HUMAN-COMPUTER INTERACTION (IS252) CHAPTER FOUR

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CHAPTER 4
PROCESS OF INTERACTION DESIGN

4.1 INTRODUCTION

- IN THIS CHAPTER, WE RAISE AND ANSWER THESE KINDS OF QUESTIONS AND DISCUSS THE FOUR BASIC ACTIVITIES AND KEY CHARACTERISTICS OF THE INTERACTION DESIGN PROCESS THAT WERE INTRODUCED IN CHAPTER 1. WE ALSO INTRODUCE A LIFECYCLE MODEL OF INTERACTION DESIGN THAT CAPTURES THESE ACTIVITIES AND CHARACTERISTICS.
- THE MAIN AIMS OF THIS CHAPTER ARE TO:

1. CONSIDER WHAT 'DOING' INTERACTION DESIGN INVOLVES.
2. ASK AND PROVIDE ANSWERS FOR SOME IMPORTANT QUESTIONS ABOUT THE INTERACTION DESIGN PROCESS.
3. INTRODUCE THE IDEA OF A LIFECYCLE MODEL TO REPRESENT A SET OF ACTIVITIES AND HOW THEY ARE RELATED.
4. DESCRIBE SOME LIFECYCLE MODELS FROM SOFTWARE ENGINEERING AND HCI AND DISCUSS HOW THEY RELATE TO THE PROCESS OF INTERACTION DESIGN.
5. PRESENT A LIFECYCLE MODEL OF INTERACTION DESIGN.

4.2 WHAT IS INTERACTION DESIGN ABOUT?

- INTERACTION DESIGN INVOLVES DEVELOPING A PLAN WHICH IS INFORMED BY THE PRODUCT'S INTENDED USE, TARGET DOMAIN, AND RELEVANT PRACTICAL CONSIDERATIONS. ALTERNATIVE DESIGNS NEED TO BE GENERATED, CAPTURED, AND EVALUATED BY USERS. FOR THE EVALUATION TO BE SUCCESSFUL, THE DESIGN MUST BE EXPRESSED IN A FORM SUITABLE FOR USERS TO INTERACT WITH.

4.2.1 FOUR BASIC ACTIVITIES OF INTERACTION DESIGN

- FOUR BASIC ACTIVITIES FOR INTERACTION DESIGN WERE INTRODUCED IN CHAPTER 1. THESE ARE: IDENTIFYING NEEDS AND ESTABLISHING REQUIREMENTS, DEVELOPING ALTERNATIVE DESIGNS THAT MEET THOSE REQUIREMENTS, BUILDING INTERACTIVE VERSIONS SO THAT THEY CAN BE COMMUNICATED AND ASSESSED, AND EVALUATING THEM, I.E., MEASURING THEIR ACCEPTABILITY. THEY ARE FAIRLY GENERIC ACTIVITIES AND CAN BE FOUND IN OTHER DESIGNS DISCIPLINES TOO.
- WE WILL BE EXPANDING ON EACH OF THE BASIC ACTIVITIES OF INTERACTION DESIGN IN THE NEXT TWO CHAPTERS. HERE WE GIVE ONLY A BRIEF INTRODUCTION TO EACH.

❖ ***IDENTIFYING NEEDS AND ESTABLISHING REQUIREMENTS***

IN ORDER TO DESIGN SOMETHING TO SUPPORT PEOPLE, WE MUST KNOW WHO OUR TARGET USERS ARE AND WHAT KIND OF SUPPORT AN INTERACTIVE PRODUCT COULD USEFULLY PROVIDE. THESE NEEDS FORM THE BASIS OF THE PRODUCT'S REQUIREMENTS AND UNDERPIN SUBSEQUENT DESIGN AND DEVELOPMENT. THIS ACTIVITY IS FUNDAMENTAL TO A USER CENTERED APPROACH, AND IS VERY IMPORTANT IN INTERACTION DESIGN.

❖ ***DEVELOPING ALTERNATIVE DESIGNS***

THIS IS THE CORE ACTIVITY OF DESIGNING: ACTUALLY SUGGESTING IDEAS FOR MEETING THE REQUIREMENTS. THIS ACTIVITY CAN BE BROKEN UP INTO TWO SUB-ACTIVITIES: CONCEPTUAL DESIGN AND PHYSICAL DESIGN. CONCEPTUAL DESIGN INVOLVES PRODUCING THE CONCEPTUAL MODEL FOR THE PRODUCT, AND A CONCEPTUAL MODEL DESCRIBES WHAT THE PRODUCT SHOULD DO, BEHAVE AND LOOK LIKE. PHYSICAL DESIGN CONSIDERS THE DETAIL OF THE PRODUCT INCLUDING THE COLORS, SOUNDS, AND IMAGES TO USE, MENU DESIGN, AND ICON DESIGN. ALTERNATIVES ARE CONSIDERED AT EVERY POINT.

❖ ***BUILDING INTERACTIVE VERSIONS OF THE DESIGNS***

INTERACTION DESIGN INVOLVES DESIGNING INTERACTIVE PRODUCTS. THE MOST SENSIBLE WAY FOR USERS TO EVALUATE SUCH DESIGNS, THEN, IS TO INTERACT WITH THEM. THIS REQUIRES AN INTERACTIVE VERSION OF THE DESIGNS TO BE BUILT, BUT THAT DOES NOT MEAN THAT A SOFTWARE VERSION IS REQUIRED. THERE ARE DIFFERENT TECHNIQUES FOR ACHIEVING "INTERACTION," NOT ALL OF WHICH REQUIRE A WORKING PIECE OF SOFTWARE. FOR EXAMPLE, PAPER-BASED PROTO- TYPES ARE VERY QUICK AND CHEAP TO BUILD AND ARE VERY EFFECTIVE FOR IDENTIFYING PROBLEMS IN THE EARLY STAGES OF DESIGN, AND THROUGH ROLE-PLAYING USERS CAN GET A REAL SENSE OF WHAT IT WILL BE LIKE TO INTERACT WITH THE PRODUCT.

❖ ***EVALUATING DESIGNS***

EVALUATION IS THE PROCESS OF DETERMINING THE USABILITY AND ACCEPTABILITY OF THE PRODUCT OR DESIGN THAT IS MEASURED IN TERMS OF A VARIETY OF CRITERIA INCLUDING THE NUMBER OF ERRORS USERS MAKE USING IT, HOW APPEALING IT IS, HOW WELL IT MATCHES THE REQUIREMENTS, AND SO ON. INTERACTION DESIGN REQUIRES A HIGH LEVEL OF USER INVOLVEMENT THROUGHOUT DEVELOPMENT, AND THIS ENHANCES THE CHANCES OF AN ACCEPTABLE PRODUCT BEING DELIVERED. IN MOST DESIGN SITUATIONS YOU WILL FIND A NUMBER OF ACTIVITIES CONCERNED WITH QUALITY ASSURANCE AND TESTING TO MAKE SURE THAT THE FINAL PRODUCT IS “FIT-FOR-PURPOSE." EVALUATION DOES NOT REPLACE THESE ACTIVITIES, BUT COMPLEMENTS AND ENHANCES THEM.

THE ACTIVITIES OF DEVELOPING ALTERNATIVE DESIGNS, BUILDING INTERACTIVE VERSIONS OF THE DESIGN, AND EVALUATION ARE INTERTWINED: ALTERNATIVES ARE EVALUATED THROUGH THE INTERACTIVE VERSIONS OF THE DESIGNS AND THE RESULTS ARE FEEDBACK INTO FURTHER DESIGN. THIS ITERATION IS ONE OF THE KEY CHARACTERISTICS OF THE INTERACTION DESIGN PROCESS.

4.2.2 THREE KEY CHARACTERISTICS OF THE INTERACTION DESIGN PROCESS

- THERE ARE THREE CHARACTERISTICS THAT WE BELIEVE SHOULD FORM A KEY PART OF THE INTERACTION DESIGN PROCESS. THESE ARE: A USER FOCUS, SPECIFIC USABILITY CRITERIA, AND ITERATION. THE NEED TO
- ***FOCUS ON USERS*** HAS BEEN EMPHASIZED THROUGHOUT THIS BOOK, SO YOU WILL NOT BE SURPRISED TO SEE THAT IT FORMS A CENTRAL PLANK OF OUR VIEW ON THE INTERACTION DESIGN PROCESS.
- ***SPECIFIC USABILITY AND USER EXPERIENCE GOALS*** SHOULD BE IDENTIFIED, CLEARLY DOCUMENTED, AND AGREED UPON AT THE BEGINNING OF THE PROJECT. THEY HELP DESIGNERS TO CHOOSE BETWEEN DIFFERENT ALTERNATIVE DESIGNS AND TO CHECK ON PROGRESS AS THE PRODUCT IS DEVELOPED.
- ***ITERATION*** ALLOWS DESIGNS TO BE REFINED BASED ON FEEDBACK. AS USERS AND DESIGNERS ENGAGE WITH THE DOMAIN AND START TO DISCUSS REQUIREMENTS, NEEDS, HOPES AND ASPIRATIONS, THEN DIFFERENT INSIGHTS INTO WHAT IS NEEDED, WHAT WILL HELP, AND WHAT IS FEASIBLE WILL EMERGE.

4.3 LIFECYCLE MODELS: SHOWING HOW THE ACTIVITIES ARE RELATED

- UNDERSTANDING WHAT ACTIVITIES ARE INVOLVED IN INTERACTION DESIGN IS THE FIRST STEP TO BEING ABLE TO DO IT, BUT IT IS ALSO IMPORTANT TO CONSIDER HOW THE ACTIVITIES ARE RELATED TO ONE ANOTHER SO THAT THE FULL DEVELOPMENT PROCESS CAN BE SEEN. THE TERM LIFECYCLE MODEL IS USED TO REPRESENT A MODEL THAT CAPTURES A SET OF ACTIVITIES AND HOW THEY ARE RELATED. SOPHISTICATED MODELS ALSO INCORPORATE A DESCRIPTION OF WHEN AND HOW TO MOVE FROM ONE ACTIVITY TO THE NEXT AND A DESCRIPTION OF THE DELIVERABLES FOR EACH ACTIVITY. THE REASON SUCH MODELS ARE POPULAR IS THAT THEY ALLOW DEVELOPERS, AND PARTICULARLY MANAGERS, TO GET AN OVERALL VIEW OF THE DEVELOPMENT EFFORT SO THAT PROGRESS CAN BE TRACKED, DELIVERABLES SPECIFIED, RESOURCES ALLOCATED, TARGETS SET, AND SO ON.

4.3.1 A SIMPLE LIFECYCLE MODEL FOR INTERACTION DESIGN

- WE SEE THE ACTIVITIES OF INTERACTION DESIGN AS BEING RELATED AS SHOWN IN FIGURE 4.1 .
- THIS MODEL INCORPORATES ITERATION AND ENCOURAGES A USER FOCUS. WHILE THE OUTPUTS FROM EACH ACTIVITY ARE NOT SPECIFIED IN THE MODEL. MOST PROJECTS START WITH IDENTIFYING NEEDS AND REQUIREMENTS. THE PROJECT MAY HAVE ARISEN BECAUSE OF SOME EVALUATION THAT HAS BEEN DONE, BUT THE LIFECYCLE OF THE NEW (OR MODIFIED) PRODUCT CAN BE THOUGHT OF AS STARTING AT THIS POINT. FROM THIS ACTIVITY, SOME ALTERNATIVE DESIGNS ARE GENERATED IN AN ATTEMPT TO MEET THE NEEDS AND REQUIREMENTS THAT HAVE BEEN IDENTIFIED. THEN INTERACTIVE VERSIONS OF THE DESIGNS ARE DEVELOPED AND EVALUATED. BASED ON THE FEEDBACK FROM THE EVALUATIONS, THE TEAM MAY NEED TO RETURN TO IDENTIFYING NEEDS OR REFINING REQUIREMENTS, OR IT MAY GO STRAIGHT INTO REDESIGNING. IT MAY BE THAT MORE THAN ONE ALTERNATIVE DESIGN FOLLOWS THIS ITERATIVE CYCLE IN PARALLEL WITH OTHERS, OR IT MAY BE THAT ONE ALTERNATIVE AT A TIME IS CONSIDERED. IMPLICIT IN THIS CYCLE IS THAT THE FINAL PRODUCT WILL EMERGE IN AN EVOLUTIONARY FASHION FROM A ROUGH INITIAL IDEA THROUGH TO THE FINISHED PRODUCT.

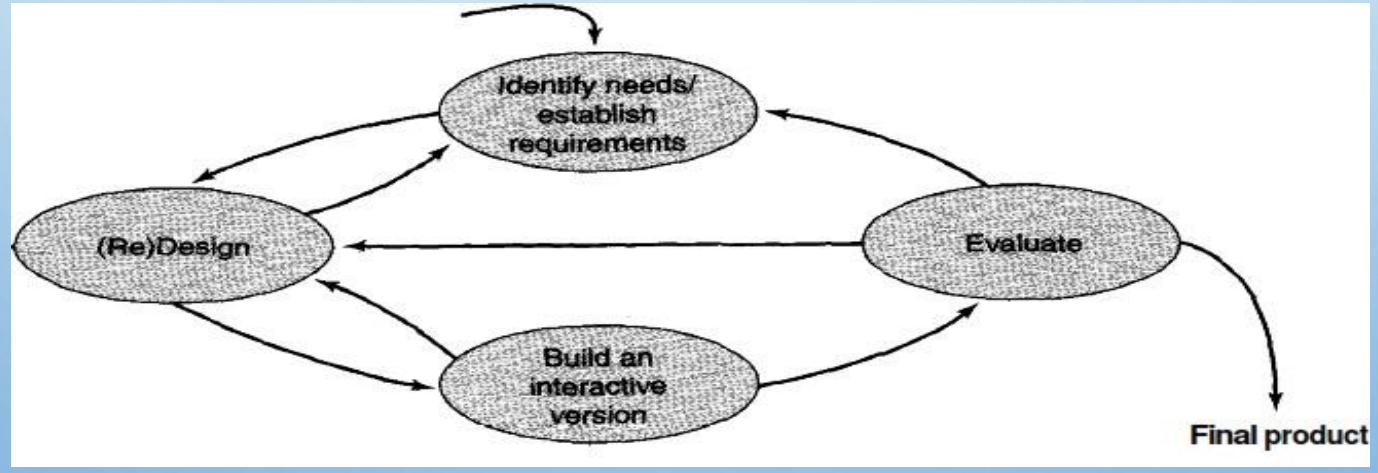

FIGURE (4.1) A SIMPLE INTERACTION DESIGN MODEL

4.3.2 LIFECYCLE MODELS IN SOFTWARE ENGINEERING

- SOFTWARE ENGINEERING HAS SPAWNED MANY LIFECYCLE MODELS, INCLUDING THE WATERFALL, THE SPIRAL, AND RAPID APPLICATIONS DEVELOPMENT (RAD).

❖ **THE WATERFALL LIFECYCLE MODEL**

- THE WATERFALL LIFECYCLE WAS THE FIRST MODEL GENERALLY KNOWN IN SOFTWARE ENGINEERING AND FORMS THE BASIS OF MANY LIFECYCLES IN USE TODAY. THIS IS BASICALLY A LINEAR MODEL IN WHICH EACH STEP MUST BE COMPLETED BEFORE THE NEXT STEP CAN BE STARTED (SEE FIGURE 4.2)

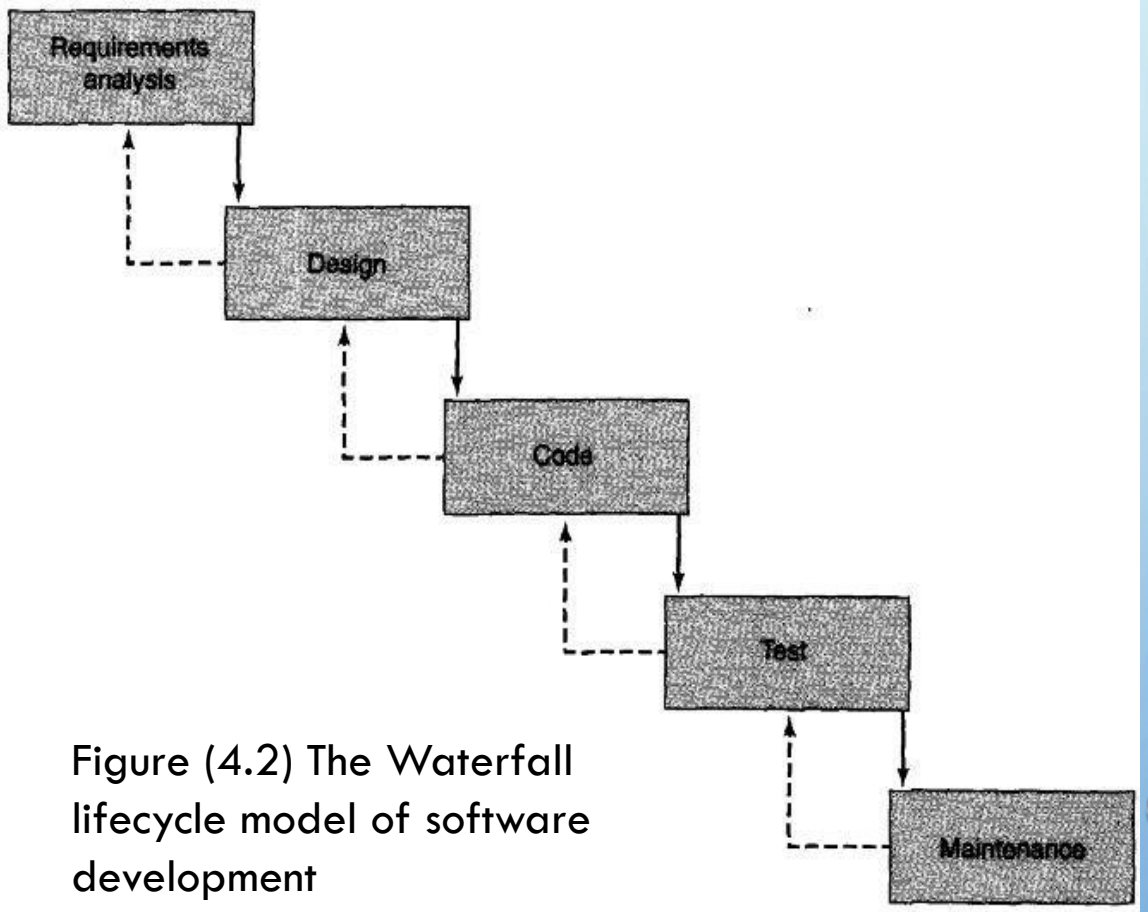

Figure (4.2) The Waterfall lifecycle model of software development

❖THE SPIRAL LIFECYCLE MODEL

FOR MANY YEARS, THE WATERFALL FORMED THE BASIS OF MOST SOFTWARE DEVELOPMENTS, BUT IN 1988 BARRY BOEHM (1988) SUGGESTED THE SPIRAL MODEL OF SOFTWARE DEVELOPMENT (SEE FIGURE 4.3). TWO FEATURES OF THE SPIRAL MODEL ARE IMMEDIATELY CLEAR FROM FIGURE 6.9: RISK ANALYSIS AND PROTOTYPING. THE SPIRAL MODEL INCORPORATES THEM IN AN ITERATIVE FRAMEWORK THAT ALLOWS IDEAS AND PROGRESS TO BE REPEATEDLY CHECKED AND EVALUATED. EACH ITERATION AROUND THE SPIRAL MAY BE BASED ON A DIFFERENT LIFECYCLE MODEL AND MAY HAVE DIFFERENT ACTIVITIES.

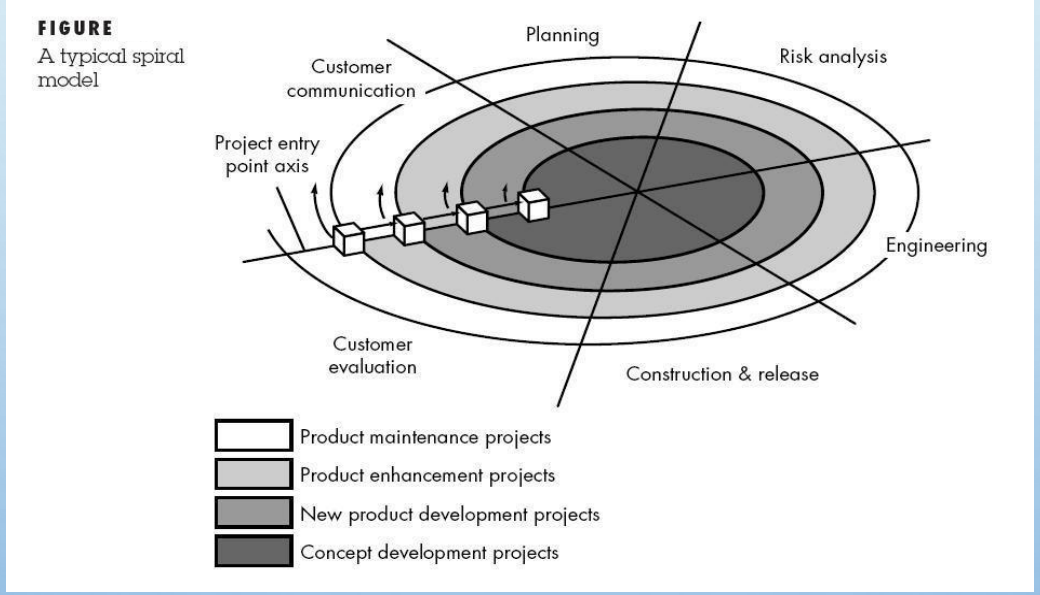

FIGURE (4.3) THE SPIRAL LIFECYCLE MODEL

- (RAD) APPROACH ATTEMPTS TO TAKE A USER-CENTERED VIEW AND TO MINIMIZE THE RISK CAUSED BY REQUIREMENTS CHANGING DURING THE COURSE OF THE PROJECT. THE IDEAS BEHIND RAD BEGAN TO EMERGE IN THE EARLY 1990S, ALSO IN RESPONSE TO THE INAPPROPRIATE NATURE OF THE LINEAR LIFECYCLE MODELS BASED ON THE WATERFALL. TWO KEY FEATURES OF A RAD PROJECT ARE:

❖ TIME-LIMITED CYCLES OF APPROXIMATELY SIX MONTHS, AT THE END OF WHICH A SYSTEM OR PARTIAL SYSTEM MUST BE DELIVERED. THIS IS CALLED TIME-BOXING. IN EFFECT, THIS BREAKS DOWN A LARGE PROJECT INTO MANY SMALLER PROJECTS THAT CAN DELIVER PRODUCTS INCREMENTALLY, AND ENHANCES FLEXIBILITY IN TERMS OF THE DEVELOPMENT TECHNIQUES USED AND THE MAINTAINABILITY OF THE FINAL SYSTEM.

❖ JAD (JOINT APPLICATION DEVELOPMENT) WORKSHOPS IN WHICH USERS AND DEVELOPERS COME TOGETHER TO THRASH OUT THE REQUIREMENTS OF THE SYSTEM (WOOD AND SILVER, 1995). THESE ARE INTENSIVE REQUIREMENTS-GATHERING SESSIONS WHICH DIFFICULT ISSUES ARE FACED AND DECISIONS ARE MADE. REPRESENTATIVES EACH IDENTIFIED STAKEHOLDER GROUP SHOULD BE INVOLVED IN EACH WORKSHOP THAT ALL THE RELEVANT VIEWS CAN BE HEARD.

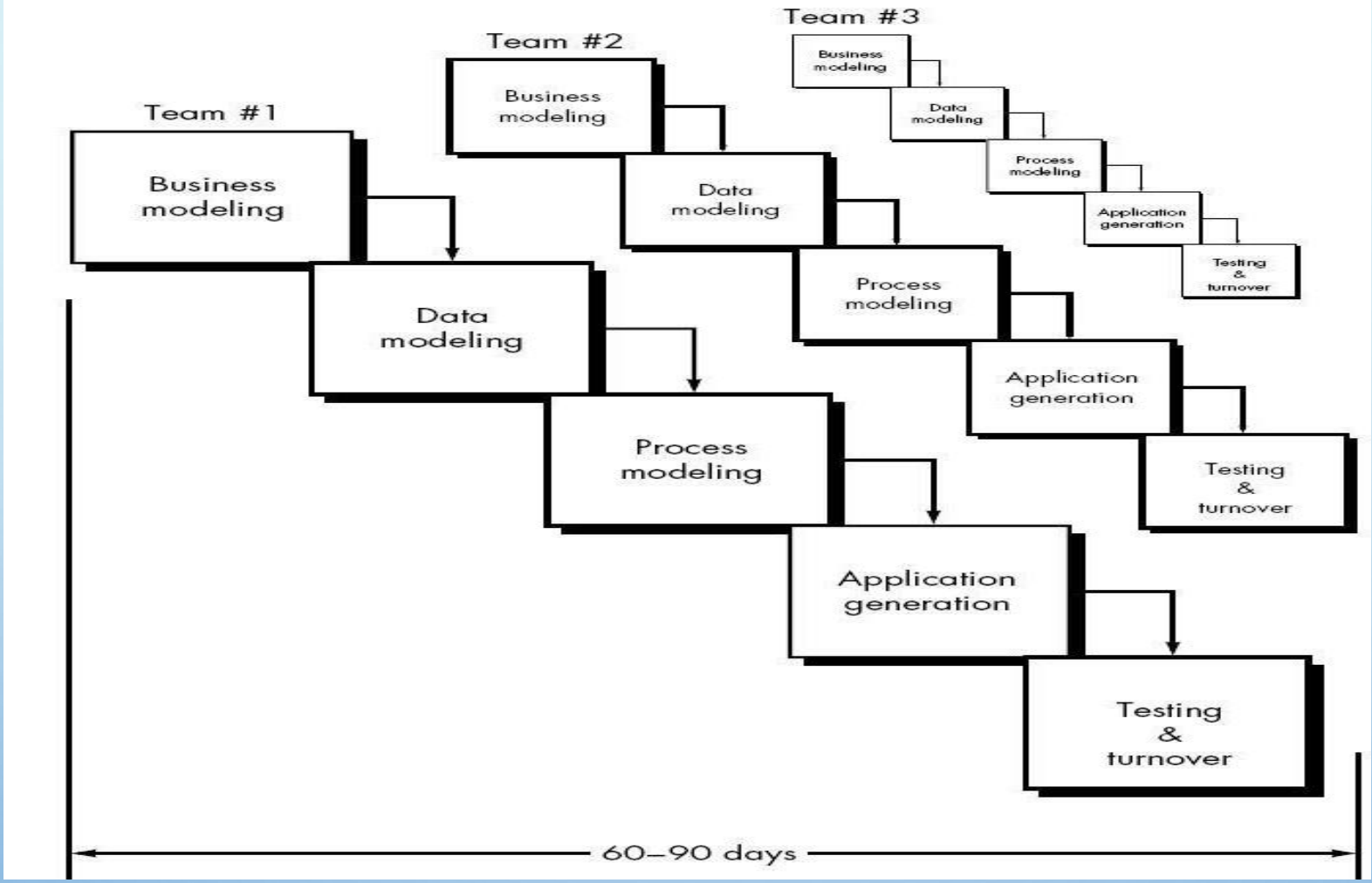

FIGURE (4.4) THE RAD MODEL

4.3.3 LIFECYCLE MODELS IN HCI

- ANOTHER OF THE TRADITIONS FROM WHICH INTERACTION DESIGN HAS EMERGED IS THE FIELD OF HCI (HUMAN - COMPUTER INTERACTION). FEWER LIFECYCLE MODELS HAVE ARISEN FROM THIS FIELD THAN FROM SOFTWARE ENGINEERING AND, AS YOU WOULD EXPECT, THEY HAVE A STRONGER TRADITION OF USER FOCUS. WE DESCRIBE TWO OF THESE HERE. THE FIRST ONE, THE STAR, WAS DERIVED FROM EMPIRICAL WORK ON UNDERSTANDING HOW DESIGNERS TACKLED HCI DESIGN PROBLEMS. THIS REPRESENTS A VERY FLEXIBLE PROCESS WITH EVALUATION AT ITS CORE. IN CONTRAST, THE SECOND ONE, THE USABILITY ENGINEERING LIFECYCLE, SHOWS A MORE STRUCTURED APPROACH AND HAILS FROM THE USABILITY ENGINEERING TRADITION.

❖ **THE *STAR* LIFECYCLE MODEL**

IN 1989, THE STAR LIFECYCLE MODEL WAS PROPOSED BY HARTSON AND HIX (1989) (SEE FIGURE 4.5). THIS EMERGED FROM SOME EMPIRICAL WORK THEY DID LOOKING AT HOW INTERFACE DESIGNERS WENT ABOUT THEIR WORK. THEY IDENTIFIED TWO DIFFERENT MODES OF ACTIVITY: ANALYTIC MODE AND SYNTHETIC MODE. THE FORMER IS CHARACTERIZED BY SUCH NOTIONS AS TOP -DOWN, ORGANIZING, JUDICIAL, AND FORMAL, WORKING FROM THE SYSTEMS VIEW TOWARDS THE USER'S VIEW; THE LATTER IS CHARACTERIZED BY SUCH NOTIONS AS BOTTOM-UP, FREE-THINKING, CREATIVE AND AD *HOC,* WORKING FROM THE USER'S VIEW TOWARDS THE SYSTEMS VIEW. INTERFACE DESIGNERS MOVE FROM ONE MODE TO ANOTHER WHEN DESIGNING A SIMILAR BEHAVIOR HAS BEEN OBSERVED IN SOFTWARE DESIGNERS (GUINDON,1990

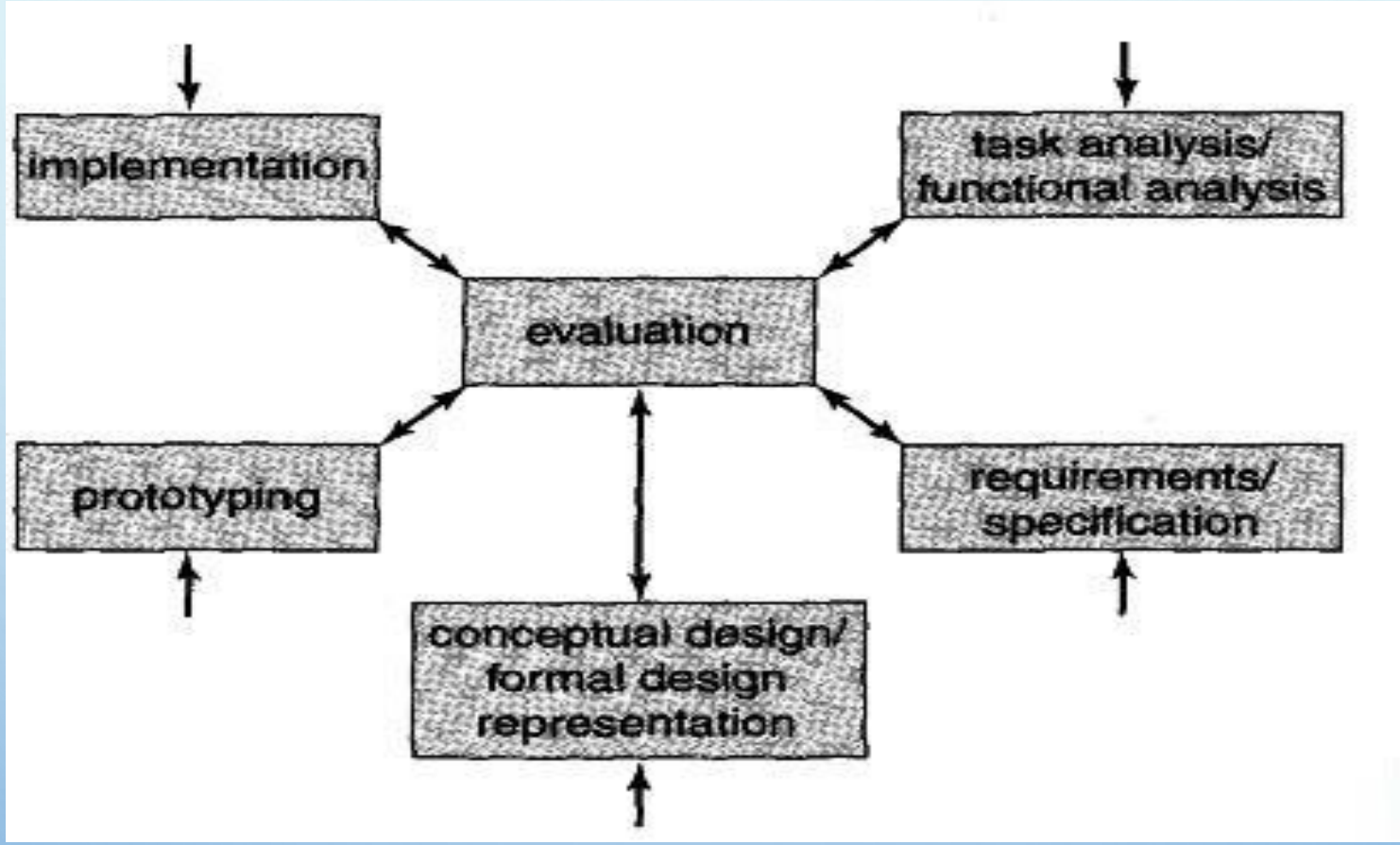

FIGURE 4.5 THE STAR LIFECYCLE MODEL

❖THE USABILITY ENGINEERING LIFECYCLE

- THE USABILITY ENGINEERING LIFECYCLE WAS PROPOSED BY DEBORAH MAYHEW IN 1999 (MAYHEW, 1999). THE LIFECYCLE ITSELF HAS ESSENTIALLY THREE TASKS: REQUIREMENTS ANALYSIS, DESIGN, TESTING, DEVELOPMENT, AND INSTALLATION, WITH THE MIDDLE STAGE BEING THE LARGEST AND INVOLVING MANY SUBTASKS (SEE FIGURE 4.6). NOTE THE PRODUCTION OF A SET OF USABILITY GOALS IN THE FIRST TASK. MAYHEW SUGGESTS THAT THESE GOALS BE CAPTURED IN A STYLE GUIDE THAT IS THEN USED THROUGHOUT THE PROJECT TO HELP ENSURE THAT THE USABILITY GOALS ARE ADHERED TO

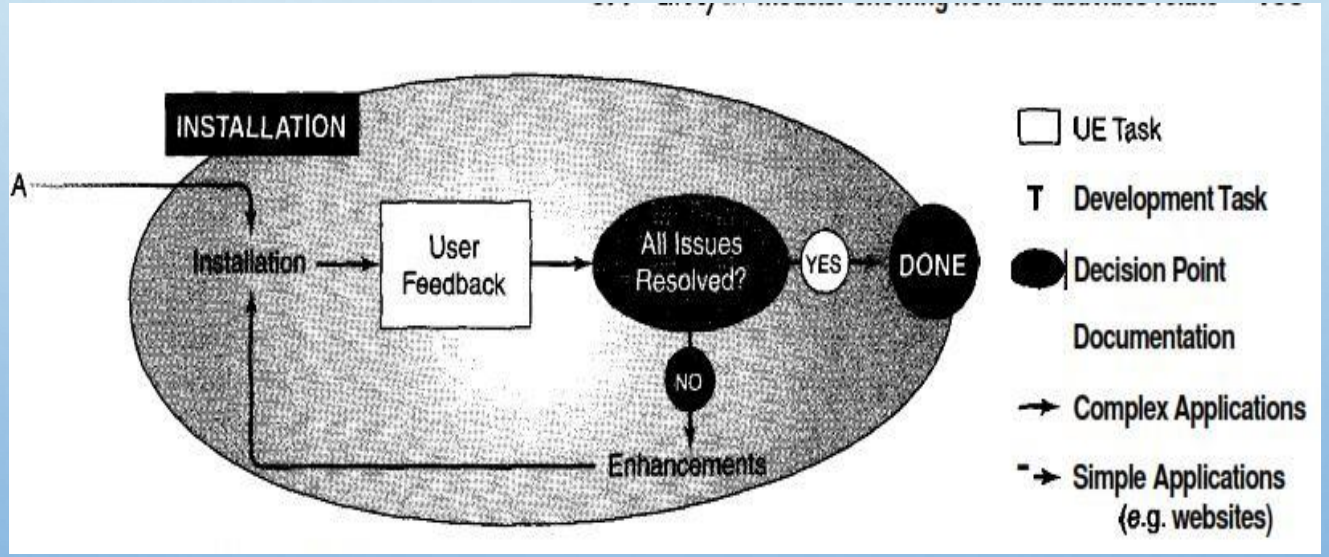

FIGURE (4.6) USABILITY ENGINEERING LIFECYCLE (CONTINUED)