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Week 5a Requirements Analysis: Recap

CSIT985

Strategic Network Design

Overview

Summary – where are we heading?

- Requirements Mapping
- Requirements Specification
- Best effort Predictable and Guaranteed Performance
- Flow specification

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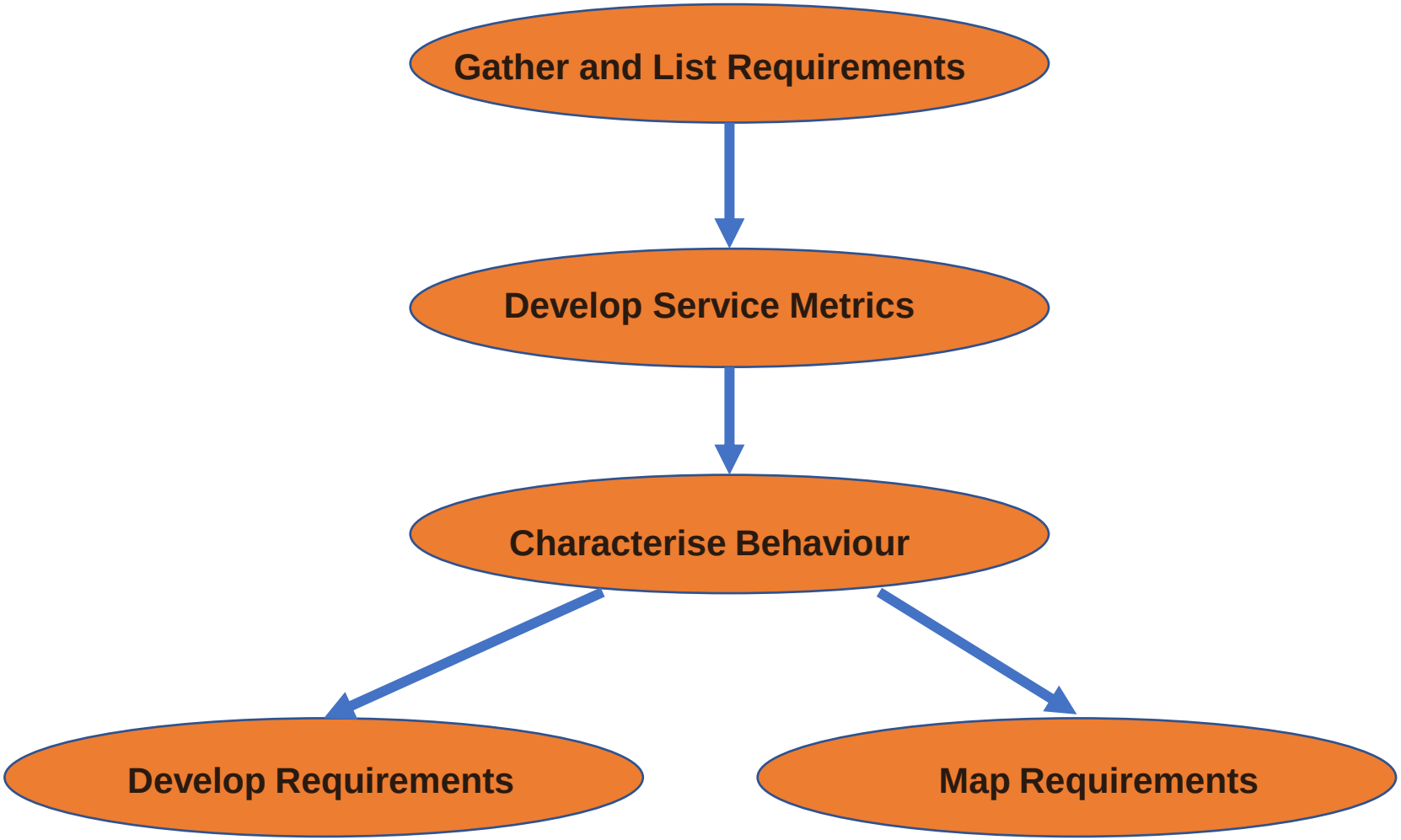
Requirement Analysis Process



Requirements Specification

- Requirements specification and map include the results of the analysis process.
- The first part of the process is determining any initial conditions for the project. This includes the type of network project, scope of the project, project goals, and political, administrative, and financial forces acting on the project.
- Part of the initial conditions of the project may be determining whether the network is single-tier or multi-tier performance.
- We would also do a rapid, initial evaluation of the problems in the network, if any, and estimate resources and schedule.

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Requirements Specification

Before we gather any requirements for the network, we should have some or all of this information documented.

Consider an example of building a network. The first part of the requirements specification may look like:

Requirements Specification	
Section 1—Initial Conditions	
Project Type	Upgrade of building network
Project Scope	Single building, two floors, approximately 150 users
Project Goals	Improve performance to all users, particularly some mission-critical applications, and increase security to Internet
Other Conditions	Financial TBD
Problem Evaluation and Definition	Application performance has been a recurring problem, so management wants to upgrade network and has suggested upgrading interfaces to Fast Ethernet. Some users have GigE interfaces on their workstations.

Template for initial conditions

TBD: To Be Determined

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Requirements Specification

The second part of the requirements specification includes the gathered and derived requirements for the network.

Requirements Specification							
Section 2—Listing of Requirements							
ID/Name	**Date**	**Type**	**Description**	**Gathered/**	**Locations**	**Status**	**Priority**
1	14Jan03	User	User distribution is 60 engineers, 15 HR and Finance, 30 Manufacturing, 10 Management, 30 Sales/Marketing, 5 Other.	Gathered from Management	TBD	Info	TBD
2	14Jan03	Network	Each area of the building must support Fast Ethernet connections to the backbone.	Gathered from Management	TBD	TBD	TBD
3	14Jan03	Application	Database, Visualization, Manufacturing, and Payroll applications are considered mission-critical for this company. More information needed.	Gathered from Management	TBD	TBD	TBD
4	14Jan03	Application	Payroll application (PAY1) requires 100% uptime (while in operation) between finance and outside payroll company.	Gathered from Management	TBD	TBD	TBD
5	14Jan03	Network	Company must be kept secure from Internet attacks.	Gathered from Management	TBD	TBD	TBD

Requirements gathered from initial meeting with customer


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Requirements Specification

- Requirements can't always be gathered from early meetings.
- To get requirements from users, we usually ask them questions about their environment. For this example, a questionnaire was developed and sent to all employees of the company.
- An example of such a questionnaire is:

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Template for questionnaire

1. **List applications that you use**	**How often? (times per day)**	**How long each time?**
Application 1 -		
Application 2 -		
Application 3 -		
Application 4 -		
Application 5 -		
2. **List computers or other devices that you use that are connected to network**	**Network interface**	**Operating system**
Device 1 (Desktop/Laptop) -		
Device 2 -		
3. **Have you experienced any problems with the network? If so, please give a brief description of each problem**		
Problems -		
4. **What capabilities would you like to see in the network (performance, features)**		
Performance - Features - Other -		
5. **Do you have any issues or problems with security? If so, please give a brief description of each problem.**		
Security Problems -		
6. **Any other suggestions, issues, or comments?**		
Suggestions/ Issues/ Comments		

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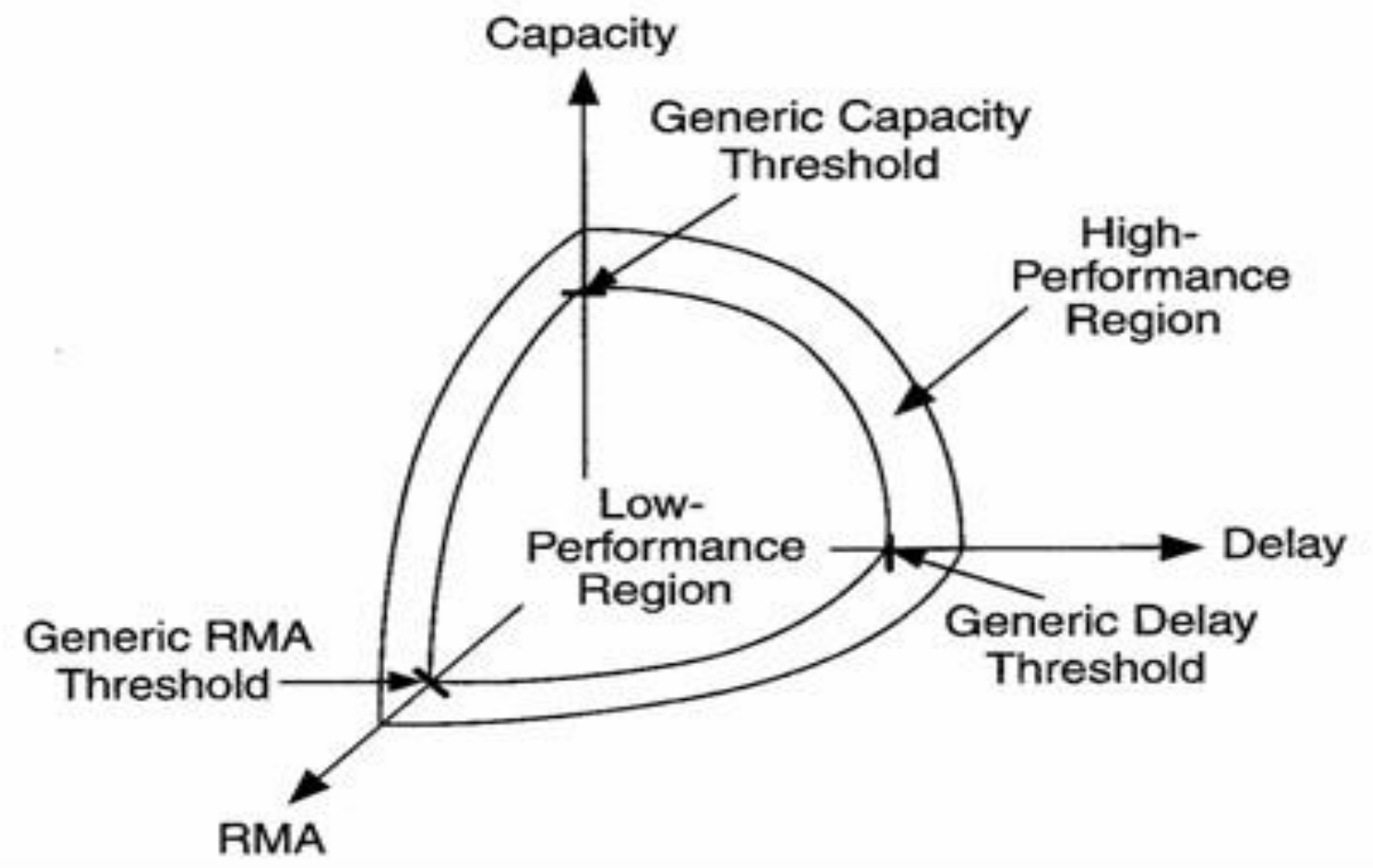
Summarising information for management



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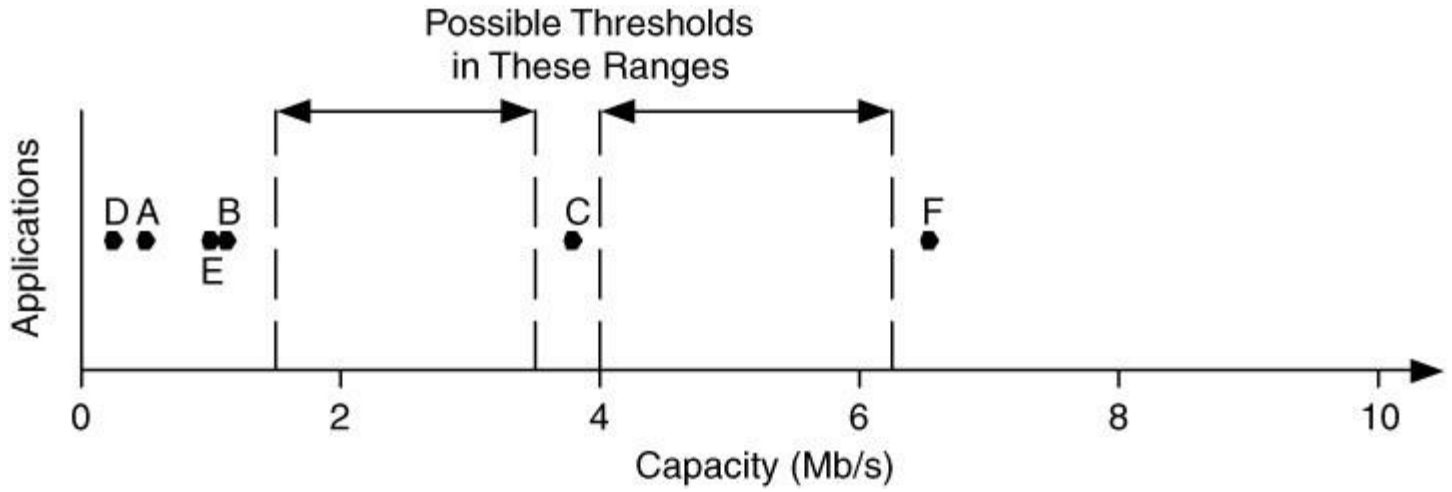
Environment-specific thresholds

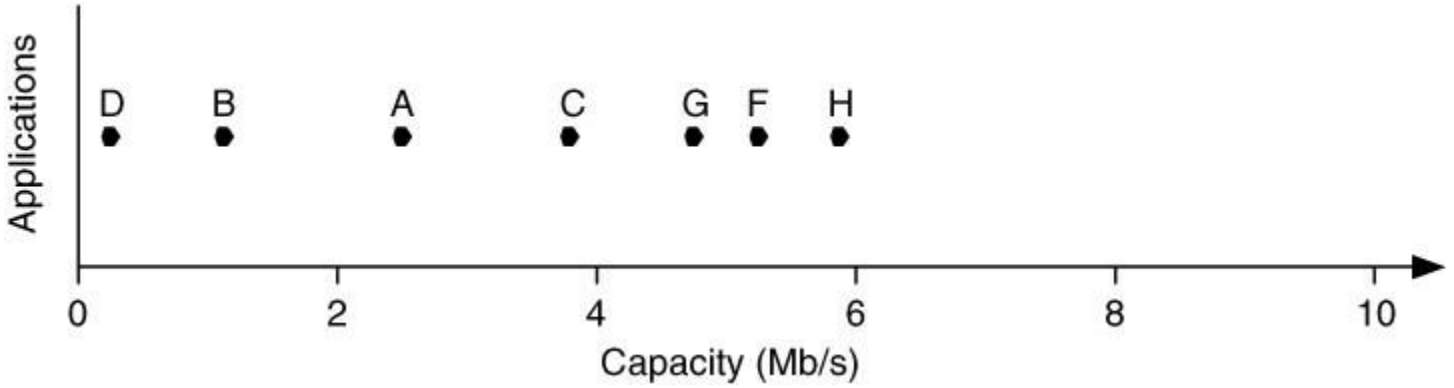
Comparing Application Characteristics

- If application characteristics can be grouped, then we can compare to determine thresholds



Comparing Application Characteristics

- The threshold settings may be arbitrary
  - Particularly if applications form a continuous range of delay



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Service Requests and Requirements

- Best effort service – there is no control over how the network will satisfy the service request
- Predictable service are traffic flows that require support are identified:
  - ① rate critical
  - ② delay critical
  - ③ mission critical
  - ④ other important requirement (e.g. political)

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Service Requests and Requirements

- Guaranteed services are one step up from predictable – they have accountability built into it
- Guaranteed services are usually defined in a Service Level Agreement (SLA)

① What the performance requirements are

② When and where they apply

③ How they will be measured and verified

④ What happens when a requirement is not met

Flow Specification

- Three types
  - One part (unitary)
    - All flows are best effort
  - Two part
    - Contains flows that have predictable requirements
    - May contain best-effort flows
  - Multi part
    - Flows that have guaranteed requirements
    - May contain predictable and best-effort

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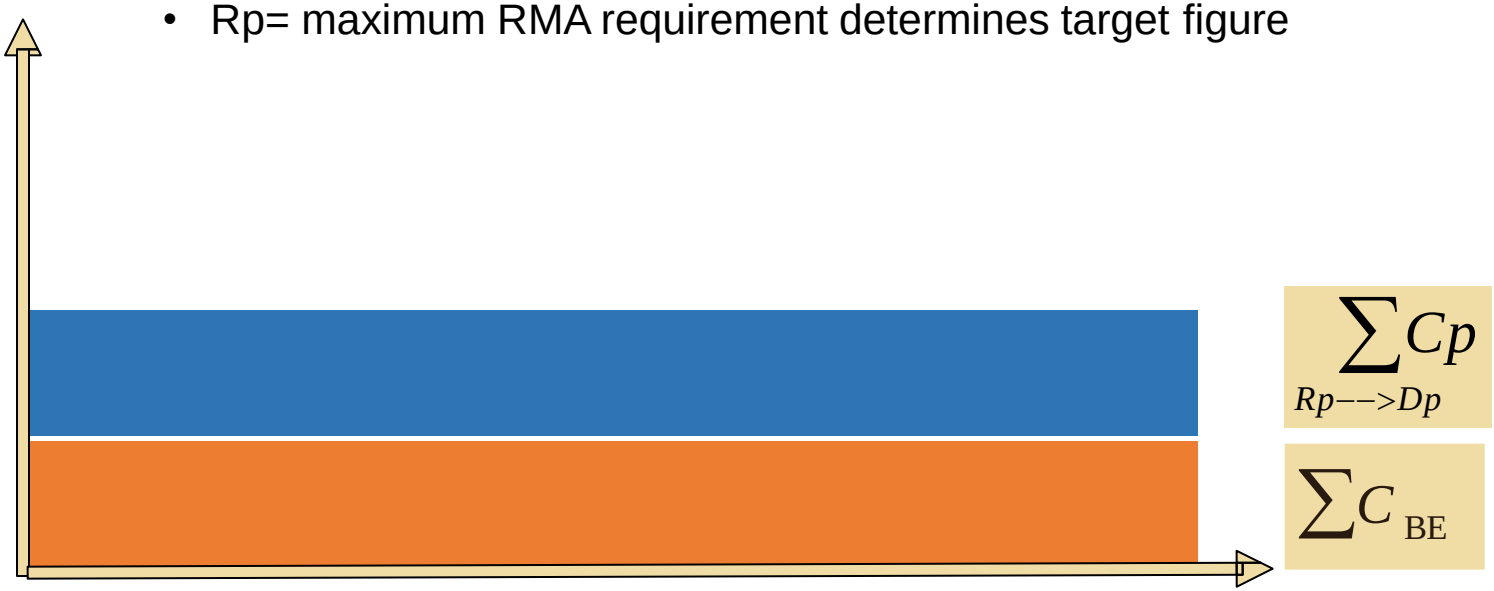
Flowspec algorithm

- For one part flowspecs
  - Capacities of flows are combined

Application Set	Performance Requirements		
	Capacity	Reliability	Delay
Application Set 1:			
Application 1	150 Kb/s	N/A	N/A
Application 2	200 Kb/s	N/A	N/A
Application 3	90 Kb/s	N/A	N/A
Application 4	120 Kb/s	N/A	N/A
Application Set 2:			
Application 1	75 Kb/s	99.999%	N/A
Application 2	150 Kb/s	N/A	N/A
Application 3	250 Kb/s	99.999%	N/A
Application 4	200 Kb/s	N/A	N/A
Application Set 3:			
Application 1	1.1 Mb/s	99.95%	40 ms
Application 2	800 Kb/s	N/A	N/A
Application 3	950 Kb/s	N/A	100 ms
Application 4	120 Kb/s	N/A	N/A

Flowspec algorithm

- For two part flowspecs
  - Capacities of flows are combined
  - Predictable capacities, delays and RMA are added
    - Goal is to maximise each requirement
    - Cp= capacity required for predictable flows
    - Dp= minimum delay requirement determines target figure
    - Rp= maximum RMA requirement determines target figure



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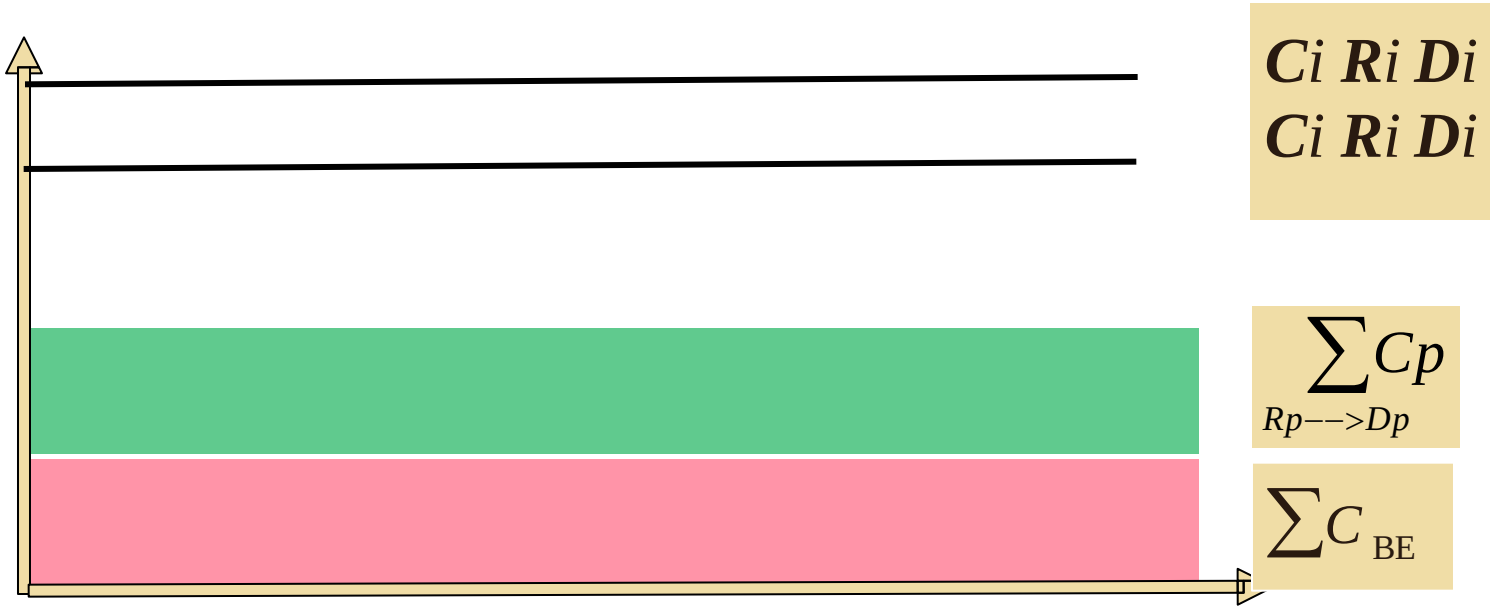
Flowspec algorithm

- For multi part flowspecs
  - Guaranteed requirements are added
    - Each flow is listed individually (Ci, Ri, Di)



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Best effort

Predictable

Guaranteed