Strategy((Strategy)) </pre>	

<p>Outcome</p> <p>The changes of state to an Entity as a consequence of an event.</p>	 <pre> graph TD Event((Event)) -- has --> Outcome((Outcome)) Outcome -- changes --> State((State)) Outcome -- applies to --> Entity((Entity)) </pre>	
<p>Period</p> <p>A specified division or portion of time.</p>	 <pre> graph TD Decision((Decision)) -- has --> Period((Period)) Deliverable((Deliverable (Outcome))) -- has --> Period Metric((Metric)) -- has --> Period Strategy((Strategy)) -- has --> Period State((State)) -- has --> Period Event((Event)) -- has --> Period </pre>	
<p>Person</p> <p>A human being</p>	 <pre> graph TD Person((Person (Entity))) -- sub class of --> Entity((Entity)) </pre>	
<p>Role</p> <p>The manner in which an Entity participates in an Event.</p>	 <pre> graph TD Entity((Entity)) -- has --> Role((Role)) Account((Account)) -- applies to --> Role Case((Case)) -- applies to --> Role Role -- participates in --> Event((Event)) Role -- has --> InfoRight((Information Right (Right))) </pre>	
<p>State</p> <p>A circumstance or condition of an Entity at a given Period.</p>	 <pre> graph TD Outcome((Outcome)) -- changes --> State((State)) Entity((Entity)) -- has --> State State -- has --> Period((Period)) </pre>	

Cases

A public sector organisation will create a series of 'cases' to manage and record activities for its services.



A 'Service Demand Event' will occur by which a 'Service Provider' is requested to initiate a 'Service'. As with all 'Events', there may be associated information about 'Roles', 'Entities', 'Periods', 'Locations', 'States', etc

A 'Case' is created to record the 'Service Activities', and 'Plans' for the instance of the 'Service'.

The 'Service' will have one or more predefined 'Processes', from which a plan may be derived for the 'Case'.

'Service Activity' creates and/or consumes 'Data' that may then be recorded against the 'Case'.

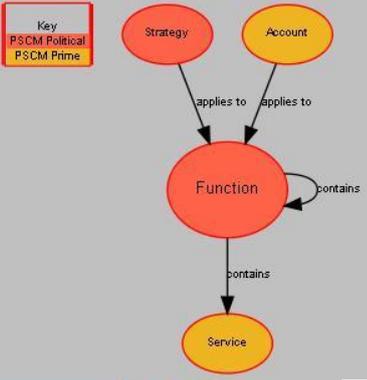
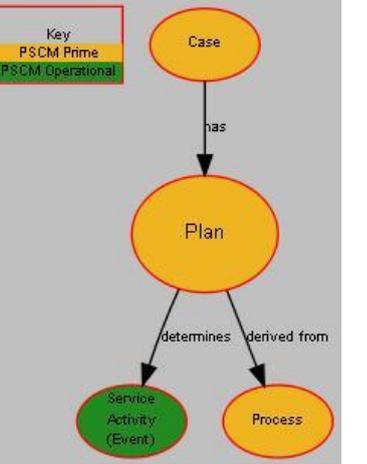
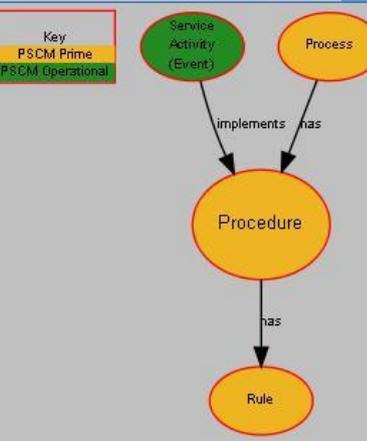
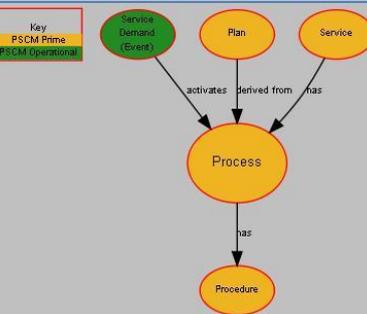
Where the 'Data' is of value beyond the lifecycle of the 'Case', an 'Account' may be created or updated so that the 'Data' can be re-used for later 'Cases' or for other appropriate purposes.

An 'Account' typically contains 'Data' for a 'Function' and for a 'Role', for example:

- A patient record
- An ongoing claim for benefit
- A driver's licence
- A food premises inspection history
- An Equipment Log

Concepts introduced by the 'Cases' view.

Concept	Definition	Relationships
Account	<p>A container for information about 'Events' and 'Statuses' for a 'Function', that relate to an 'Entity' and a 'Role'.</p> <p>For example</p> <ul style="list-style-type: none"> • A patient record • An ongoing claim for benefit • A driver's licence • A food premises inspection history • An equipment log 	<pre> graph TD Case((Case)) -- updates --> Account((Account)) Function((Function)) -- applies to --> Account Role((Role)) -- applies to --> Account Data((Data)) -- contains --> Account </pre> <p>Key: PSCM Prime (yellow), PSCM Political (red)</p>
Case	<p>The management of a Service Demand.</p>	<pre> graph TD SD((Service Demand (Event))) -- creates --> Case((Case)) Case -- applies to --> Service((Service)) Case -- applies to --> Role((Role)) Case -- updates --> Account((Account)) Case -- contains --> SA((Service Activity (Event))) Case -- has --> Plan((Plan)) </pre> <p>Key: PSCM Prime (yellow), PSCM Operational (green)</p>
Data	<p>The recorded value of an attribute.</p> <p>When organised, data can be the basis of</p> <ul style="list-style-type: none"> * Information * Knowledge * Wisdom * Insight 	<pre> graph TD IR((Information Right (Right))) -- applies to --> Data((Data)) Account((Account)) -- contains --> Data SA((Service Activity (Event))) -- creates --> Data SA -- consumes --> Data Data -- governed by --> Org((Organisation (Entity))) </pre> <p>Key: PSCM Prime (yellow), PSCM Operational (green)</p>

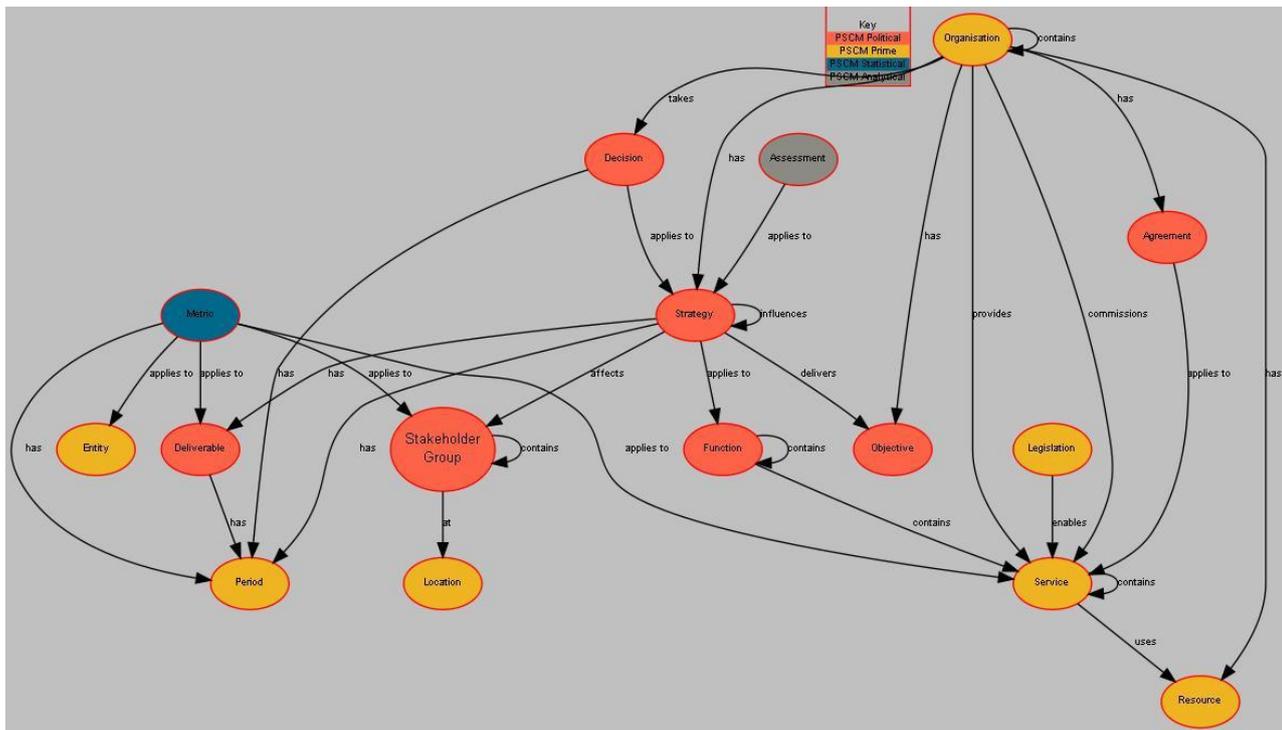
<p>Function</p>	<p>A collection of services that come together into a cohesive set.</p>	 <pre> graph TD Strategy((Strategy)) -- applies to --> Function((Function)) Account((Account)) -- applies to --> Function Function -- contains --> Service((Service)) Function -- contains --> Function </pre>	
<p>Plan</p>	<p>A list of procedures with proposed periods and resources, used to achieve a desired outcome.</p>	 <pre> graph TD Case((Case)) -- has --> Plan((Plan)) Plan -- determines --> ServiceActivity((Service Activity (Event))) Plan -- derived from --> Process((Process)) </pre>	
<p>Procedure</p>	<p>Definition of steps and methods that would achieve an outcome.</p> <p>Procedures can be re-used in many Processes.</p>	 <pre> graph TD ServiceActivity((Service Activity (Event))) -- implements --> Procedure((Procedure)) Process((Process)) -- has --> Procedure Procedure -- has --> Rule((Rule)) </pre>	
<p>Process</p>	<p>A predefined set of Procedures, and decision points based on the outcome of each procedure.</p>	 <pre> graph TD ServiceDemand((Service Demand (Event))) -- activates --> Process((Process)) Plan((Plan)) -- derived from --> Process Service((Service)) -- has --> Process Process -- has --> Procedure((Procedure)) </pre>	

<p>Service</p>	<p>The capacity to carry out a defined process.</p> <p>A service exists even if it is not accessed.</p>	
<p>Service Activity</p>	<p>An event that is undertaken within a Case.</p>	
<p>Service Demand</p>	<p>An event that causes a service to create a case.</p>	
<p>Service Interface</p>	<p>The facility that enables a Service Activation.</p> <p>This may be</p> <ul style="list-style-type: none"> • A web site form • An API • A help desk • An Application Form <p>... etc</p>	

Concept Models for Political Information.

Commissioning Services

This view illustrates how information that informs how public sector services are commissioned. This type of view supports the drive towards 'Open Public Services' by enabling the public to discover information that enables them to take part in local decision making and service provision.



This view shows how the concept model can be used to combine information from many sources, to provide a joined-up set of information on a topic, in particular:-

- A *Service* is commissioned by a '*Public Sector Body*' and may be contained in one or more functions, for instance
 - An 'Education' function may contain a 'Schools Admissions Service'
- One or more '*Strategies*' will apply to each '*Function*' setting out purpose, ambition, throughput, performance targets, and so on.
- '*Strategies*' will have been informed by '*Assessments*' which include studies, analytics, forecasts and so on; '*Strategies*' will be influenced by the core '*Objectives*' of the commissioning *Organisation*.
- '*Services*', and the commissioning rationale contained in the associated *Strategies* are of interest to a range of *Stakeholder Groups*, where those groups are segmentations such as
 - Business Community
 - Localities
 - Communities
 - Circumstances

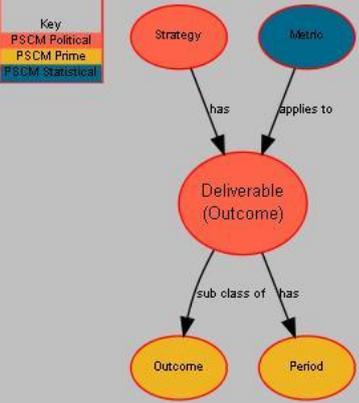
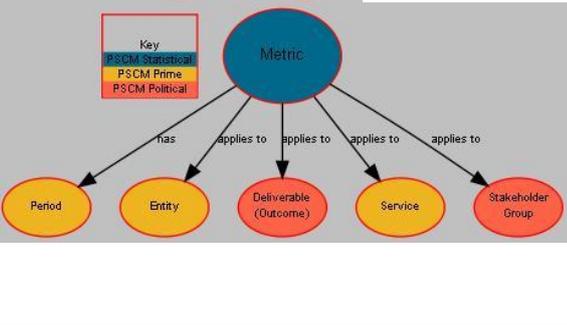
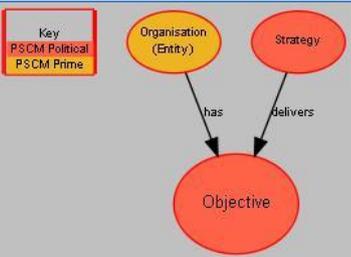
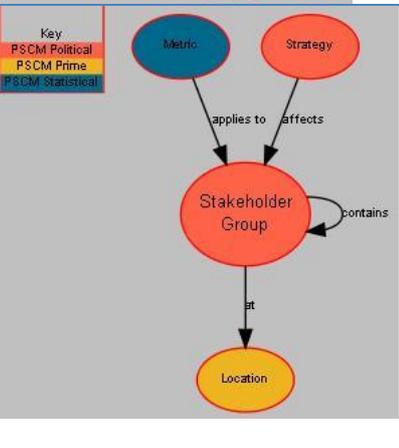
... and where each can be further broken down and recombined, for example

- Business Community
 - Manufacturing
 - Tourism
 - Retail
 - Service
 - etc

Metrics can then be associated with each stakeholder group.

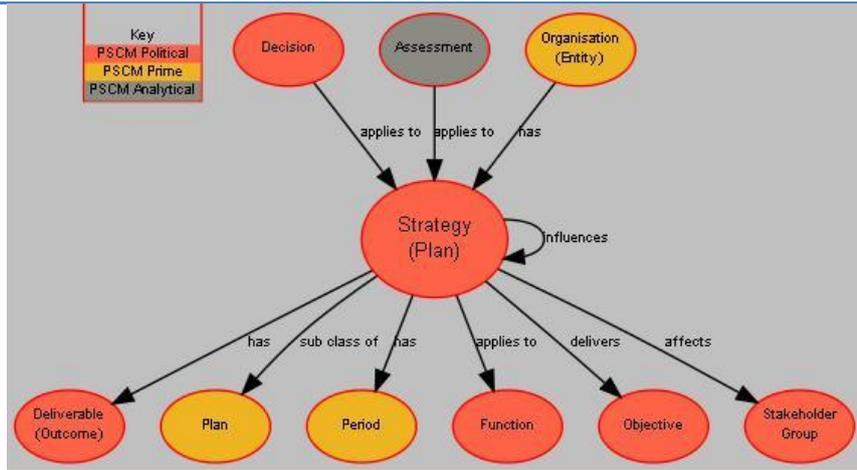
Concepts introduced by the 'Service Commissioning' view.

Concept	Definition	Relationships
Agreement	<p>An agreement between two parties.</p> <p>For example</p> <ul style="list-style-type: none"> • a contract • a memorandum of understanding 	<pre> graph TD Org[Organisation (Entity)] -- has --> Ag[Agreement] Ag -- applies to --> Serv[Service] </pre>
Assessment	<p>A study that reaches conclusions to inform a decision.</p>	<pre> graph TD Ass[Assessment] -- applies to --> Strat[Strategy] </pre>
Decision		<pre> graph TD Org[Organisation (Entity)] -- takes --> Dec[Decision] Dec -- has --> Per[Period] Dec -- applies to --> Strat[Strategy] </pre>

<p>Deliverable</p>	<p>An 'Outcome' of a 'Strategy'</p>	
<p>Metric</p>	<p>An analytical measurement intended to quantify the state of a system.</p> <p>For example</p> <ul style="list-style-type: none"> • population density" 	
<p>Objective</p>	<p>A desired state</p>	
<p>Stakeholder Group</p>	<p>A segmentation defining groups of people or organisations, who affect or can be affected by an organization's actions.</p>	

Strategy

A plan chosen to bring about a desired outcome or objective.



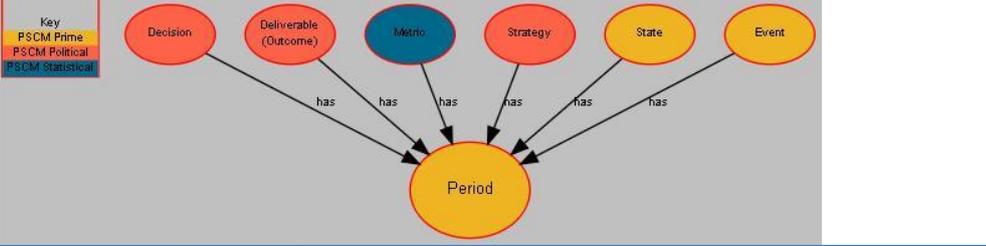
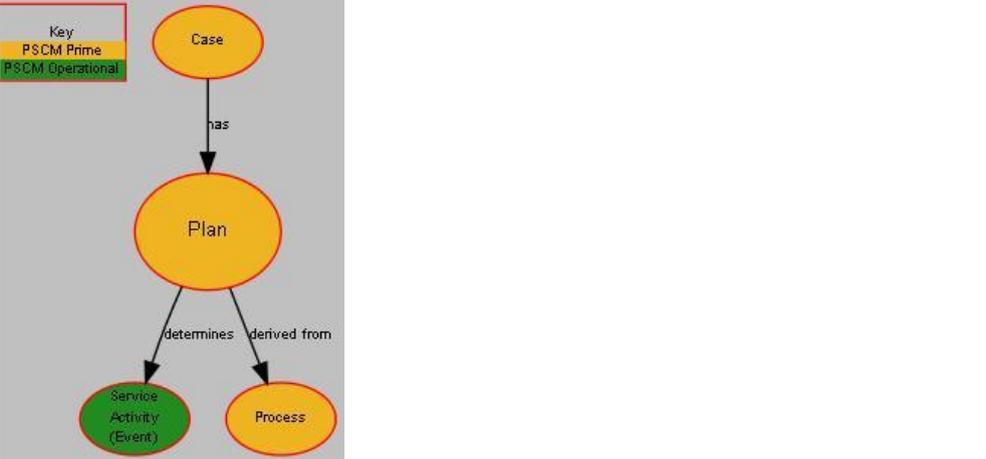
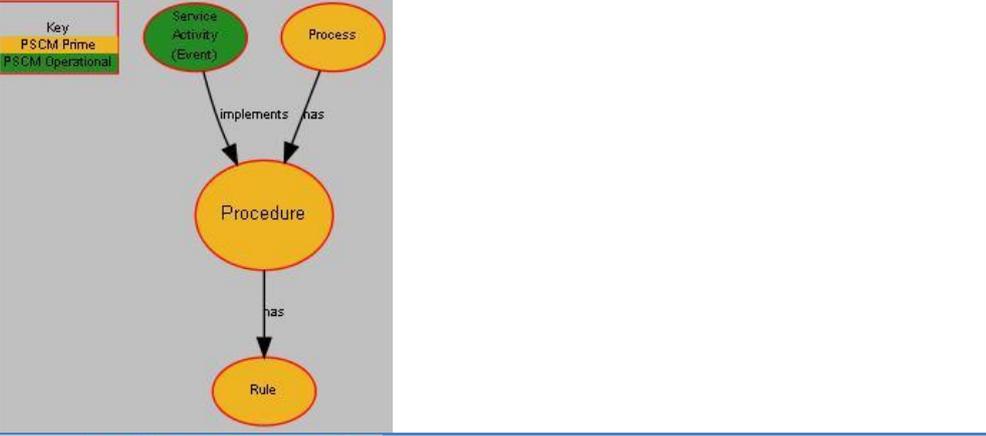
Definitions of each Concept.

Concept	Definition	Relationships
Account	<p>A container for information about 'Events' and 'Statuses' for a 'Function', that relate to an 'Entity' and a 'Role'.</p> <p>For example</p> <ul style="list-style-type: none"> • A patient record • An ongoing claim for benefit • A driver's licence • A food premises inspection history • An equipment log 	<pre> graph TD Case((Case)) -- updates --> Account((Account)) Account -- applies to --> Function((Function)) Account -- applies to --> Role((Role)) Account -- contains --> Data((Data)) </pre> <p>Key: PSCM Prime, PSCM Political</p>
Agreement	<p>An agreement between two parties.</p> <p>For example</p> <ul style="list-style-type: none"> • a contract • a memorandum of understanding 	<pre> graph TD Org((Organisation (Entity))) -- has --> Agreement((Agreement)) Agreement -- applies to --> Service((Service)) </pre> <p>Key: PSCM Political, PSCM Prime</p>
Assessment	<p>A study that reaches conclusions to inform a decision.</p>	<pre> graph TD Assessment((Assessment)) -- applies to --> Strategy((Strategy)) </pre> <p>Key: PSCM Analytical, PSCM Political</p>

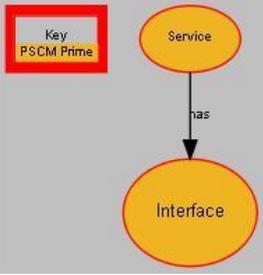
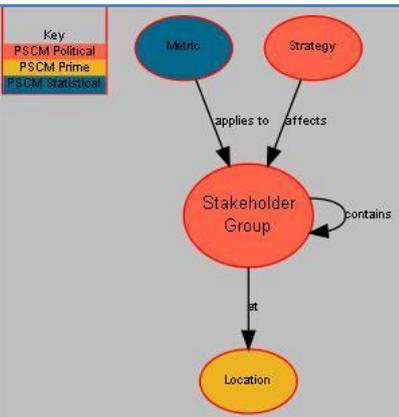
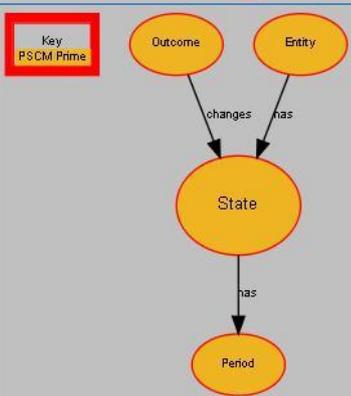
<p>Case</p> <p>The management of a Service Demand.</p>	<pre> graph TD SD[Service Demand (Event)] -- creates --> Case((Case)) Case -- applies to --> Service((Service)) Case -- applies to --> Role((Role)) Case -- updates --> Account((Account)) Case -- contains --> SA[Service Activity (Event)] Case -- has --> Plan((Plan)) </pre>	
<p>Community</p> <p>A group of interacting people that share common values and/or location.</p>	<pre> graph TD Ent((Entity)) -- sub class of --> Com((Community (Entity))) </pre>	
<p>Data</p> <p>The recorded value of an attribute.</p> <p>When organised, data can be the basis of</p> <ul style="list-style-type: none"> * Information * Knowledge * Wisdom * Insight 	<pre> graph TD IR[Information Right (Right)] -- applies to --> Data((Data)) Acc((Account)) -- contains --> Data SA[Service Activity (Event)] -- creates --> Data SA -- consumes --> Data Org((Organisation (Entity))) -- governed by --> Data </pre>	
<p>Decision</p> <p>An 'Outcome' of a 'Strategy'</p>	<pre> graph TD Org((Organisation (Entity))) -- takes --> Dec((Decision)) Dec -- has --> Per1((Period)) Dec -- applies to --> Str1((Strategy)) Str1 -- has --> Del((Deliverable (Outcome))) Str1 -- applies to --> Met((Metric)) Del -- sub class of --> Out((Outcome)) Del -- has --> Per2((Period)) </pre>	

<p>Entity</p>	<p>Something that has a distinct, separate existence.</p>	
<p>Event</p>	<p>A happening, that has occurred, or is due to occur.</p>	
<p>Function</p>	<p>A collection of services that come together into a cohesive set.</p>	
<p>Legislation</p>	<p>Law which has been enacted by a governing body.</p>	
<p>Location</p>	<p>A fixed point, area, or volume</p>	

<p>Metric</p> <p>An analytical measurement intended to quantify the state of a system.</p> <p>For example</p> <ul style="list-style-type: none"> • population density" <p>Object</p> <p>A physical item.</p>			
<p>Objective</p> <p>A desired state</p>			
<p>Organisation</p> <p>A social group which distributes tasks for a collective goal.</p>			
<p>Outcome</p> <p>The changes of state to an Entity as a consequence of an event.</p>			

<p>Period</p> <p>A specified division or portion of time.</p>	
<p>Person</p> <p>A human being</p>	
<p>Plan</p> <p>A list of procedures with proposed periods and resources, used to achieve a desired outcome.</p>	
<p>Procedure</p> <p>Definition of steps and methods that would achieve an outcome.</p> <p>Procedures can be re-used in many Processes.</p>	
<p>Process</p> <p>A predefined set of Procedures, and decision points based on the outcome of each procedure.</p>	

<p>Public Sector Body</p>	<p>An organisation that is a part of the Public Sector.</p>	<pre> graph TD PSB["Public Sector Body (Organisation)"] -- sub class of --> Org["Organisation (Entity)"] </pre>
<p>Role</p>	<p>The manner in which an Entity participates in an Event.</p>	<pre> graph TD Role((Role)) Entity((Entity)) -- has --> Role Account((Account)) -- applies to --> Role Case((Case)) -- applies to --> Role Role -- participates in --> Event((Event)) Role -- has --> InfoRight["Information Right (Right)"] </pre>
<p>Service</p>	<p>The capacity to carry out a defined process.</p> <p>A service exists even if it is not accessed.</p>	<pre> graph TD Service((Service)) Agreement((Agreement)) -- applies to --> Service Case((Case)) -- applies to --> Service Rule["Service Eligibility (Rule)"] -- applies to --> Service Demand["Service Demand (Event)"] -- applies to --> Service Function((Function)) -- contains --> Service Org["Organisation (Entity)"] -- commissions --> Service Legislation((Legislation)) -- provides --> Service Legislation -- enables --> Service Process((Process)) -- contains --> Service Interface((Interface)) -- has --> Service </pre>
<p>Service Activity</p>	<p>An event that is undertaken within a Case.</p>	<pre> graph TD SA["Service Activity (Event)"] Case((Case)) -- contains --> SA Plan((Plan)) -- determines --> SA SA -- sub class of --> Event((Event)) SA -- creates --> Data((Data)) SA -- consumes --> Data SA -- implements --> Procedure((Procedure)) </pre>
<p>Service Demand</p>	<p>An event that causes a service to create a case.</p>	<pre> graph TD SD["Service Demand (Event)"] Event((Event)) -- sub class of --> SD SD -- applies to --> Service((Service)) SD -- creates --> Case((Case)) SD -- activates --> Process((Process)) </pre>

<p>Service Interface</p>	<p>The facility that enables a Service Activation.</p> <p>This may be</p> <ul style="list-style-type: none"> • A web site form • An API • A help desk • An Application Form <p>... etc</p>	
<p>Stakeholder Group</p>	<p>A segmentation defining groups of people or organisations, who affect or can be affected by an organization's actions.</p>	
<p>State</p>	<p>A circumstance or condition of an Entity at a given Period.</p>	
<p>Strategy</p>	<p>A plan chosen to bring about a desired outcome or objective.</p>	

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