

A wide-angle photograph of a park path in autumn. The scene is dominated by large, leafless trees standing on a grassy hillside. In the foreground, a paved path curves from the bottom left towards the center. The ground is covered with fallen leaves. The sky is overcast with some sunlight breaking through.

WHERE TO START

PART ONE: START WITH BUSINESS (CH5)

BUSINESS REQUIREMENTS

Definition of business requirements:

- Description of a need that leads to one or more projects to deliver a solution and the desired ultimate **business** outcomes.
- Contents including business objectives, business opportunities, success metrics, and a vision statement.
 - business objectives – what to achieve
 - business opportunities – justification on objectives
 - success metrics – objectives must be measurable
 - a vision statement – a written document to formally record the commitment

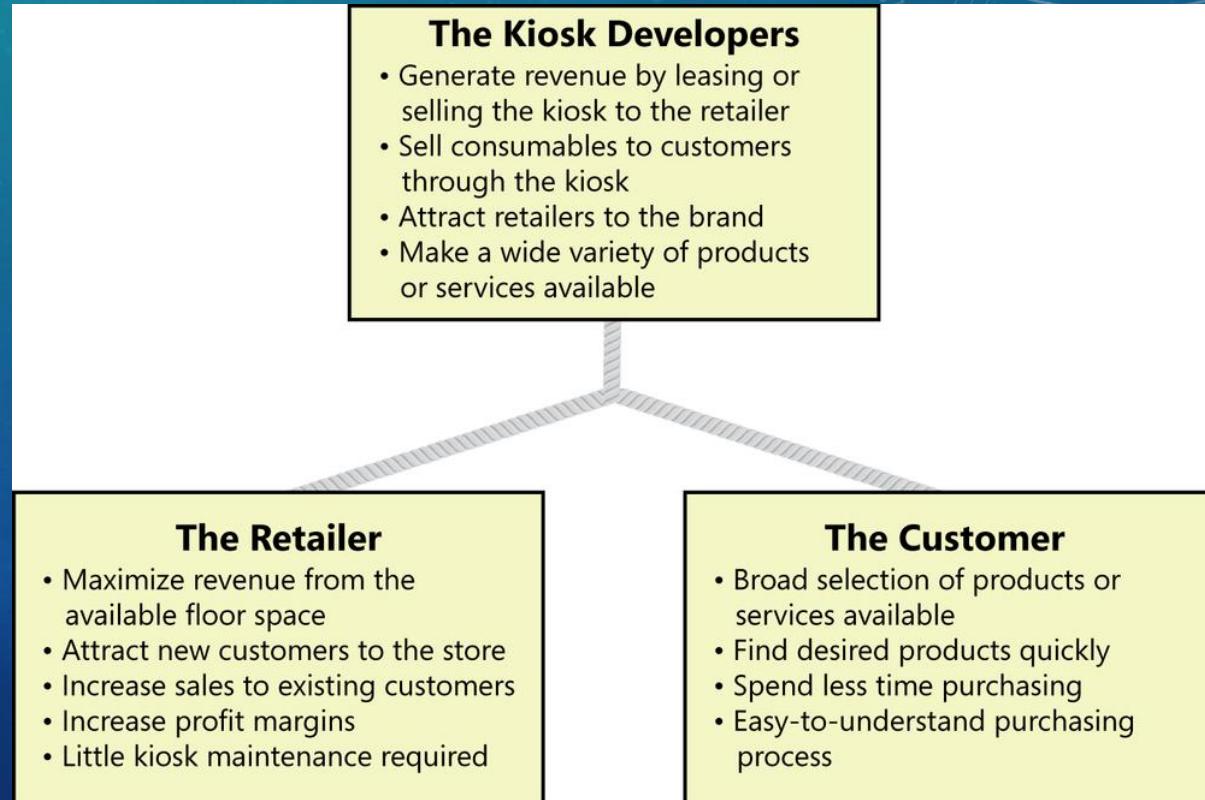
Steps:

- Identifying desired business benefits
- Product vision and project scope
 - Vision -- ultimate product that will achieve the business objectives
 - Scope -- portion of the ultimate product which the current project or development iteration will address

BUSINESS REQUIREMENTS

Dealing with conflicting business requirements

- Principles: delivering the maximum business value to the primary stakeholders
- Example: Business requirements on a Kiosk system. The retailer, the customer and the developer all hope the system will provide them with an advantage over their current way of doing business.
 - Customer may want a simple and therefore quick way of shopping
 - Retailer may want customers to hang on in shops for longer time and buy more
 - Developer may care security more so more time to spend on security check
 - Who is the primary stakeholder?



BUSINESS REQUIREMENTS

Vision and scope document collects business requirements in a single deliverable.

- The owners who take the responsibility of the document
 - Project exclusive sponsors
 - Funding authorities
- BA develops the document
- Template
 - Contents of the document
 - Way to produce
 - Populate sections when the corresponding information becomes available
 - But not write one after another from the top to the bottom

1. Business requirements
 - 1.1 Background
 - 1.2 Business opportunity
 - 1.3 Business objectives
 - 1.4 Success metrics
 - 1.5 Vision statement
 - 1.6 Business risks
 - 1.7 Business assumptions and dependencies
2. Scope and limitations
 - 2.1 Major features
 - 2.2 Scope of initial release
 - 2.3 Scope of subsequent releases
 - 2.4 Limitations and exclusions
3. Business context
 - 3.1 Stakeholder profiles
 - 3.2 Project priorities
 - 3.3 Deployment considerations

BUSINESS REQUIREMENTS

Financial	Nonfinancial
<ul style="list-style-type: none">Capture a market share of X% within Y months.Increase market share in country W from X% to Y% within Z months.Reach a sales volume of X units or revenue of £Y within Z months.Achieve X% return on investment within Y months.Achieve positive cash flow on this product within Y months.Save \$X per year currently spent on a high-maintenance legacy system.Reduce monthly support costs from \$X to \$Y within Z months.Increase gross margin on existing business from X% to Y% within 1 year.	<ul style="list-style-type: none">Achieve a customer satisfaction measure of at least X within Y months of release.Increase transaction-processing productivity by X% and reduce data error rate to no more than Y%.Develop an extensible platform for a family of related products.Develop specific core technology competencies.Be rated as the top product for reliability in published product reviews by a specified date.Comply with specific federal and state regulations.Receive no more than X service calls per unit and Y warranty calls per unit within Z months after shipping.Reduce turnaround time to X hours on Y% of support calls.

Section 1 – business requirement

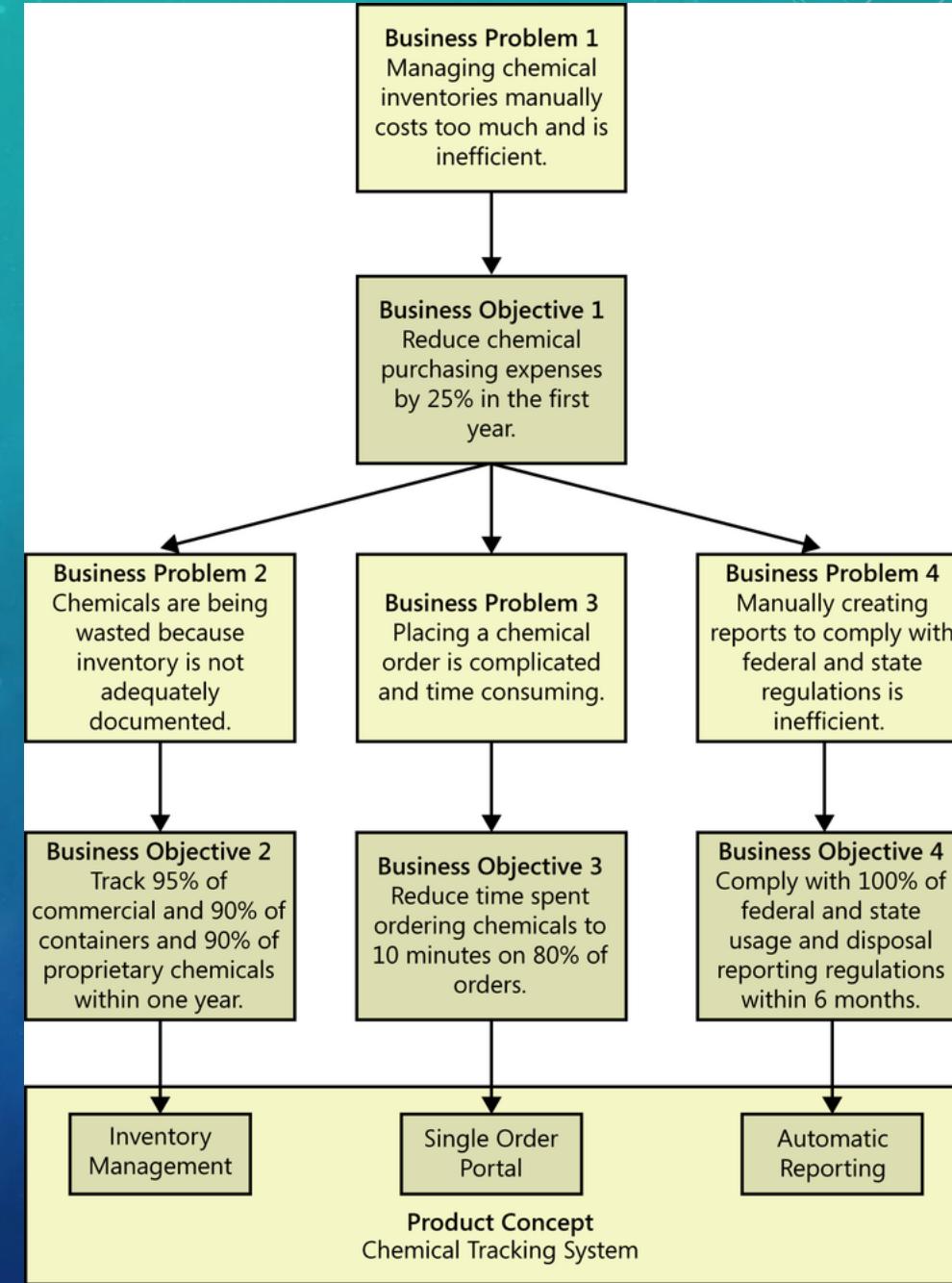
- 1.1. Background: Rationale and context for the new product or for changes to be made to an existing one
 - History or situation that led to the decision to build this product
 - Gaps between the current products and the market trends, technological evolution, etc.
- 1.2. Business opportunity
 - Profits/benefits the new products could bring in a qualitative way
 - Leading or catching the gaps
 - Feasibility
- 1.3. Business objectives
 - Profits/benefits the new products could bring in a quantitative way

BUSINESS REQUIREMENTS

Section 1 – business requirement (continue)

- 1.4. Success metrics
 - Indication of whether a project is on track to meet its business objectives.
 - The metrics can be tracked during testing or shortly after product release
 - It is important to evaluate the success of an individual project even Business objectives cannot normally be measured well after a project is complete.

Example: Chemical Tracking System
which contains 3 individual projects



CW TASK 5

- Task 5 is about success metrics:
 - Success metrics, you may have to refine the requirements you have considered to make them more specific and measurable
 - (Note, this part of CW is tricky because you should have business requirements identified first.)

BUSINESS REQUIREMENTS

Section 1 – business requirement (continue)

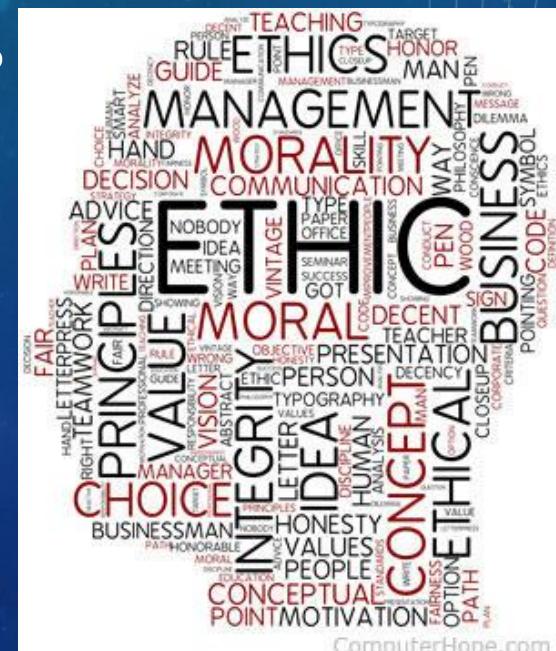
- 1.5. Vision document
 - Long-term purpose and intent (intention) of the product.
 - Elements
 - For [target customers]
 - Who [further specifying the needs that the target customers request] – customer and needs
 - The [product name] is [specifying the product to develop, such as capabilities, key benefit, compelling reason to buy or use] – product (why)
 - Unlike [existing products], our product [specifying the advantages over the existing ones to justify the need for the new product] – product (features)

Example: For scientists who need to request containers of chemicals, the Chemical Tracking System is an information system that will provide a single point of access to the chemical stockroom and to vendors. The system will store the location of every chemical container within the company, the quantity of material remaining in it, and the complete history of each container's locations and usage. This system will save the company 25 percent on chemical costs in the first year of use by allowing the company to fully exploit chemicals that are already available within the company, dispose of fewer partially used or expired containers, and use a standard chemical purchasing process. Unlike the current manual ordering processes, our product will generate all reports required to comply with federal and state government regulations that require the reporting of chemical usage, storage, and disposal.

BUSINESS REQUIREMENTS

Section 1 – business requirement (continue)

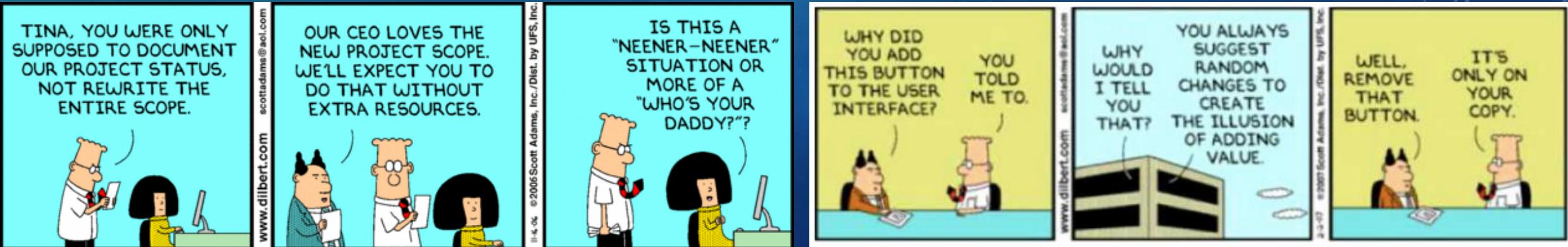
- 1.6 Business risks (and mitigation)
 - Risks are related to key technical break throughs. If they cannot be achieved or satisfied, then the product cannot be delivered.
 - A contingent plan (Plan B) that explains how the risks will be handled need to be developed before any project starts but may not at requirement stage.
 - 1.7 Business assumptions and dependencies
 - Conditions and resources that are related to the viability of the project.
 - Finance – does customer have enough money to support digitalised system?
 - Environment – can the system survive in the current working environment?
 - Society – what neighbours would think/accept?
 - Ethics – would users trust the system?
 - Regulations – would law or government agency allow the system?



BUSINESS REQUIREMENTS

Section 2 – Scope and limitation

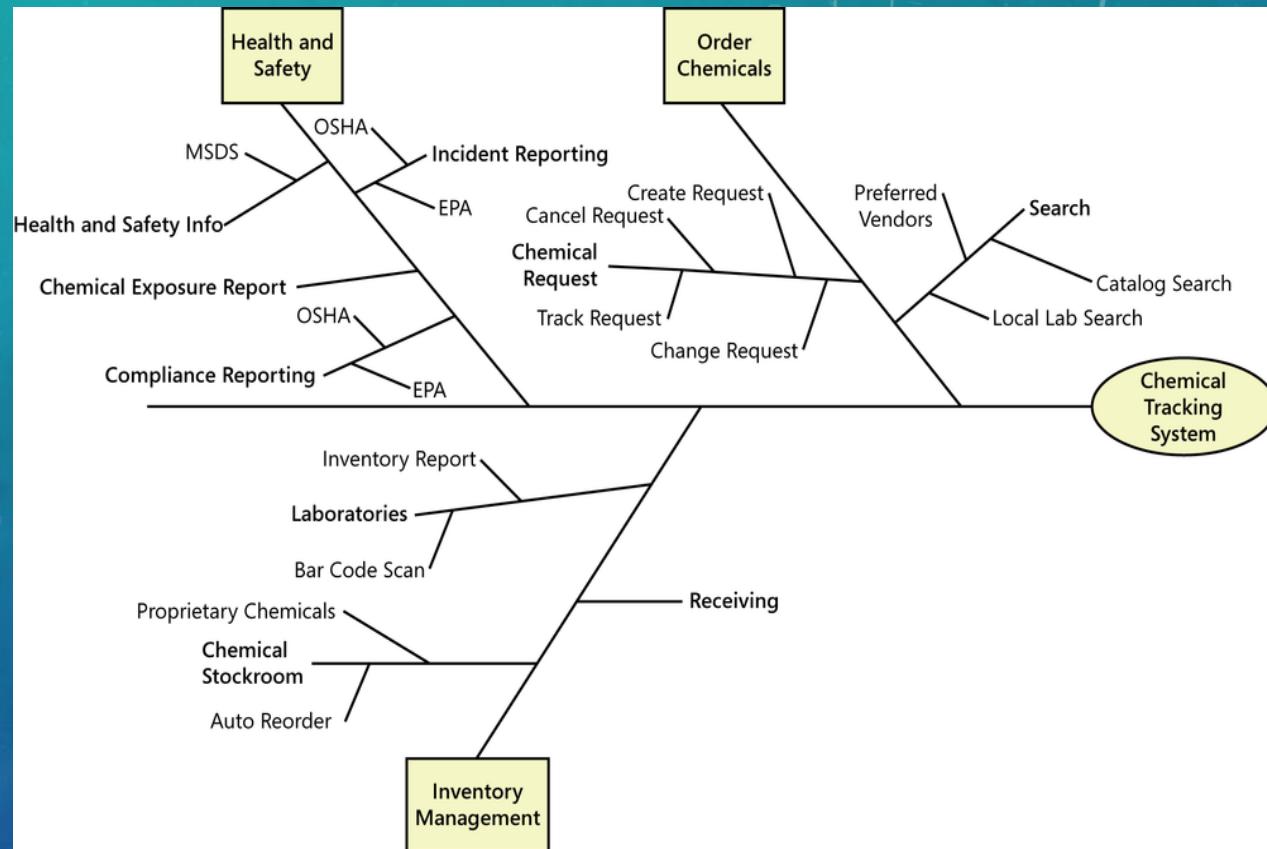
- 2.1 Major features of the software to develop
 - Feature tree
- 2.2 It is important to define project scope/boundary at the very beginning
 - Scope presentations
 - Context diagram
 - Ecosystem map
 - Event list
 - Scope creed – functionalities expansion leads to complicity and unmanageable situations
 - Timeline of implementation of the features (releases)



BUSINESS REQUIREMENTS

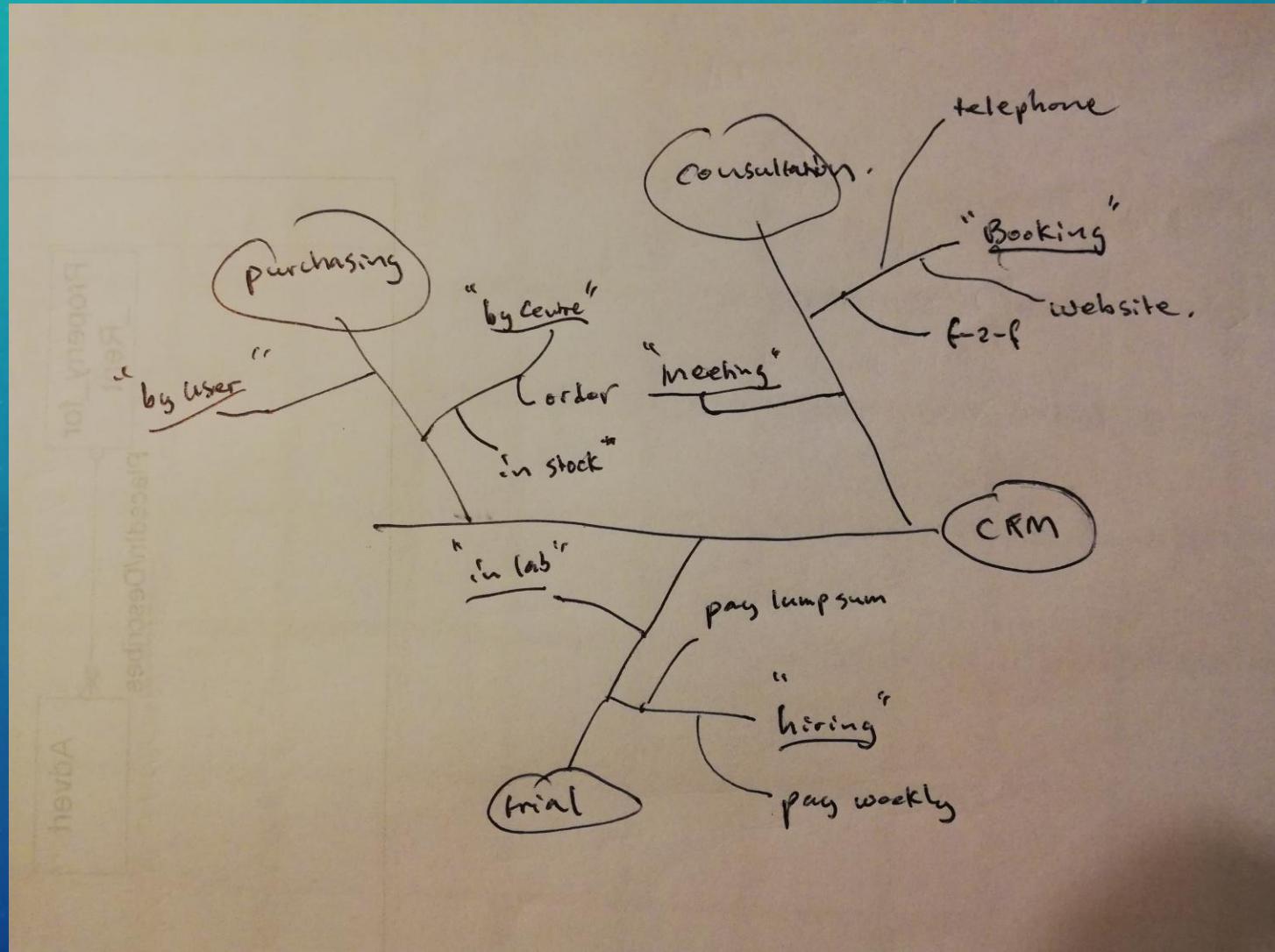
Section 2 – Scope and limitation (continue)

- Feature tree
 - A feature tree is a visual depiction of the **product's features** organized in logical groups, hierarchically subdividing each feature into further levels of detail.
 - The feature tree provides a concise view of all of the features planned for a project, making it an ideal model to show to executives who want a quick glance at the project scope.
 - A feature tree can show up to three levels of features, commonly called level 1 (L1), level 2 (L2), and level 3 (L3). L2 features are sub-features of L1 features, and L3 features are sub-features of L2 features.
 - Example



BUSINESS REQUIREMENTS

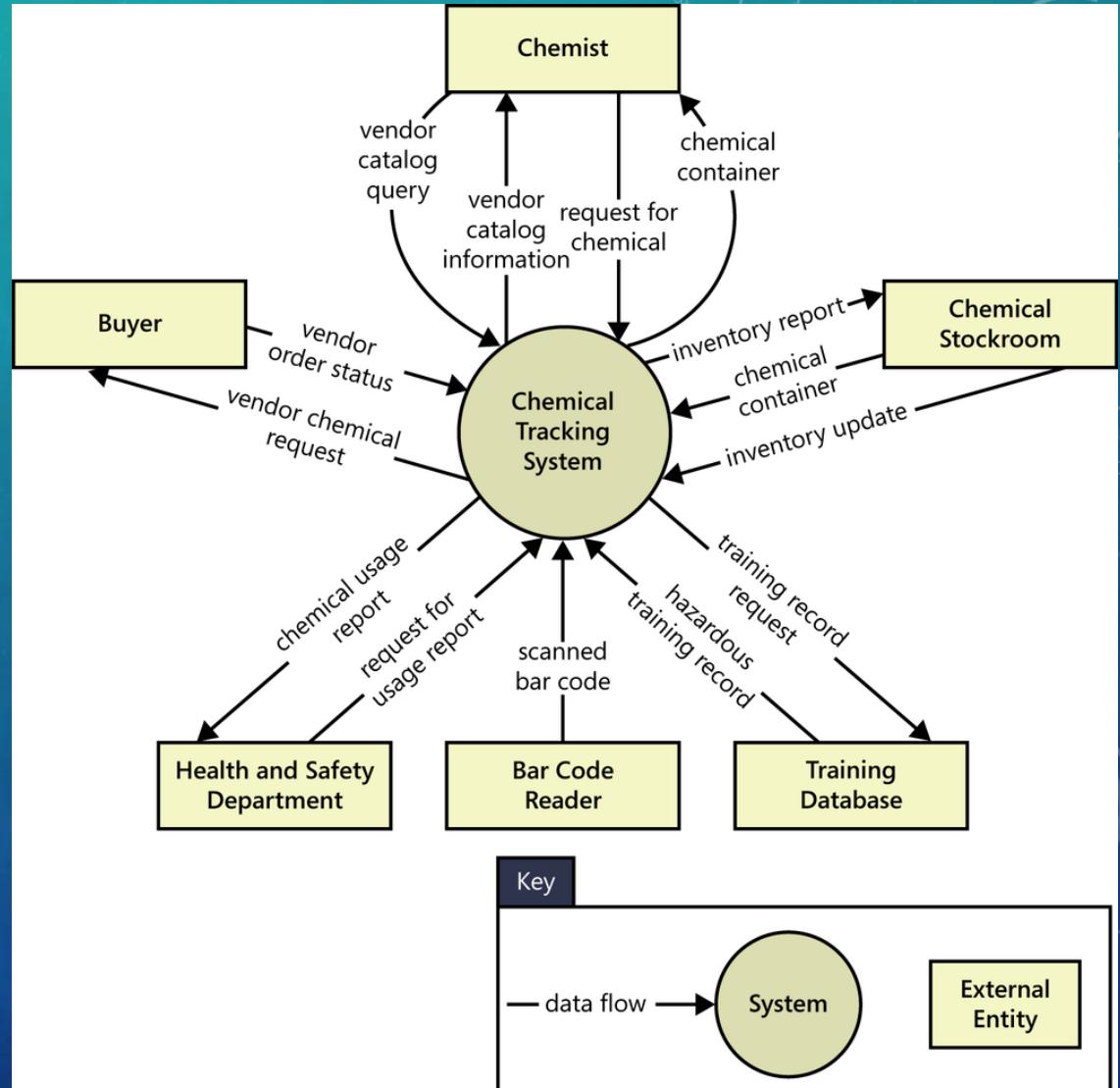
- Example and exercise
- CRM system to develop for Luton DSC
- Build up a feature tree from any previous or current project you participated in



BUSINESS REQUIREMENTS

Section 2 – Scope and limitation (continue)

- Context diagram
 - The scope description establishes the **boundary and connections** between the system you're developing and everything else in the universe. The context diagram visually illustrates this boundary.
 - It identifies external entities (also called terminators) outside the system that interface to it in some way, as well as data, control, and material flows between the terminators and the system.
 - The context diagram is the top level in a data flow diagram developed according to the principles of structured analysis, but it's a useful model for all projects.
 - Example



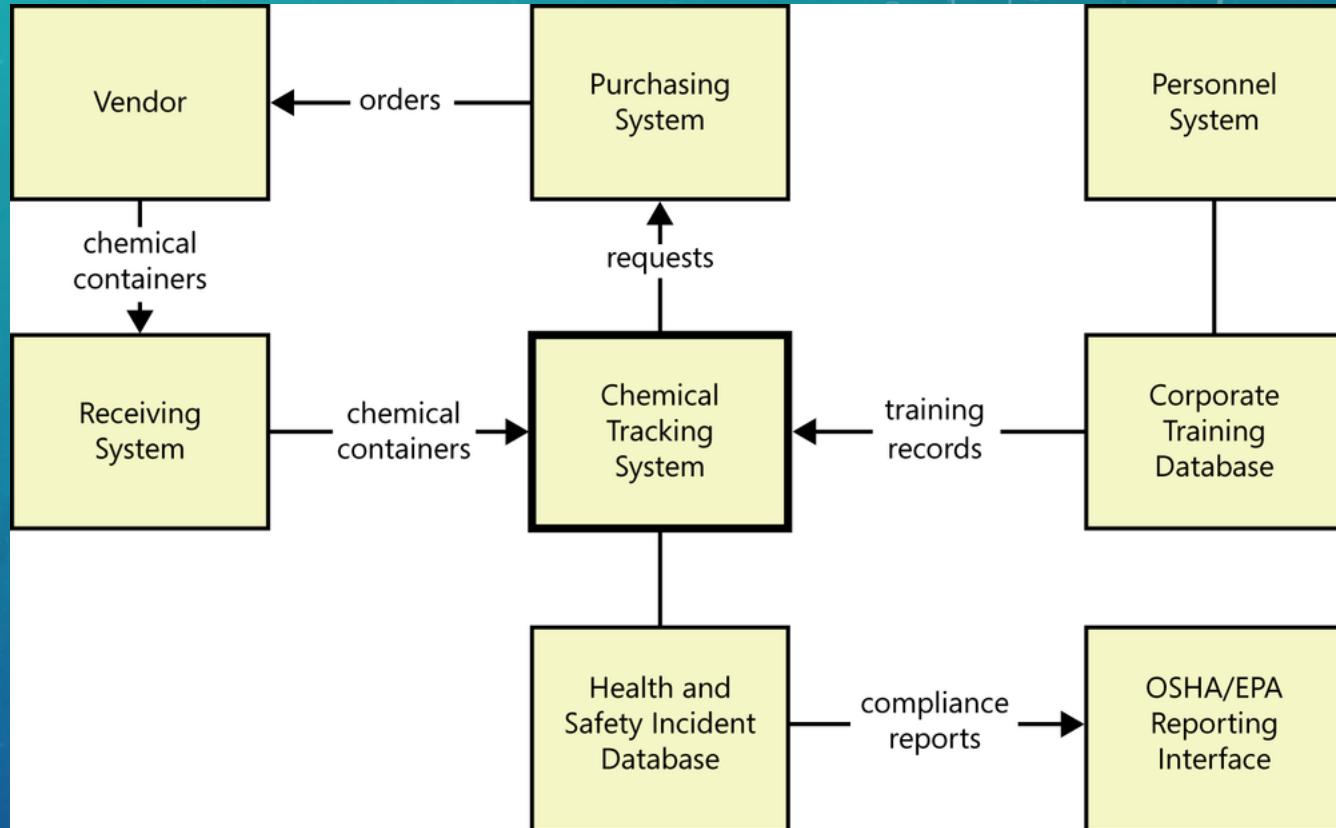
CW TASK 6

- Task 6 is about scope and limitations
- Tasks in this part:
 - Develop context diagram for your group project.

BUSINESS REQUIREMENTS

Section 2 – Scope and limitation (continue)

- Ecosystem map
 - An ecosystem map shows all of the systems related to the system of interest that interact with one another and the nature of those interactions.
 - Ecosystem maps differ from context diagrams in that they show **other systems** that have a relationship with the system you're working on, including those without direct interfaces.
 - Example



BUSINESS REQUIREMENTS

Section 2 – Scope and limitation (continue)

- Event list
 - An event list identifies **external events** that could trigger certain behaviour in the system. The event list depicts the scope boundary for the system by naming possible business events triggered by users, time-triggered (temporal) events, or signal events received from external components, such as hardware devices. The event list only names the events; the functional requirements that describe how the system responds to the events would be detailed in the SRS by using event-response tables.
 - Example

External Events for Chemical Tracking System

- Chemist places a chemical request.
- Chemical container bar code is scanned.
- Time to generate OSHA compliance report arrives.
- Vendor issues new chemical catalog.
- New proprietary chemical is accessioned into system.
- Vendor indicates chemical is backordered.
- Chemist asks to generate his chemical exposure report.
- Updated material safety datasheet is received from EPA.
- New vendor is added to preferred vendor list.
- Chemical container is received from vendor.

Exercise: Each group to compare these four “diagrams” with UML. What information in the four diagrams can be represented by which part of use case diagram or other UML diagrams?

BUSINESS REQUIREMENTS

Section 3 – Business context

- 3.1 Stakeholders' profiles
 - Benefits they could have from project such as productivity, waste, cost, automation, ability, useability, business process, etc.
 - Attitudes toward project (participate, contribute, positive, negative, opposite, etc.)
 - Interests, characteristics
 - Constrains such as business rules, regulations, resources, finance, etc.
- 3.2 Project priorities decided by taking into account of (the balance of) functionalities, quality, schedule, cost and human resources
- 3.3 Development considerations: the information and activities that are needed to ensure an effective deployment of the solution into its operating environment e.g.
 - The availability and the commitment of stakeholders
 - Relationship between customers and development team
 - Facilities
 -

Prioritisation is an optimisation process:
Min: an objective function
Subject to: conditions on variables that can be manipulated

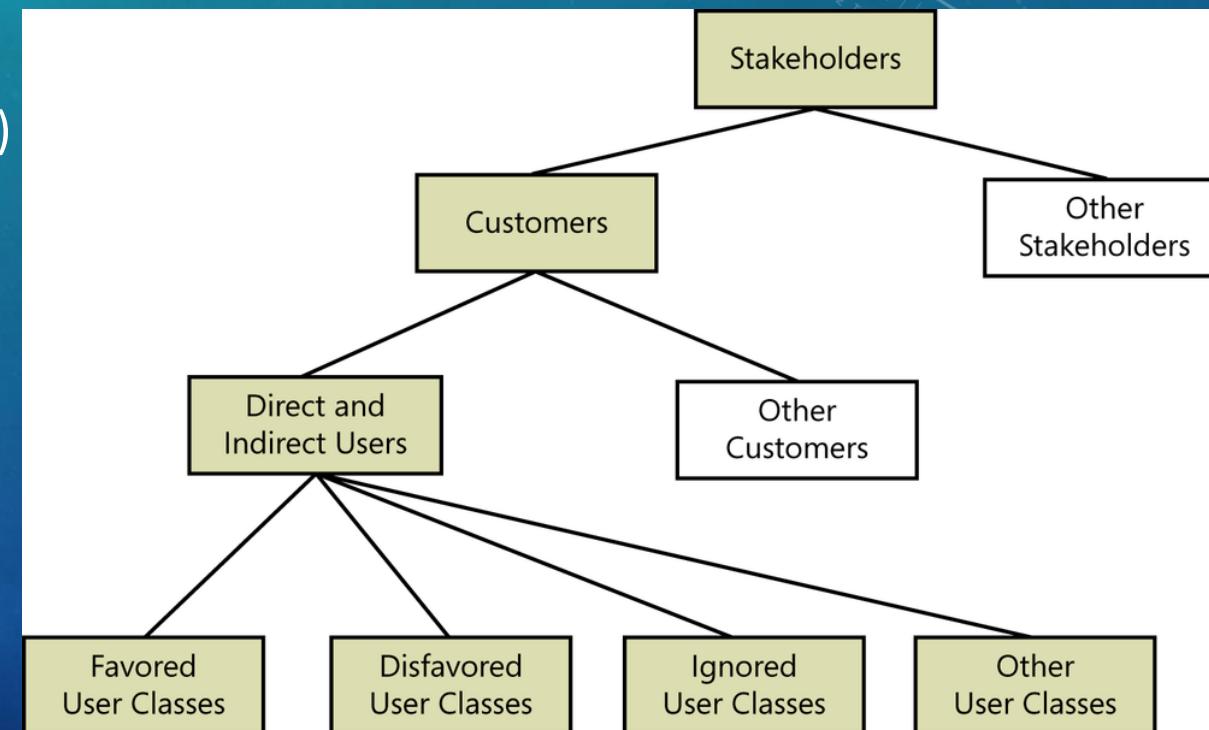
PART TWO: USER, USER, USER (CH6)

REMEMBER USERS (CH6)

User classes

- What? – Users can be classified into different categories according to
 - Their access privilege or security levels (such as ordinary user, guest user, administrator)
 - The tasks they perform during their business operations
 - The features they use (relating to feature tree)
 - The frequency with which they use the product
 - Their application domain experience and computer systems expertise
 - The platforms they will be using (desktop PCs, laptop PCs, tablets, smartphones, specialised devices)
 - Their native language
 - Whether they will interact with the system directly or indirectly

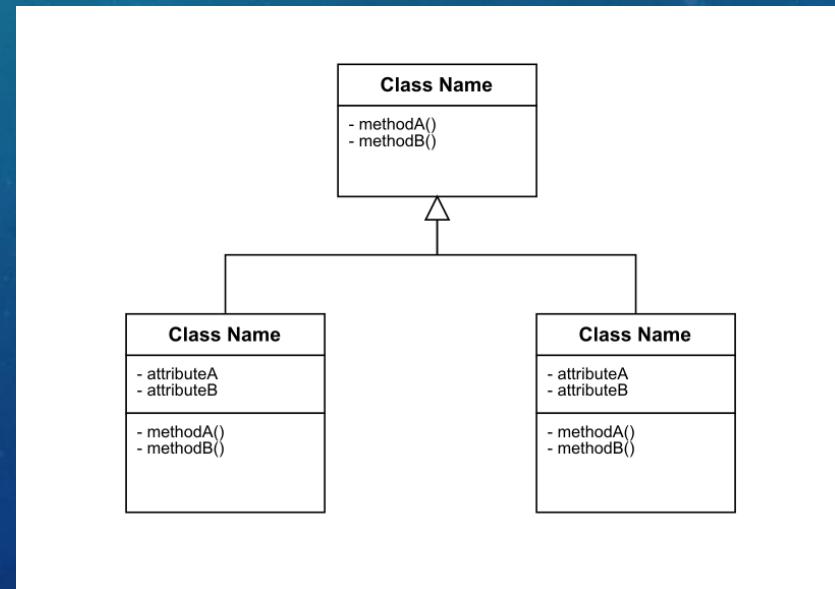
Then, identify the following four user classes:



REMEMBER USERS

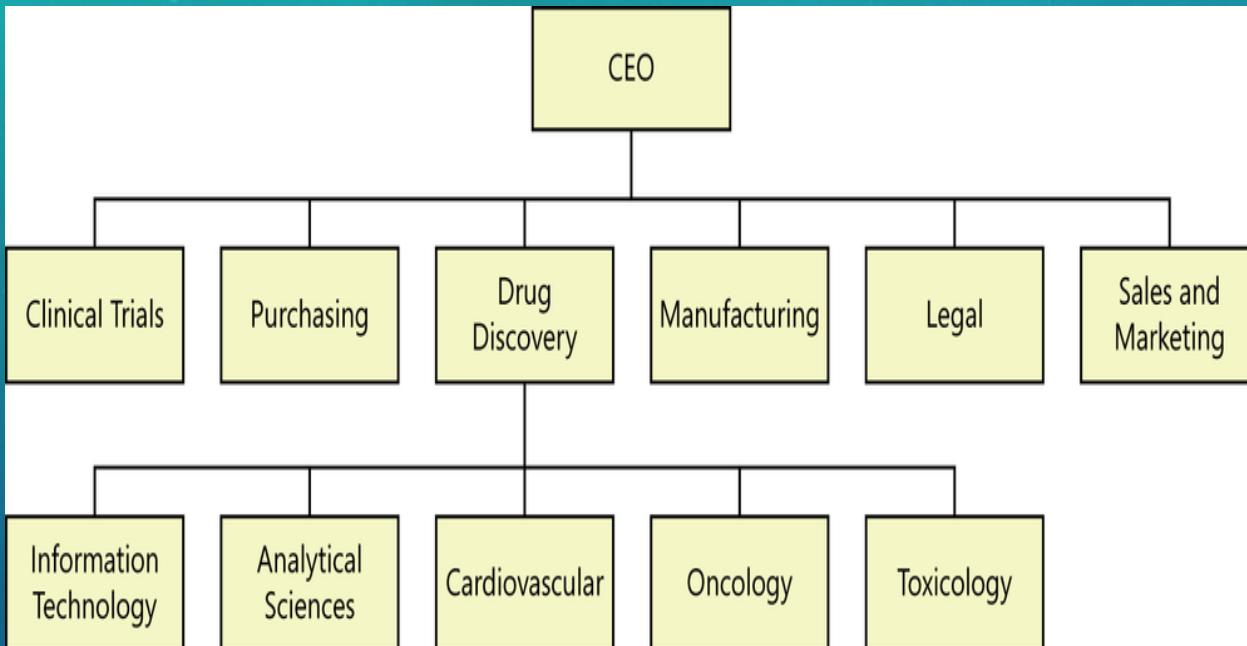
Identify user classes

- Why user class? – Elicit requirements from important user classes for your project
- How? -- Collaboration pattern (brainstorming involving as many user classes as possible and then merge those who have the similar needs or access business process in the similar ways)
 - Principle: expand then contract (see the diagram)
 - Implementation -- Study the organization chart (on the next slide) to look for:
 1. Departments that participate in the business process.
 2. Departments that are affected by the business process.
 3. Departments or role names in which either direct or indirect users might be found.
 4. User classes that span multiple departments.
 5. Departments that might have an interface to external stakeholders outside the company.



REMEMBER USERS

- Organisation chart (example of pharmaceutical company that develop and manufacturing drugs). If the software project is about tracking chemicals, then the focus should be on Drug discovery Department.



- Organization chart analysis reduces the likelihood that you will overlook an important class of users within that organisation.

REMEMBER USERS

Example

Chemical Tracking System

Name	Number	Description
Chemists (favoured)	Approximately 1,000 located in 6 buildings	Chemists will request chemicals from vendors and from the chemical stockroom. Each chemist will use the system several times per day, mainly for requesting chemicals and tracking chemical containers into and out of the laboratory. The chemists need to search vendor catalogs for specific chemical structures imported from the tools they use for drawing structures.
Buyers	5	Buyers in the purchasing department process chemical requests . They place and track orders with external vendors. They know little about chemistry and need simple query facilities to search vendor catalogues. Buyers will not use the system's container-tracking features. Each buyer will use the system an average of 25 times per day.
Chemical stockroom staff	6 technicians, 1 supervisor	The chemical stockroom staff manages an inventory of more than 500,000 chemical containers. They will supply containers from three stockrooms, request new chemicals from vendors, and track the movement of all containers into and out of the stockrooms. They are the only users of the inventory-reporting feature. Because of their high transaction volume, features that are used only by the chemical stockroom staff must be automated and efficient.
Health and Safety Department staff (favoured)	1 manager	The Health and Safety Department staff will use the system only to generate predefined quarterly reports that comply with federal and state chemical usage and disposal reporting regulations. The Health and Safety Department manager will request changes in the reports periodically as government regulations change. These report changes are of the highest priority, and implementation will be time critical.

REMEMBER USERS

User persona

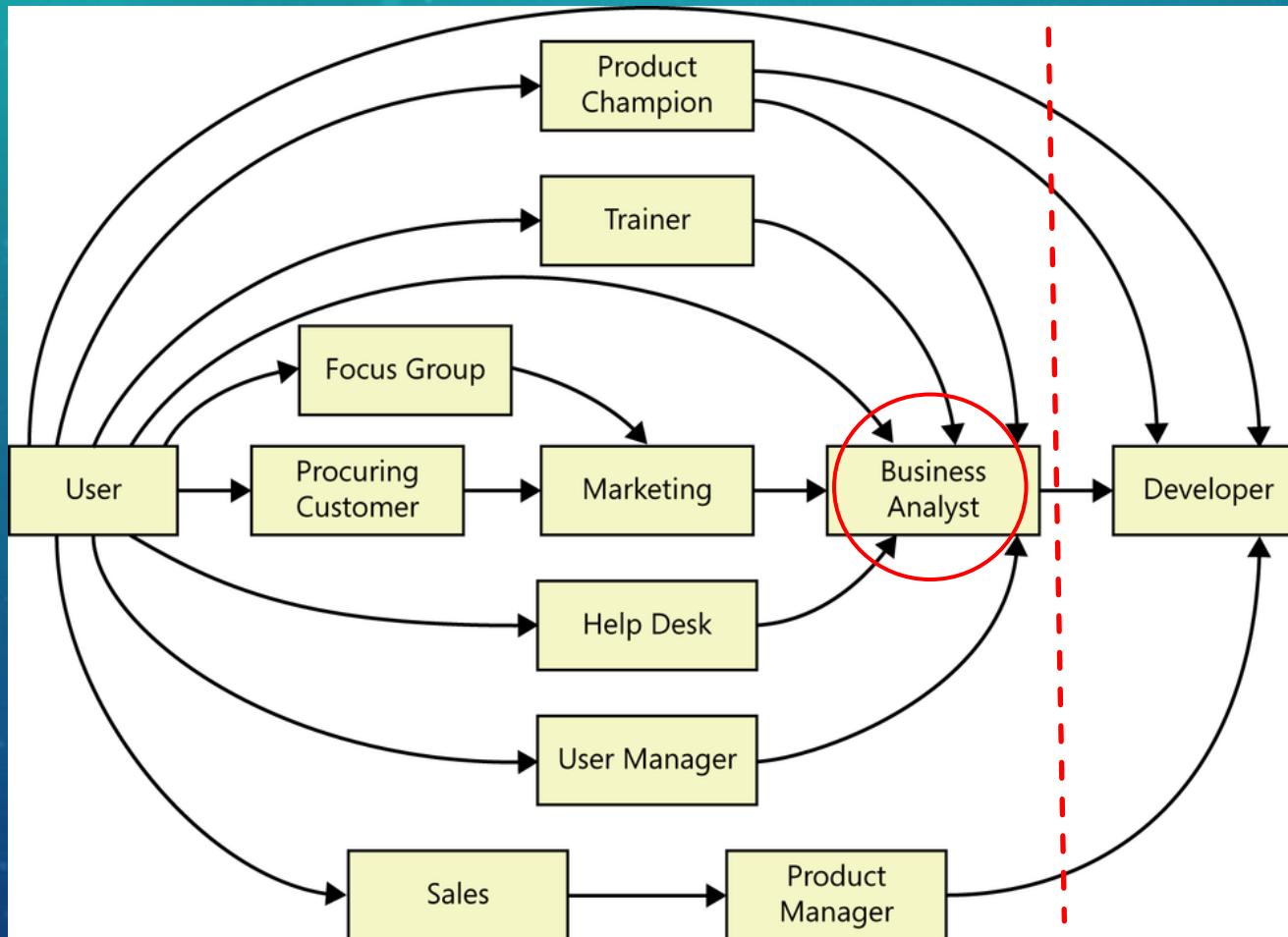
- A description of a hypothetical, generic and virtual person who serves as a stand-in for a group of users who have similar characteristics and needs
- help to understand the requirements and to design the user experience to best meet the needs of specific user communities
- Here's an example of a persona for the user class "Chemists" of the Chemical Tracking System:

Fred, 41, has been a chemist at Contoso Pharmaceuticals since he received his PhD 14 years ago. He doesn't have much patience with computers. Fred usually works on two projects at a time in related chemical areas. His lab contains approximately 300 bottles of chemicals and gas cylinders. On an average day, he'll need four new chemicals from the stockroom. Two of these will be commercial chemicals in stock, one will need to be ordered, and one will come from the supply of proprietary Contoso chemical samples. On occasion, Fred will need a hazardous chemical that requires special training for safe handling. When he buys a chemical for the first time, Fred wants the material safety data sheet emailed to him automatically. Each year, Fred will synthesize about 20 new proprietary chemicals to go into the stockroom. Fred wants a report of his chemical usage for the previous month to be generated automatically and sent to him by email so that he can monitor his chemical exposure.

REMEMBER USERS

Connect to user representatives

- Some typical communication pathways that connect the voice of the user to the ear of the developer



REMEMBER USERS

Product champion (or user representative?)

- Who?
 - They are a few key members of our user community to provide the requirements.
 - Each product champion serves as the primary interface between members of a single user class and the project's business analyst.
- Why?
- What to do – the next slide.

REMEMBER USERS

Category	Activities
Planning	<ul style="list-style-type: none">Refine the scope and limitations of the product.Identify other systems with which to interact.Evaluate the impact of the new system on business operations.Define a transition path from current applications or manual operations.Identify relevant standards and certification requirements.
Requirements	<ul style="list-style-type: none">Collect input on requirements from other users.Develop usage scenarios, use cases, and user stories.Resolve conflicts between proposed requirements within the user class.Define implementation priorities.Provide input regarding performance and other quality requirements.Evaluate prototypes.Work with other decision makers to resolve conflicts among requirements from different stakeholders.Provide specialized algorithms.

Category	Activities
Validation and verification	<ul style="list-style-type: none">Review requirements specifications.Define acceptance criteria.Develop user acceptance tests from usage scenarios.Provide test data sets from the business.Perform beta testing or user acceptance testing
User aids	<ul style="list-style-type: none">Write portions of user documentation and help text.Contribute to training materials or tutorials.Demonstrate the system to peers
Change management	<ul style="list-style-type: none">Evaluate and prioritize defect corrections and enhancement requests.Dynamically adjust the scope of future releases or iterations.Evaluate the impact of proposed changes on users and business processes.Participate in making change decisions.

REMEMBER USERS

- BA's advice to product champion -- traps to avoid
 - Managers override the decisions that a qualified and duly authorized product champion makes. Perhaps a manager has a new idea at the last minute, or thinks he knows what the users need. This behaviour often results in dissatisfied users and frustrated product champions who feel that management doesn't trust them.
 - A product champion who forgets that he is representing other customers and presents only his own requirements won't do a good job. He might be happy with the outcome, but others likely won't be.
 - A product champion who lacks a clear vision of the new system might defer decisions to the BA. If all of the BA's ideas are fine with the champion, the champion isn't providing much help.
 - A senior user might nominate a less experienced user as champion because she doesn't have time to do the job herself. This can lead to backseat driving from the senior user who still wishes to strongly influence the project's direction.

PART THREE: CASE STUDY

CASE STUDY: THE VOICE OF THE USER

Jeremy walked into the office of Ruth, the Director of the Drug Discovery Division at Contoso Pharmaceuticals. Ruth had asked the information technology team that supported Contoso's research department to build a new application to help the research chemists accelerate their exploration for new drugs. Jeremy was assigned as the BA for the project. After introducing himself and discussing the project in broad terms, Jeremy said to Ruth: "**I'd like to talk with some of your chemists to understand their requirements for the system.** Who might be good people to start with?"

Ruth replied: "I did that same job for five years before I became the division director three years ago. **You do not really need to talk to any of my people. I can tell you everything you need to know about this project.**"

Jeremy was concerned. Scientific knowledge and technology change quickly, so he wasn't sure if Ruth could adequately represent the current and future needs for users of this complex application. Perhaps there were some internal policies going on that weren't apparent and there was a good reason for Ruth to create a buffer between Jeremy and the actual users. After some discussion, though, it became clear that Ruth didn't want any her people involved directly with the project.

"OK," Jeremy agreed reluctantly. "**May be I can start by doing some document analysis** and bring questions I have to you. Can we set up a series of interviews for the next couple of weeks so I can understand the kinds of things you expect your scientists to be able to do [with this new system?]"

"Sorry I'm swamped right now," Ruth told him. "**I can give you a couple of hours in about three weeks** to clarify things you are unsure about. **Just go ahead and start writing the requirements.** When we meet, then you can ask me any questions you still have, I hope that will let you get the ball rolling on the project."