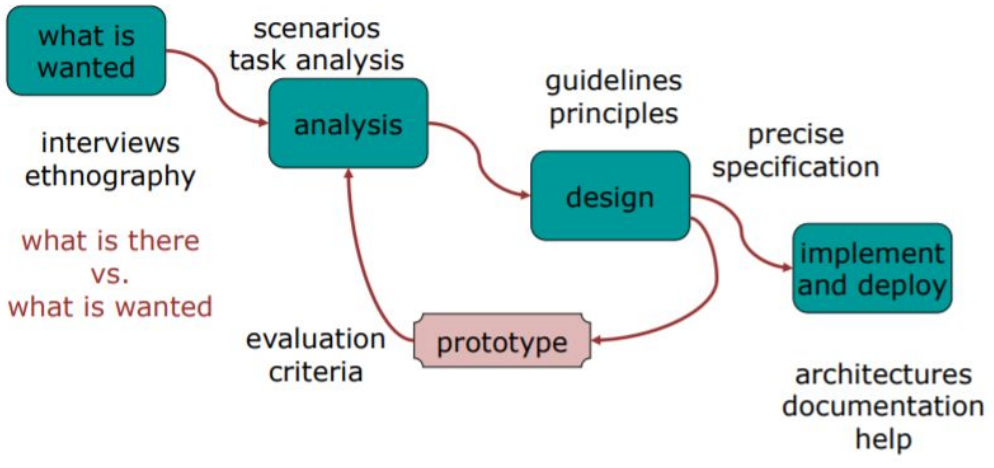
Design Process

- 3 mile island - caution tags on important controls covered LEDs reflecting system state, also some LEDs reflected command execution, and not the actual system state
- **Design error**
  - Control panels didn't indicate the state of the reactor plant
  - No instrument even showed coolant level
  - Information was not in an appropriate form
  - Training didn't prepare for edge cases
- **What is Design? Achieving goals within constraints - trade-offs**
  - Design for usability at all stages of the life cycle
  - **Interactions and interventions**
    - Design interactions, not just interfaces - not just the immediate interaction, technology can change interaction style
    - Design interventions, not just artefacts and system, but also - documentation, manuals, tutorials
  - **Interaction design**
    - **Identify needs and requirements for the user experience**
      - Profile user population, types of users, frequency of use, experience, level of training…
      - Profile the task, complexity, breakdown, context
      - Determine the constraints and objectives, acceptable error rate
    - **Develop alternative designs that meet those requirements**
    - **Build interactive versions of the designs so they can be communicated and assessed**
      - Allocate elements of task to user or system, determine communication requirements between user and system
      - Design elements of interface to support communication between user and system, in light of user profile
    - **Evaluate what is being built throughout the process and the u.ex it offers**
      - Develop prototypes of design, test with users to determine if objectives are met
- **Process of design**



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    - **Design rules - standards**
        - Set by national/international bodies - to ensure compliance by a large community of designers, standards have underlying theory and slowly changing technology
        - Hardware standards are common
        - ISO9241 - Usability defined as effectiveness, efficiency and satisfaction with which users accomplish tasks
    - **Design rules - guidelines**
        - Suggestive and general
        - Abstract guidelines (principles) applicable during early life cycle
        - Detailed guidelines (style guides) applicable during later life cycle
- **Prototyping**
    - Never get it right on the first time, when you stop depends on the goal of the prototype
    - Iterative design and prototyping
        - Overcomes inherent problems of incomplete requirements
        - **Prototypes** - simulate or animate features of intended system
            - Throw away vs incremental prototypes
            - **Techniques**
                - **Storyboards**
                    - Don’t need to be computer-based, can be animated
                - **Limited functionality systems**
                    - Some functionality implemented (also wizard of oz technique)
                - **Warning about iterative design**
                    - **Design inertia** - early bad decisions remain bad
                    - **Diagnosing real user problems in prototypes**
                    - Move little by little - need a good starting point, need to understand what is wrong
        - Management issues
            - Time, planning, non-functional features (safety, reliability, response time)
- **Scenario based approaches**
    - Step-by-step description of a user’s actions used as a tool in requirements gathering, interface design and evaluation
    - Can be textual narratives describing the users actions, or storyboards (pictures depicting the actions)
    - Can capture both actions the user carries out in the existing system, or how they would see themselves performing with a new system
- **Ethnographic Approaches**
    - Research through observation and participation
    - Qualitative
    - Captures the contextual factors missed in a lab
    - **Hawthorne effect:** people behave differently when watched
- **Human Centred Design**

- ISO 9241 - guidance on achieving quality by incorporating user centred design activities throughout life cycle
- Describes user centred design as a multi-disciplinary activity
    - Understand and specify context of use
    - Specify the user and organisational requirements
    - Produce design solutions
    - Evaluate designs against requirements