Canada School
of Public Service

École de la fonction
publique du Canada

A Primer on Digital Terms & Concepts

Canada

Purpose:

- Provide a reference of key digital terms
- Illustrate their interdependence
- Define select terms

What you need to know: Frame for categorizing key terms

Foundations of digital

- The basics of technology / **Slide 5**

- There are **business practices** that were born in the digital sphere / **Slide 6**
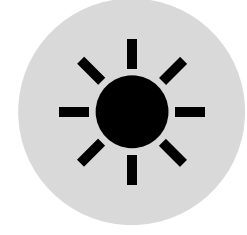
Creation of digital products and services

- **To design with users** and implement digital technologies and services well is to understand and respond to 'user' needs / **Slide 7**

- **Development** is the process of creating, designing, deploying and supporting software / **Slide 8**

- **Cyber security** is the practice of protecting systems, networks, and programs from digital incursions / **Slide 9**

Administration of digital products and services

- **Data** is essential for powering new technologies, with new collection and analytical techniques providing powerful insights / **Slide 10**

- **Cloud** plays an important role in quickly scaling the adoption of tech tools, and the amount of data that can be processed / **Slide 11**

- **DevOps** is a software development process that focuses on helping development, operations, and quality teams understand each other and collaborate better / **Slide 12**

Emerging digital products and services

- Massive amounts of data can be processed by **Artificial Intelligence (AI)** to identify patterns and generate predictions and content, and improve over time / **Slide 13**

- Characterized by speed, scale, and complexity, **emerging technologies** must be continuously monitored and analyzed as they create possibilities, risks, and policy questions for governments / **Slide 14**

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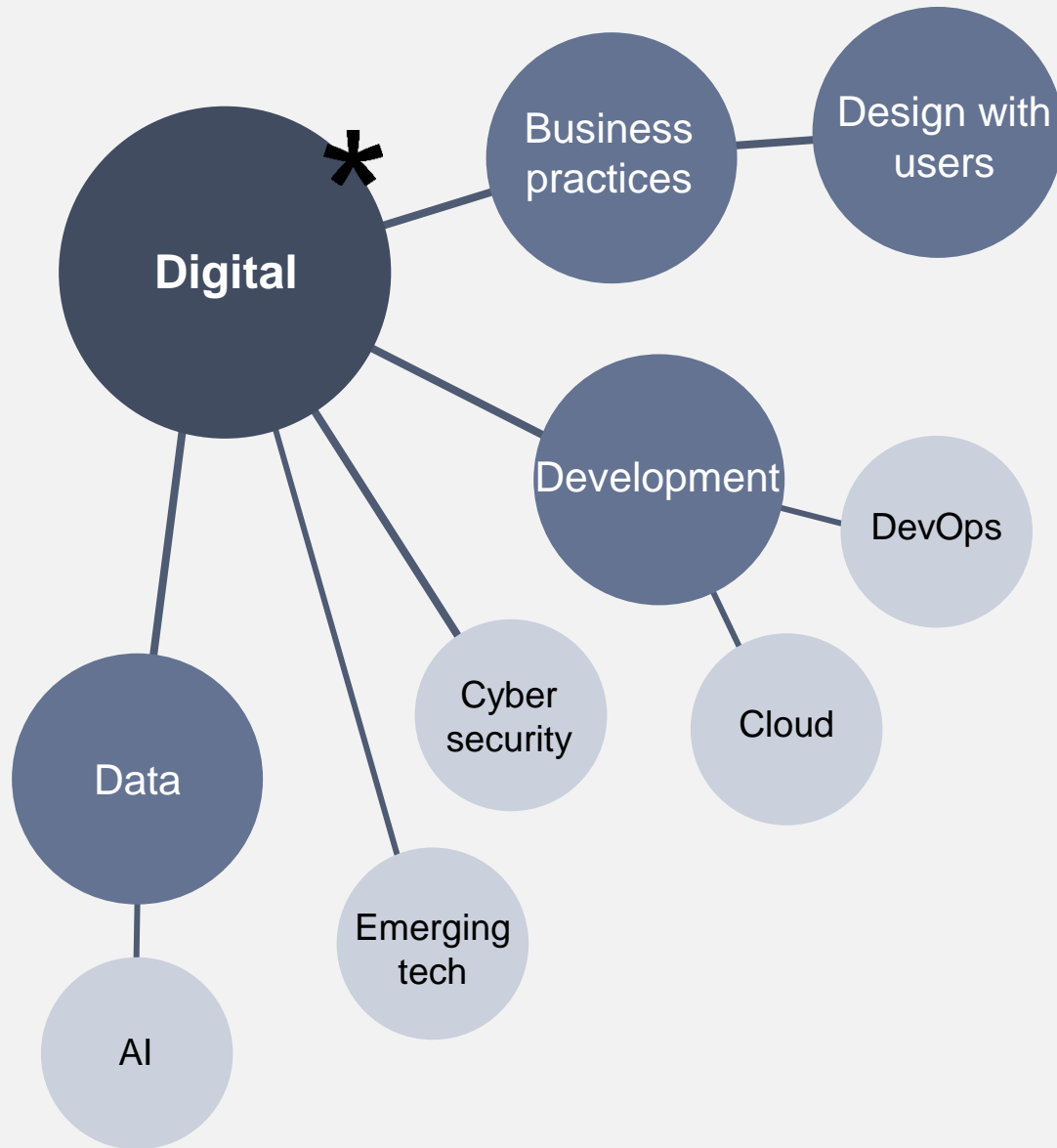
*Starred concepts are defined terms

Digital is "applying the culture, processes, business models and technologies of the internet era to respond to people's raised expectations…" (Tom Loosemore, Partner at Public Digital, co-founder UK Government Digital Service.)

Digital, in this way, is a much more expansive term than *technology*, covering ways of working, mindsets, and proven and promising approaches to modern government.
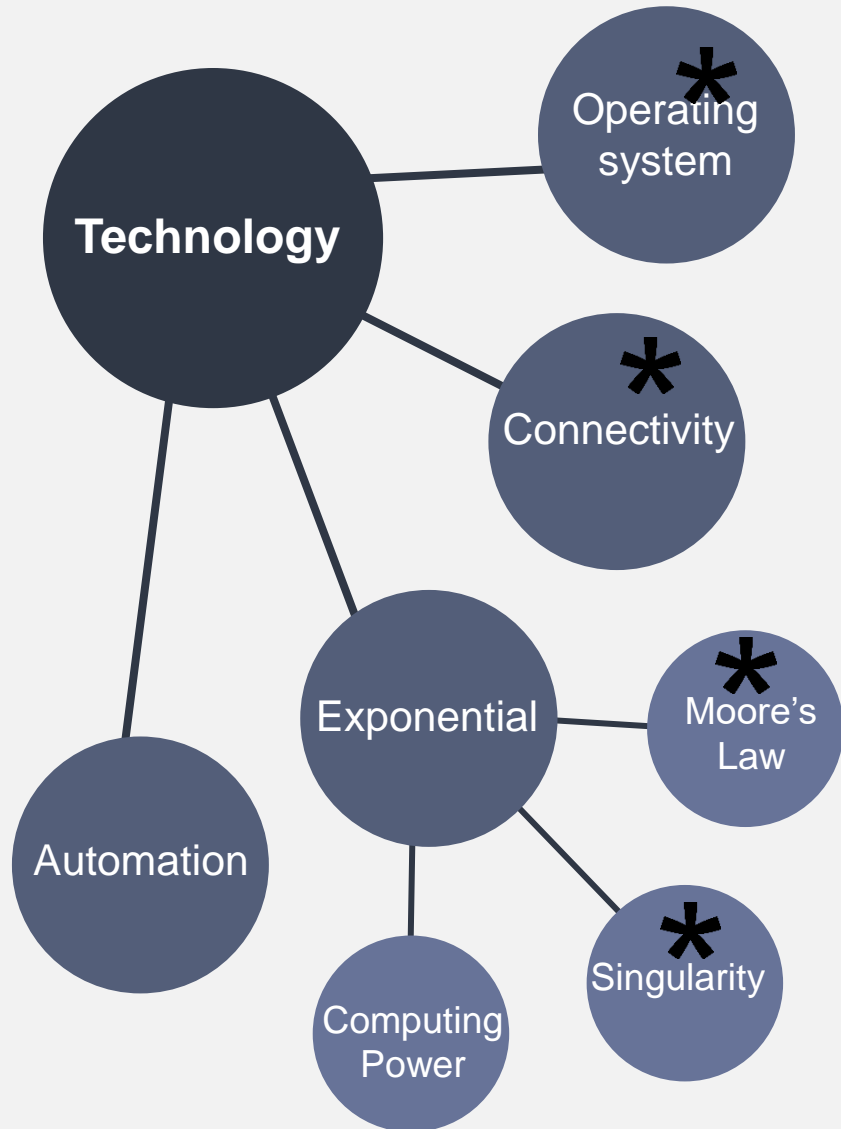
The Government of Canada's **Digital Ambition** defines the goal as "to enable delivery of government in the digital age for all Canadians. This will be done by providing modernized and accessible tools to support service delivery that expresses the best of Canada in the digital space."

Related:

- *Policy on Service and Digital*
- Digital Standards

*Starred concepts are defined terms

- An **operating system** is the primary software that manages a computer's hardware and the user's software applications (Example: Microsoft Windows).

- **Connectivity** refers to the ability of a computer to connect to other computers or to the internet.

- **Moore's Law** states that we can expect the speed and capability of our computers ('computing power') to double every couple of years at a significantly decreased cost.

- **Singularity** is the theory that the pace of technological change will be so rapid and its impact so deep that human life will be irreversibly transformed.

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Digital business practices are flexible and adaptable
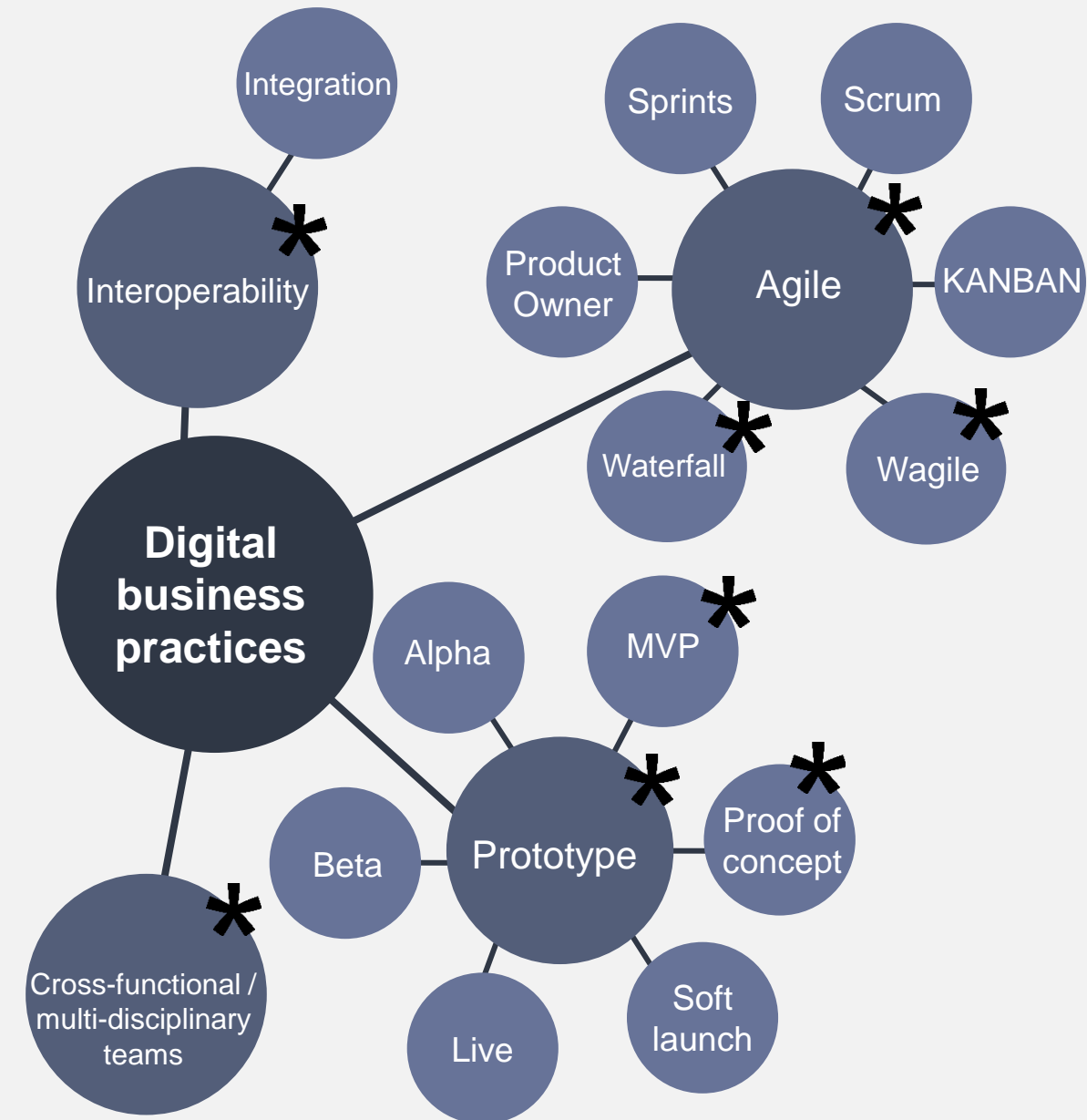
Interoperability is having unrestricted sharing of resources between different systems. This is especially important when it comes to designing new technologies that can work with old technologies.

An **Agile** approach focuses on iterating quickly, incorporating and learning from user feedback continuously through testing.

A **waterfall** approach tends towards more major software releases through phases of requirements elicitation and project gating, with acceptance criteria being satisfied before moving to the next phase.

"Wagile" is trying to get the best of both worlds – Agile and waterfall – or trying to do Agile in a constrained environment. Is sometimes used negatively and sometimes used to describe a pragmatic compromise.

Prototype is a working interactive model of several aspects of an end product that gives an idea of the design, navigation and layout. It allows developers to test the product's design, usability and functionality.

Minimum Viable Product (MVP) is a development technique in which a new product or website is developed with sufficient features to get user feedback to avoid creating something they won't use.

Proof of concept is a demonstration to verify that concepts have the potential for real-world application and is likely to be adopted by its intended users.

Cross-functional or multi-disciplinary teams are a best practice, connecting policy / service or business / IT teams directly to work towards an outcome.

*Starred concepts are defined terms

Designing based on user needs and feedback
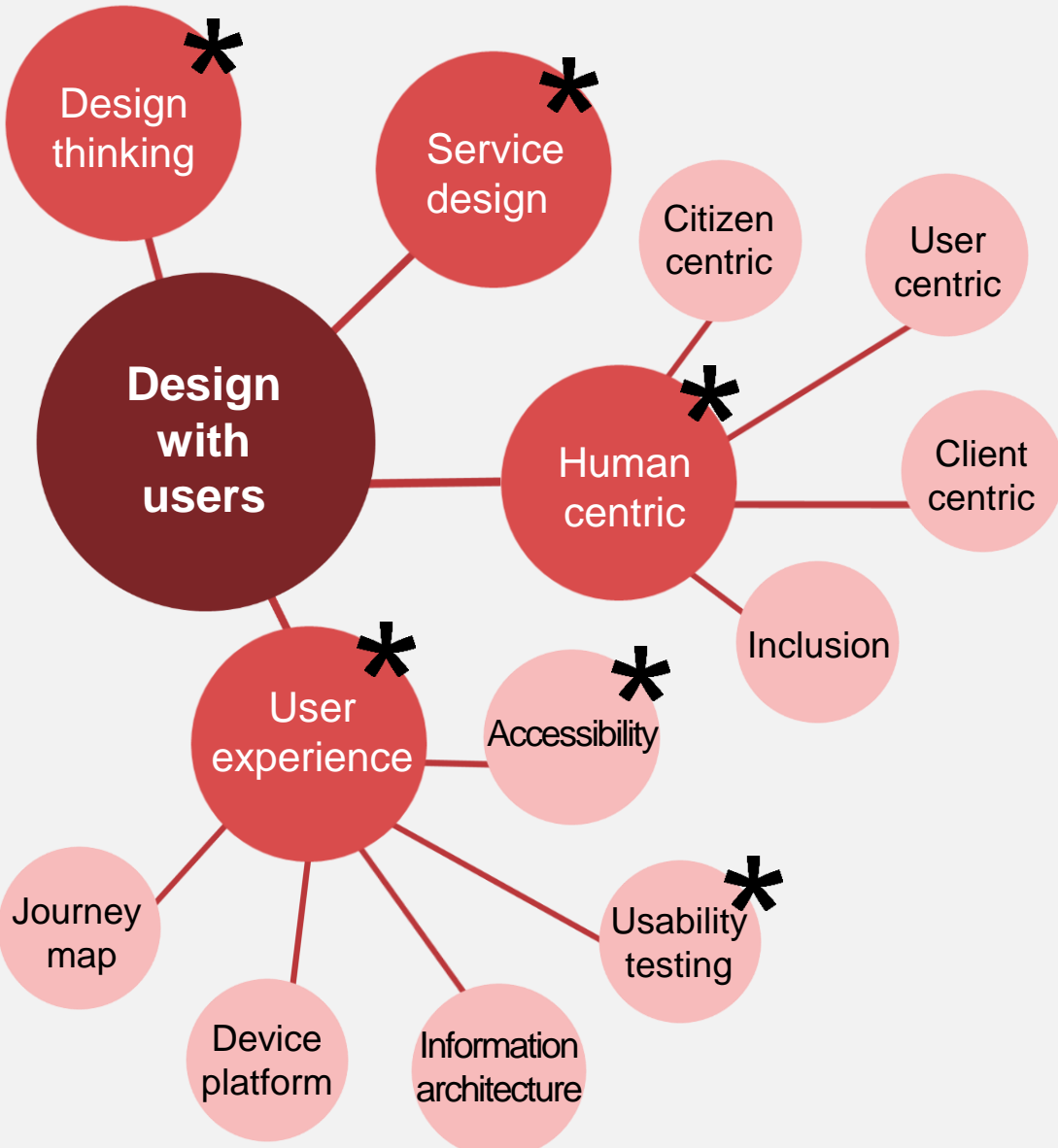
Design thinking is a structured process for navigating complex problems through problem framing, research, prototyping, and testing to enable learning over time. Experimentation, digital, and innovation are all served by these same principles.

Service design is the activity of planning and organizing people, infrastructure, communication, and material components of a service to improve its quality and useability. It also refers to an emerging and needed field of work in government.

Human centric design puts the people served by government at the centre of the design and development process to maximize useability and the achievement of the policy and program goal.

User Experience (UX) describes the emotions, attitudes, and ease-of-use a person has when using a product or service. It also refers to the field of professionals with the skills and techniques that enable governments to improve UX.

Accessibility refers to the design of products and environments for people with disabilities.

Usability testing is a method used to evaluate how easy a product or service is to use. The tests take place with real users to measure how 'usable' or 'intuitive' it is.

*Starred concepts are defined terms

Creation
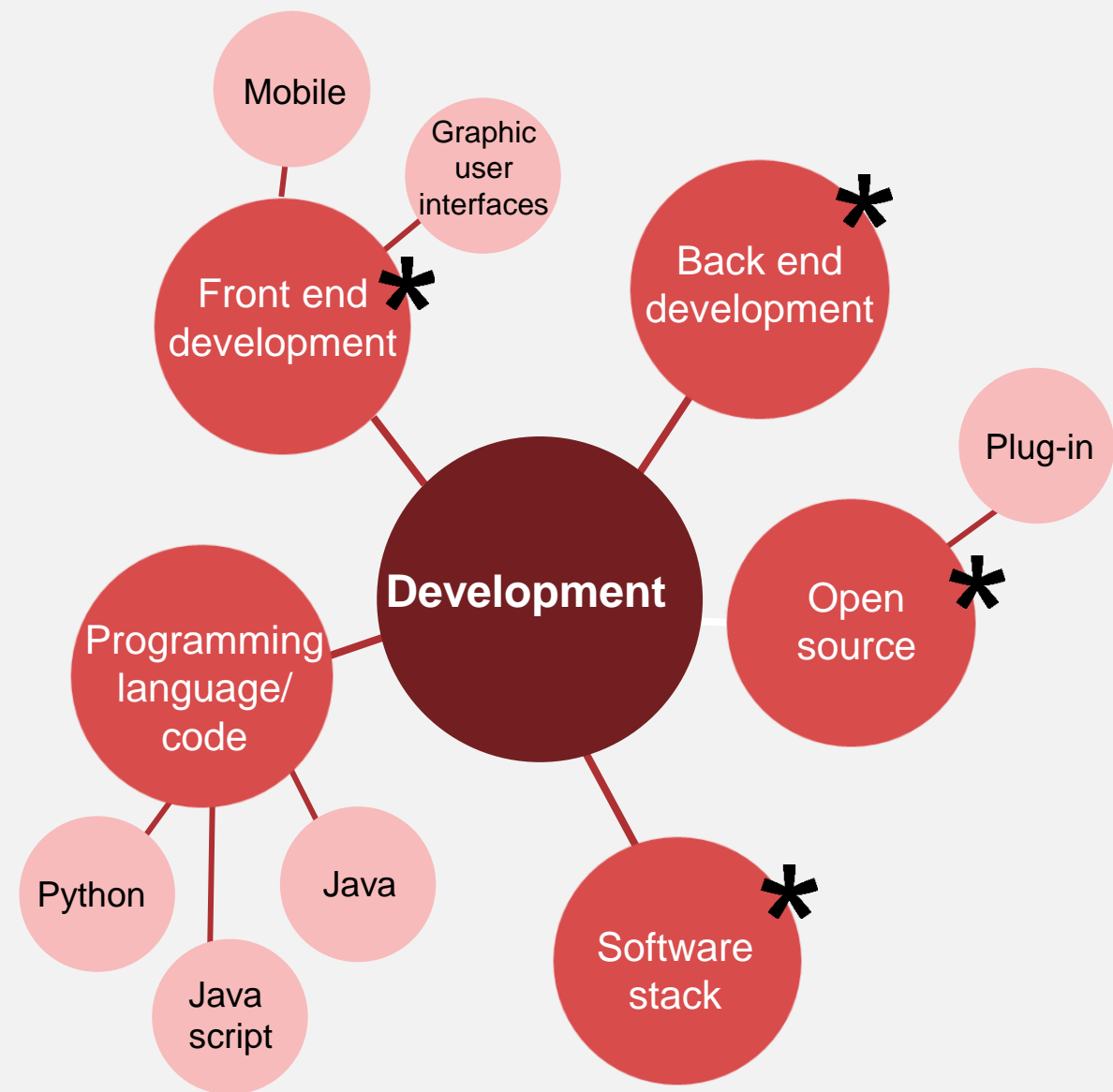
Front-end development describes all the parts of a website or service that can be seen and interacted with by users. Front end web development usually involves coding.

Back-end development refers to the "under the hood" part of a website or service that makes it run (this includes applications, web servers, and databases), and is typically not visible to the user interacting with the site or service.

Open source software is openly shared through code repositories to enable collaboration, sharing, transparency, and external review for quality, functionality, and security.

A **software stack** is a set of components that work together to support the execution of an application. The components may include an operating system, server, databases, one or multiple programming languages, content management systems, and the application layer (or front end) that users see. May also be referred to as a technology stack, though that may include hardware as well.

*Starred concepts are defined terms

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# Cyber security: protecting systems, networks, and programs from digital incursions
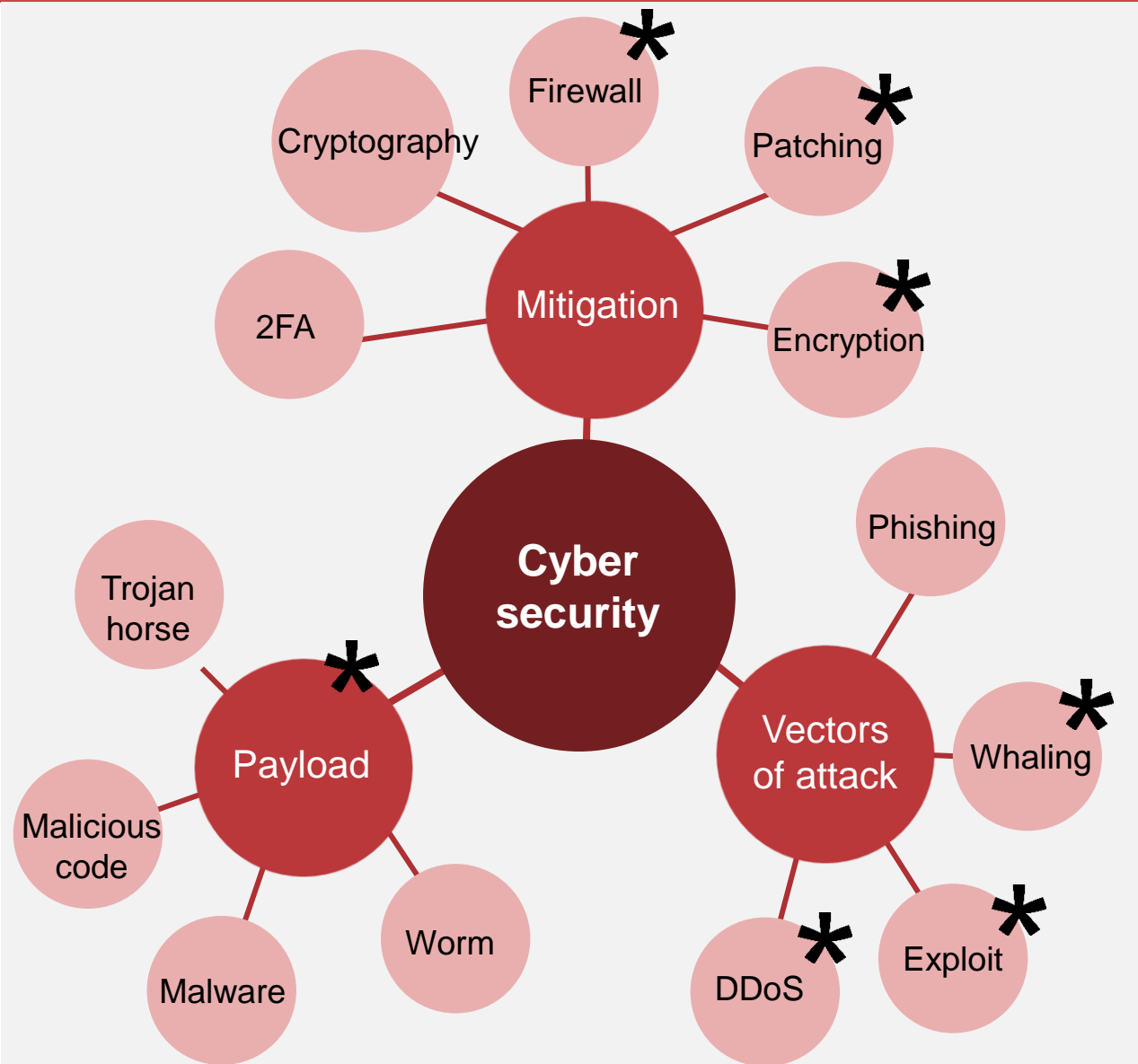
Firewall is the first line of defense. Firewalls monitor inbound and outbound network traffic and determine whether or not to allow the traffic through based on a user-defined set of security standards.

Patching is software that an organization issues when a security flaw is uncovered. Just like the name implies, the patch covers the hole, keeping hackers from further exploiting the flaw.

Encryption is a mathematical function that protects information by making it unreadable by everyone except those with the key to decode it.

Whaling is a specific type of phishing attack that targets high-profile employees, such as the CEO or CFO, to steal sensitive information from a company

An **Exploit** is a vulnerability a computer system offers to intruders, or the use thereof. (For example, a failure to install a patch for a given problem exposes the user to a computer exploit and the possibility of a security breach.)

Distributed Denial of Service (DDoS) is a method of overloading a website with traffic to prevent it from functioning.

Payload is the data received by the destination system.

*Underlined concepts are defined terms

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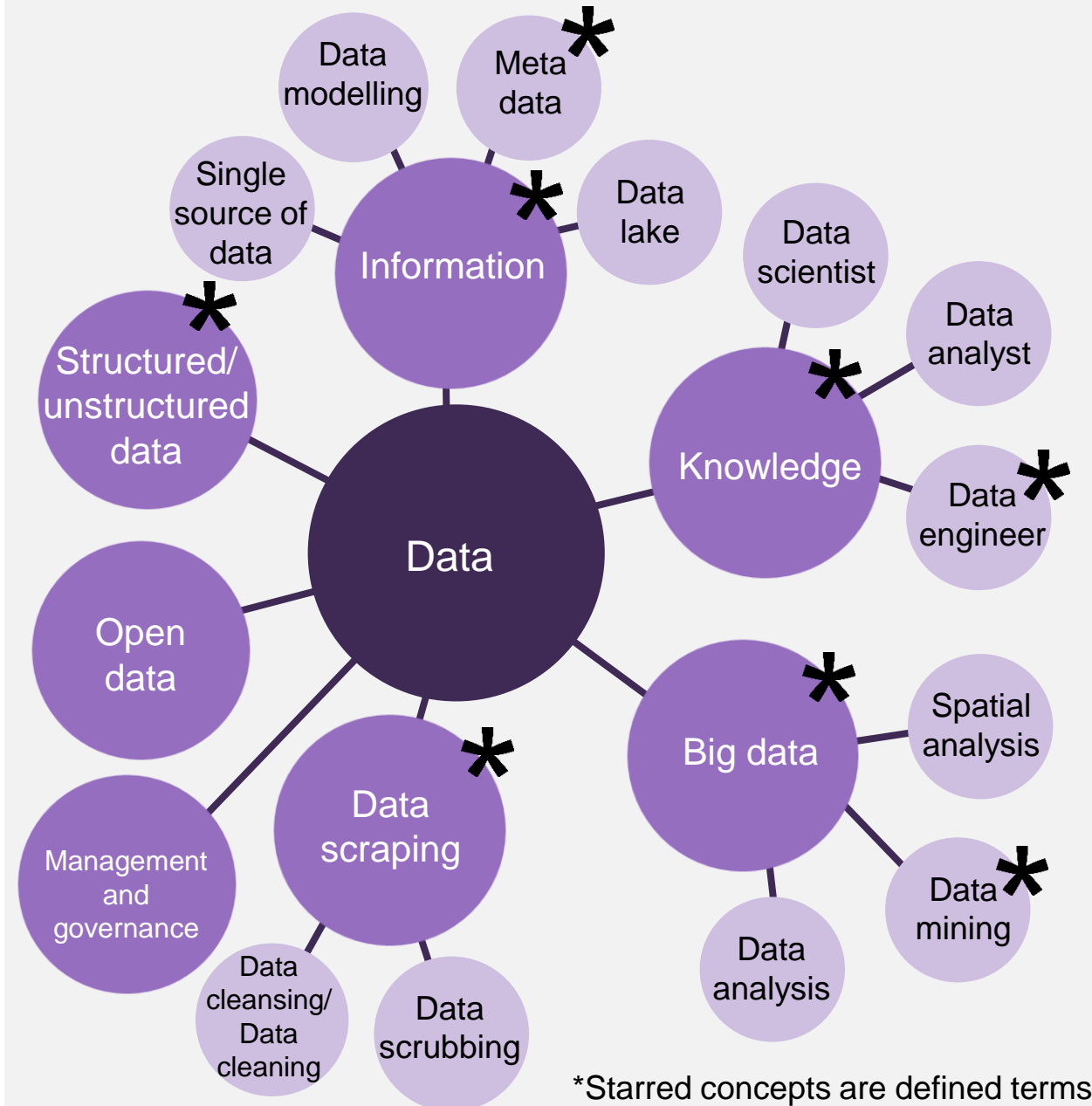
Information is data interpreted to mean something to the user.

Metadata is data about data, such as the source, format, size, date of creation, language, and more.

Knowledge is information (from data) plus insight. It is information processed in the mind of the individual.

Data engineers build pipelines that prepare and transform data for data scientists.

Big Data refers to the collection, storage, analysis and interpretation of huge amounts of data of different types (such as transaction data, incoming sensor data, social media feeds etc.)

Data mining is the practice of examining large amounts of data in user databases and websites to find patterns, behaviours, and relationships.

Data scraping (aka web scraping) is one of the most efficient ways of importing information from a website into a file saved on your computer.

Structured data refers to data in a traditional row-column tabular format (dataset). **Unstructured data** is in a non-tabular form (e.g. voice, email, pdf) and requires either data cleansing or Natural Language Processing (NLP) for analysis.

*Starred concepts are defined terms

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# Cloud is the delivery of computing services over the internet
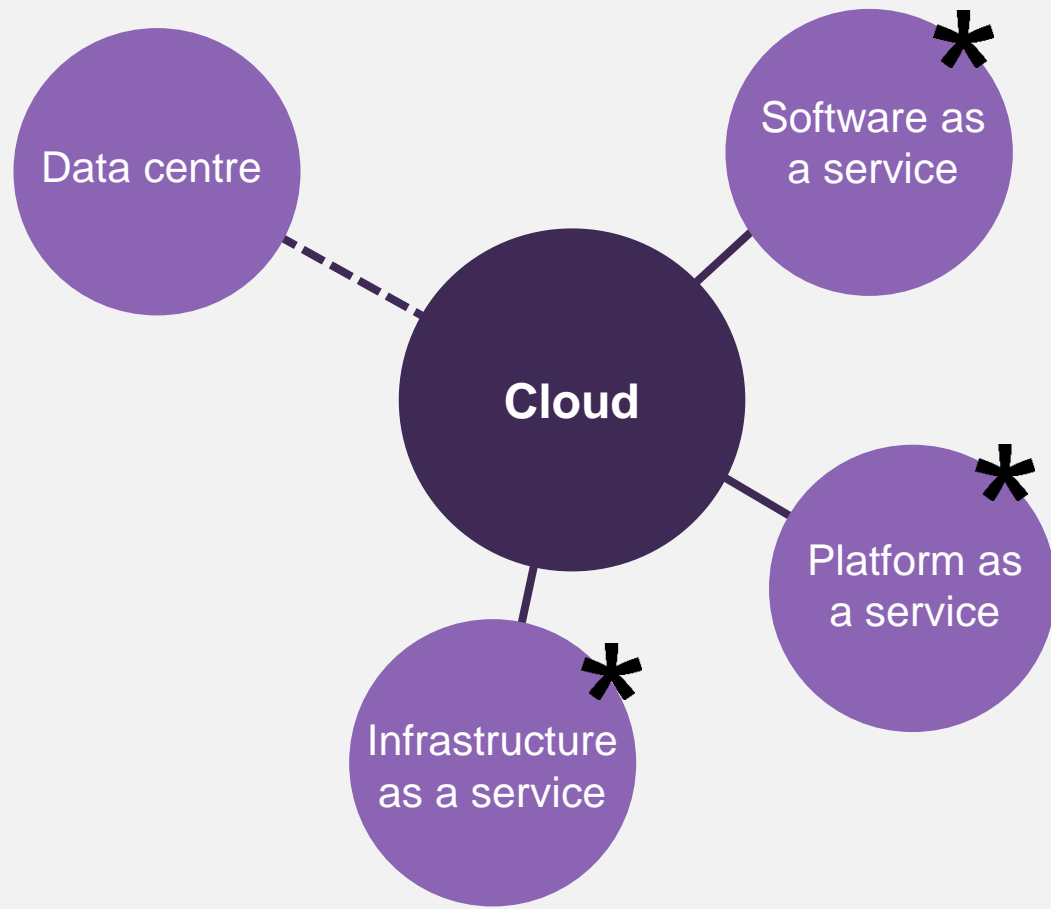
Software as a service (SaaS) is also known as "software on demand" and is a way of delivering software via the Internet. SaaS is usually paid for on a monthly basis, making it more affordable than other software options.

Platform as a service (PaaS) is a framework for developers that they can build upon and use to create customized applications. It enables developers to develop, run, and manage business applications without the need to build and maintain the infrastructure that software development processes typically require.

Infrastructure as a service (IaaS) is a service that offers companies use of a basic computing platform. This often includes simply the hardware and virtual machine, or hardware and operating system.

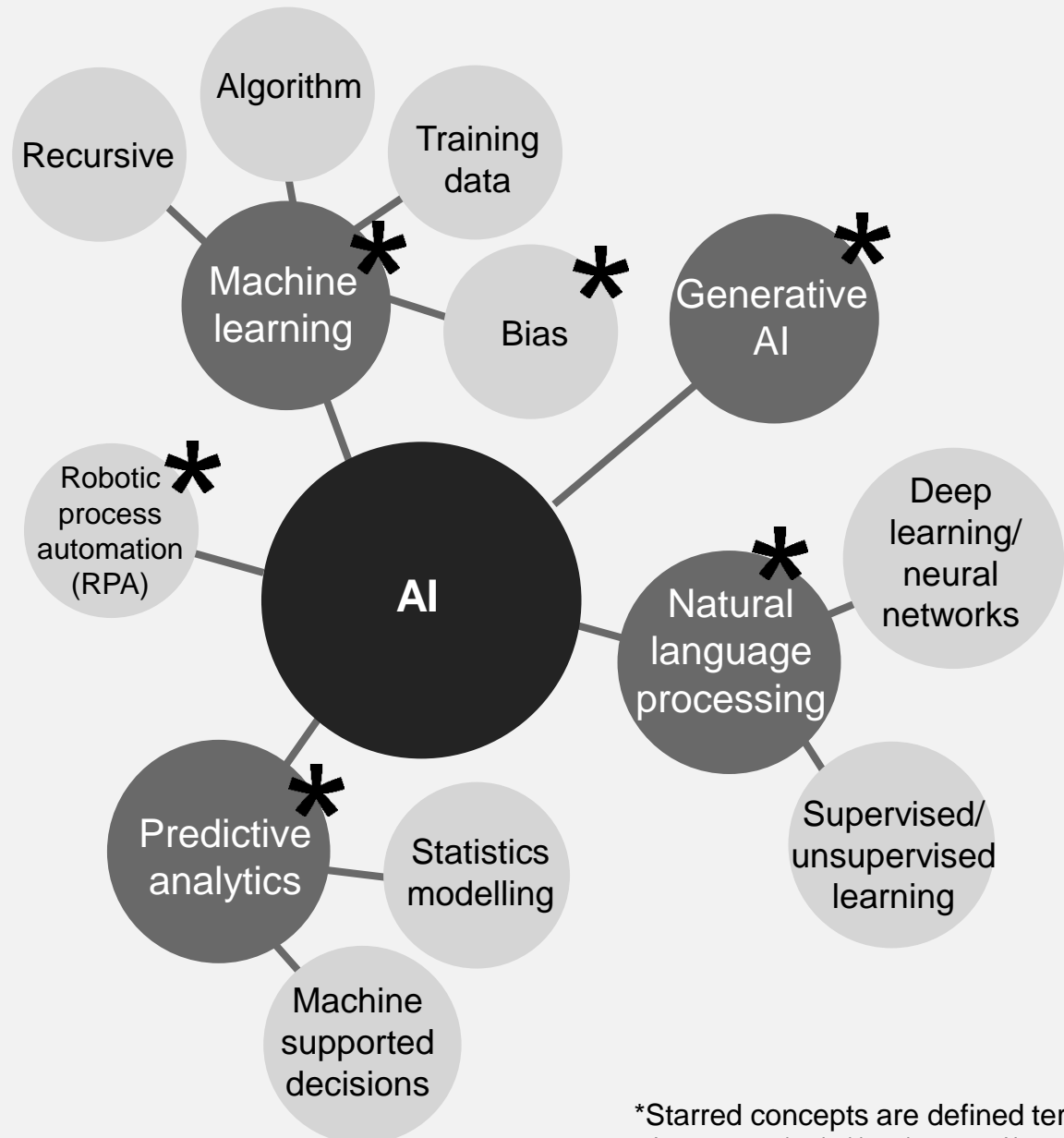*Starred concepts are defined terms

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Development Operations (DevOps) aims to improve collaboration between development and operations teams
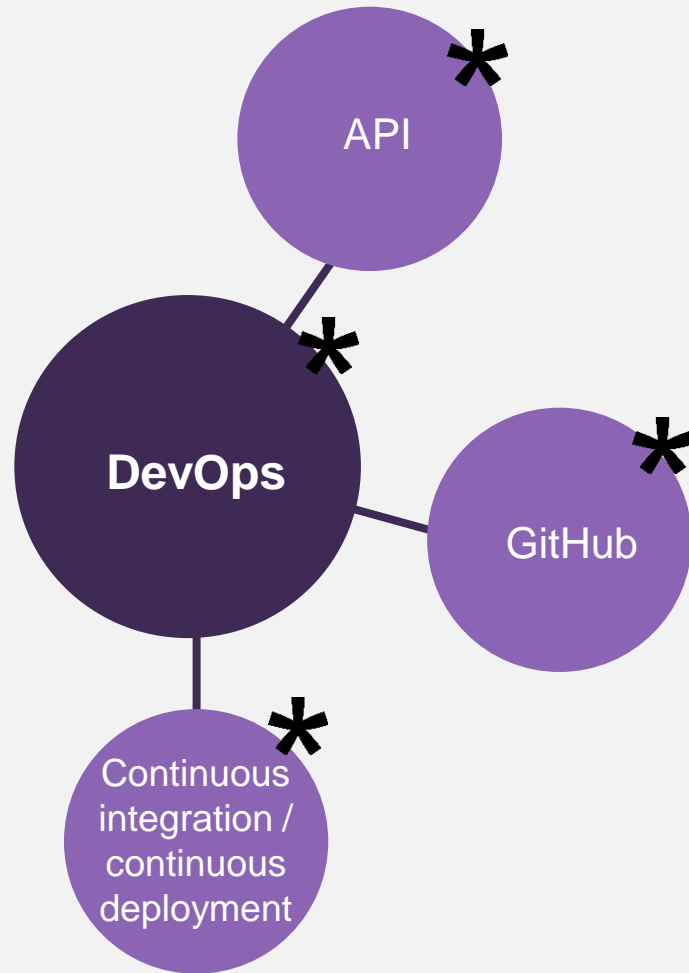
DevOps is a set of software development practices that combines software development (Dev) and information-technology operations (Ops) to shorten the development life cycle to deliver features, fixes, and updates in close alignment with business objectives. Often combined with security ("DevSecOps").

An **Application Programming Interface (API)** is a set of commands, functions, protocols, and objects that programmers can use to create software or interact with an external system. It helps different components of software work together (e.g. the Google Maps API allows developers to embed Google maps on web pages).

GitHub is an open source code management tool that allows developers to manage, and collaborate on, projects.

Continuous integration / continuous deployment (CI/CD) is a process and practice of frequently (usually daily, or even multiple times per day) deploying code changes into production, including the governance, dependencies checks, and security requirements in the process. Some elements are automated.
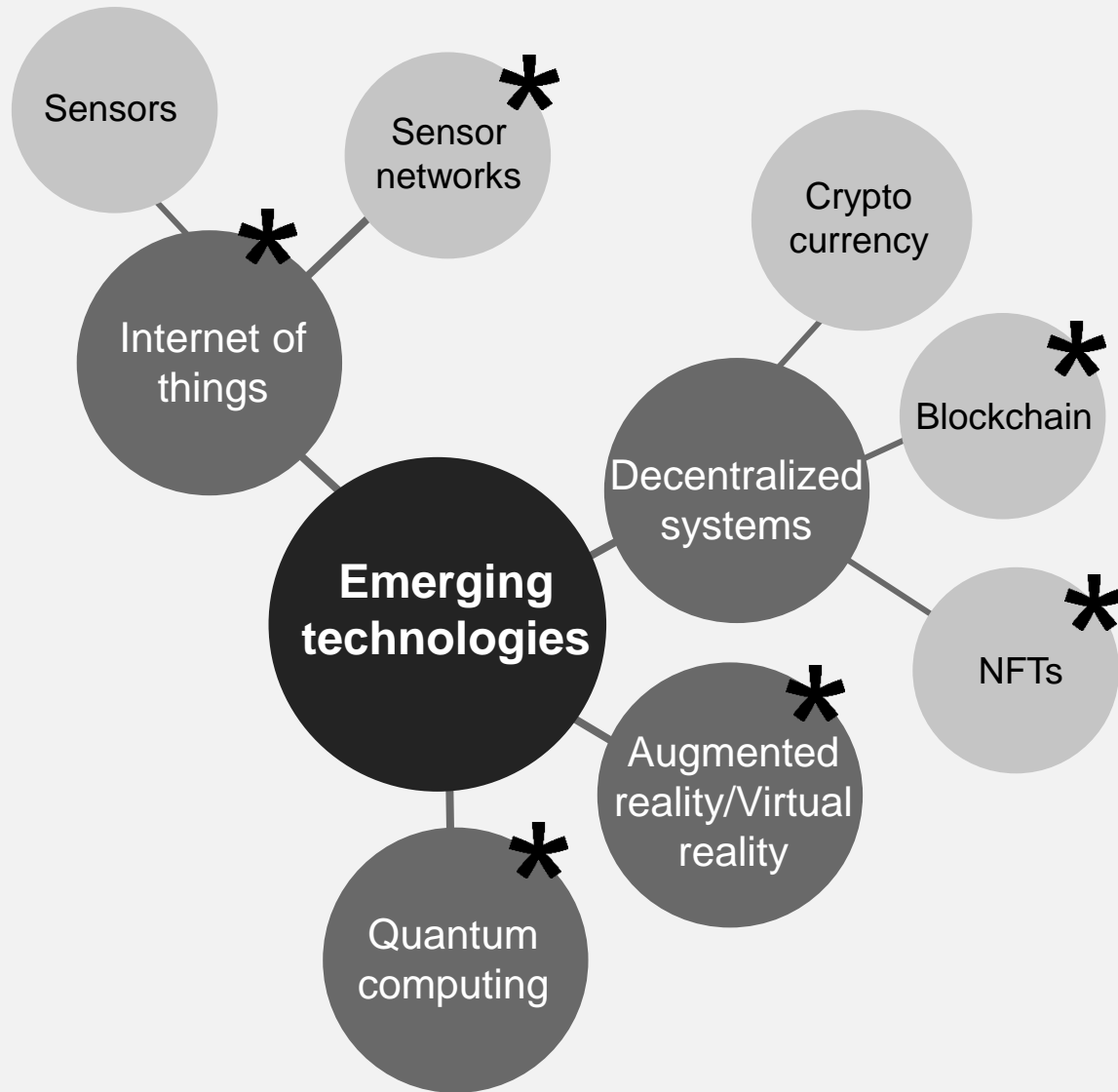
API

DevOps

GitHub

Continuous integration / continuous deployment

*Starred concepts are defined terms

Artificial Intelligence (AI) is a system that generates outputs based on sophisticated statistical analysis of input data

A subset of AI, **Machine Learning** is the use of algorithms to help machines "learn" new information without having to be programmed. Machine learning guides things like the product recommendations a user gets based on past purchases.

Algorithmic **bias** describes systematic and repeatable errors in a computer system that can create unfair outcomes, such as privileging one arbitrary group of users over others.

Data **bias** refers to how even well-designed models, if trained on or provided with biased data, will generate biased outputs.

Natural Language Processing (NLP) is a related field to AI. It allows machines to understand and analyze human language.

Predictive analytics uses statistical models and forecasting techniques to understand the future. It provides insights about the likelihood of a future outcome.

Robotic process automation (RPA) uses automation technologies, scripts, and rules to fulfill administrative tasks such as inputting data, digitizing forms, and connecting data sources.

Generative AI accepts natural language and other media prompts to generate new content (text, images, audio, or other forms of data) that is statistically probable in response to a prompt.

*Starred concepts are defined terms

A separate product in this series covers AI more fully

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Emerging technologies change the technology, society, and policy environment

Sensors

Sensor networks *

Internet of things *

Crypto currency

Blockchain *

Decentralized systems

Emerging technologies

NFTs *

Augmented reality/Virtual reality *

Quantum computing *

*Starred concepts are defined terms

- **Internet of Things (IoT)** refers to physical objects with built-in technology that are connected via the Internet.

- **Sensor Networks** are a large collection of sensors that can individually gather and send data and may or may not be connected to the internet.

- **Blockchain** is a distributed ledger spread across the internet among all peers in the network. With no central authority it is open for anyone and everyone to see.

- **Augmented reality** is where the user sees computer-generated pictures, sound and other data overlaying the actual physical reality (e.g. IKEA's app that allows the user to check whether there is space for a couch in their living room).

- **Virtual reality** refers to computer-generated 3D experiences and environments that users view and interact with.

- **Quantum computing** refers to a leap forward in computing capability, enabled by quantum technology, that comes with both opportunities and security implications.

- **Non-fungible tokens (NFTs)** are blockchain-based certificates that attest that a digital "object" is unique and/or an original.

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Resources

TBS Policy Suite:

1. **Policy on Service and Digital:** Authority for the Chief Information Officer of Canada to support workforce capacity and capability of the digital functional community: increasing digital skills is one of many ways to increase capacity.

2. **Canada's Digital Ambition:** A digital government-wide goal; all of which rely on some aspect of digital skills: technology and operations; data-enabled services and program; action-ready policy; and funding, talent and culture.

3. **GC Digital Standards:** The digital skills and associated learning and development opportunities for all public servants, executives, and managers must be aligned and build off the GC Digital Standards.

4. **2023–2026 Data Strategy for the Federal Public Service:** The Strategy outlines the current policy landscape that relates to data, describes a long-term strategic vision, and identifies actions over the next three years that will move the public service closer to that goal.

Learning

Courses
- How to be Digital in the Canadian Public Service (DDN201)
- A Self-Directed Guide to Understanding Data (DDN303)
- Introduction to Human-Centred Design (DDN207)
- Introduction to Agile in the Public Service (DDN208)
- Introduction to Product Management in the Public Service (DDN236)
- Discover Cyber Security (DDN235)
- Discover Artificial Intelligence (DDN210)
- Discover GC Cloud (DDN104)

Microlearning
- How to be Digital in the Government of Canada (video)
- CSPS Digital Academy microlearning articles

Terminology
- The Tech Terms Computer Dictionary
- The EGN Digital Dictionary for Executives and (other) Tech-novices
- 99 Terms You Need To Know When You're New To Tech

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