GIS Implementation part 1

Implementation challenges
Key issues
Effect
Consequences

GIS management

http://inbusinessmagcom.c.presscdn.com/wp-content/uploads/2014/05/blind_0614.png

GIS management

The first aspect of understanding and successfully accomplishing GIS **implementation** and **management** is to fully <u>understand the GIS implementation process</u>   *Somers 1993–2001*

Developing GIS

no recipe for the GIS implementation
no cookie-cutter formula..

..but

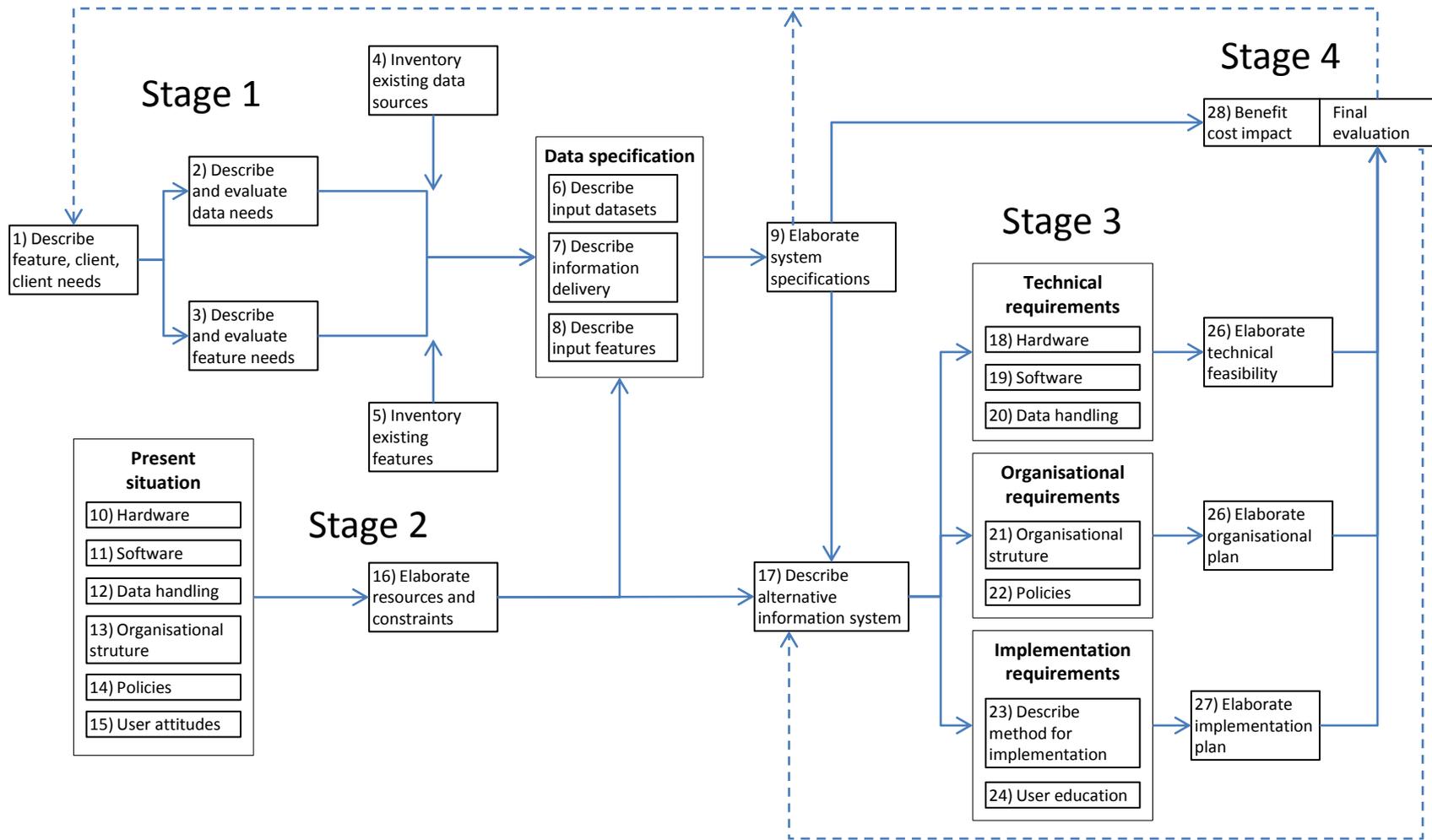there are general procedures and processes which can help..

..and

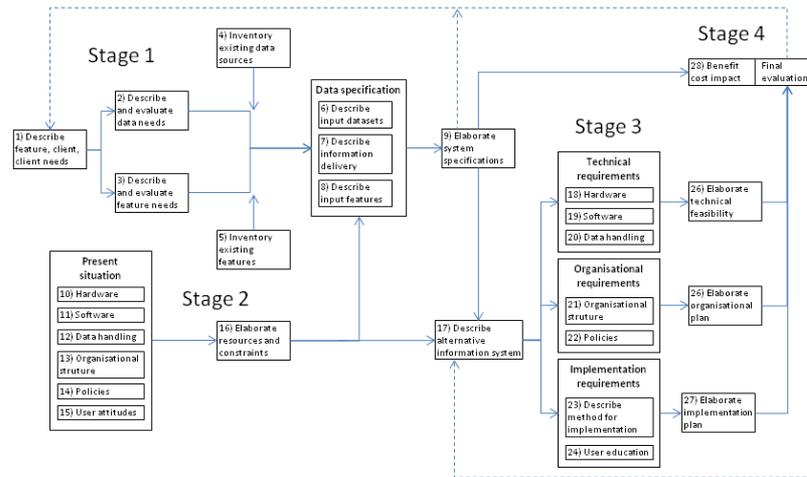do not forget the K.I.S.S. principle

Developing GIS

I. Tomlinson

II. Calkins

III. Marble and Wilcox

IV. GeoCRAFT

V. Waterfall

Developing GIS - Tomlinson
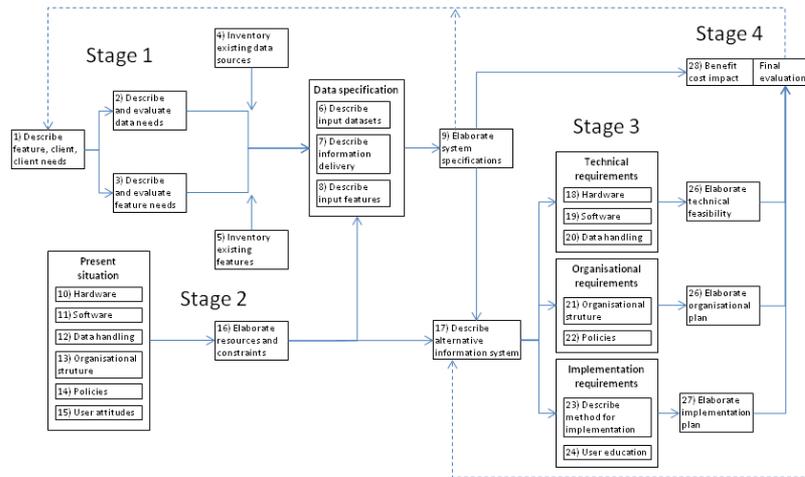
Developing GIS - Tomlinson

- Stage **one** begins with an assessment of the vision and goals of the project.
- Stage **two** identify the resources and constraints of the GIS project.
- Stage **three** involves the comparison of the system specification derived with the identified resources and constraints.
- The final stage, stage **four**, entails a final evaluation of the system.

Developing GIS - Tomlinson


- Stage one begins with an assessment of the vision and goals of the project.
- The second step defines the organization's functional needs and requirements followed by the identification of data needs.
- Stage one concludes with the definition of specifications for the objective system.

The steps of stage one reflect the first three steps of the traditional waterfall model.

Developing GIS - Tomlinson
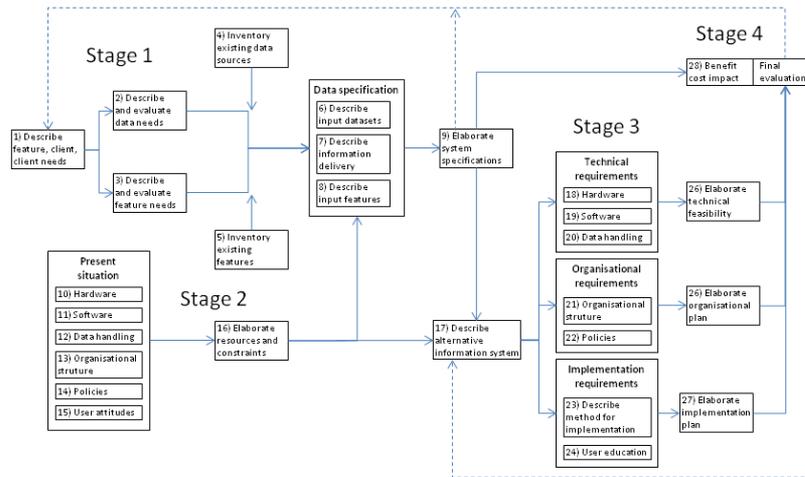
- Stage two identifies the resources and constraints of the GIS project, in particular hardware and software resources, and the culture and structure of the organization are identified.
- Consideration of the organizational context has been recognized as an essential component of GIS design and implementation from the beginnings of GIS-specific design methodologies.

Stage two is a departure from the traditional waterfall model

Developing GIS - Tomlinson
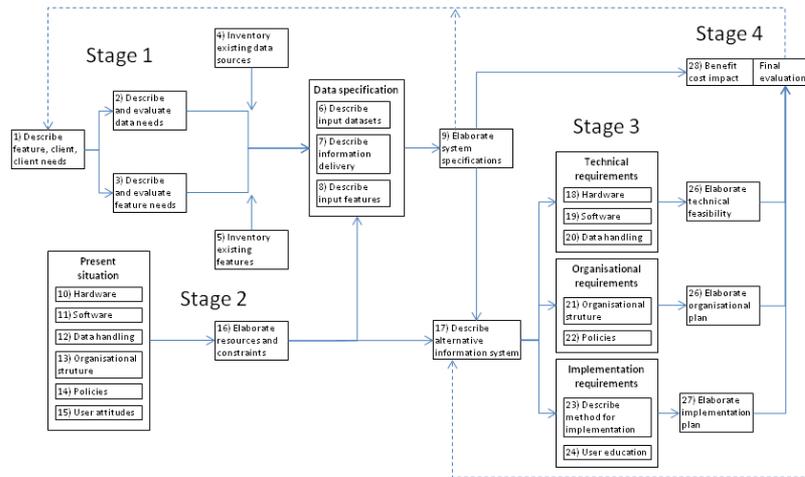
- Stage three involves the comparison of the system specification derived in stage one with the resources and constraints identified in stage two.
  A notable inclusion is step 24, which calls for the description of user education needs.

Stage three refer to design-construction steps in a waterfall model.

Developing GIS - Tomlinson
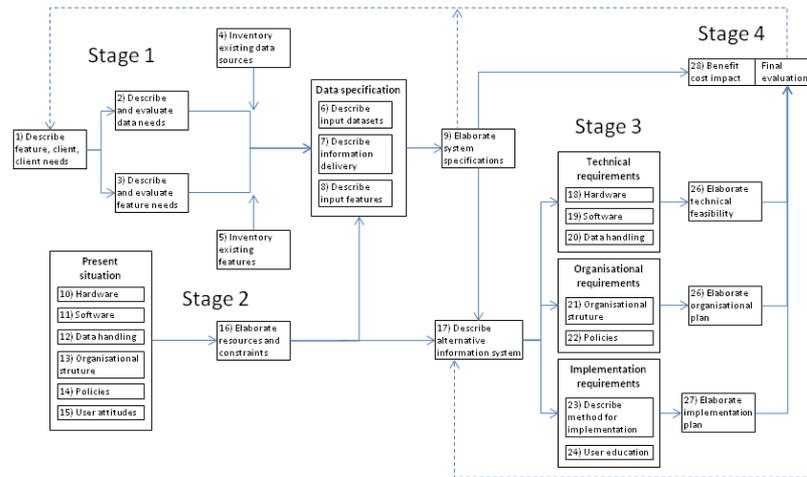
- Stage four entails a final evaluation of the system. Three possible directions:
  - The system can be implemented, if it is deemed satisfactory.
  - The project can return to the first step of stage one to reassess the original requirements of the system.
  - An alternative system can be defined to meet the previously determined needs

Developing GIS - Tomlinson
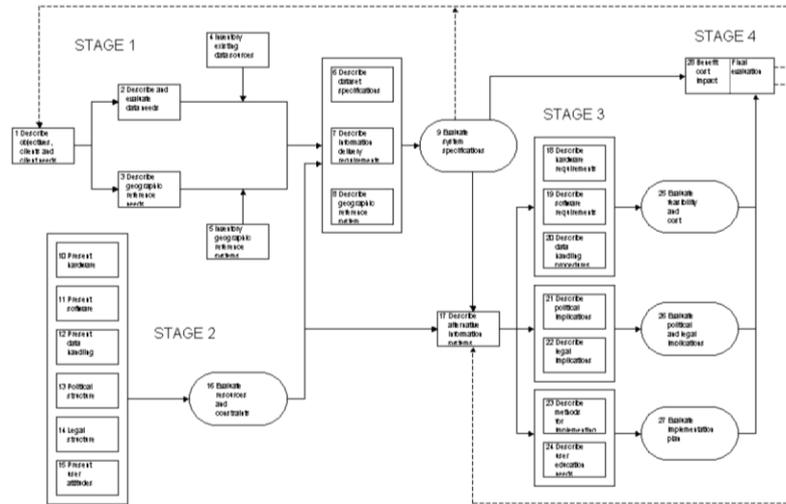
- This methodology is straightforward and simple to follow.
- In the initial definition of requirements, user involvement is not specified.
- The feedback mechanisms in this methodology are important and necessary.
- This methodology partially meets only two of the requirements: an iterative feedback mechanism exists and user education is specified. The other requirements (i.e., organization-wide participation, emphasis on communication, and effective group-work environments) are not explicitly addressed.

Developing GIS - Calkins

Developing GIS - Calkins
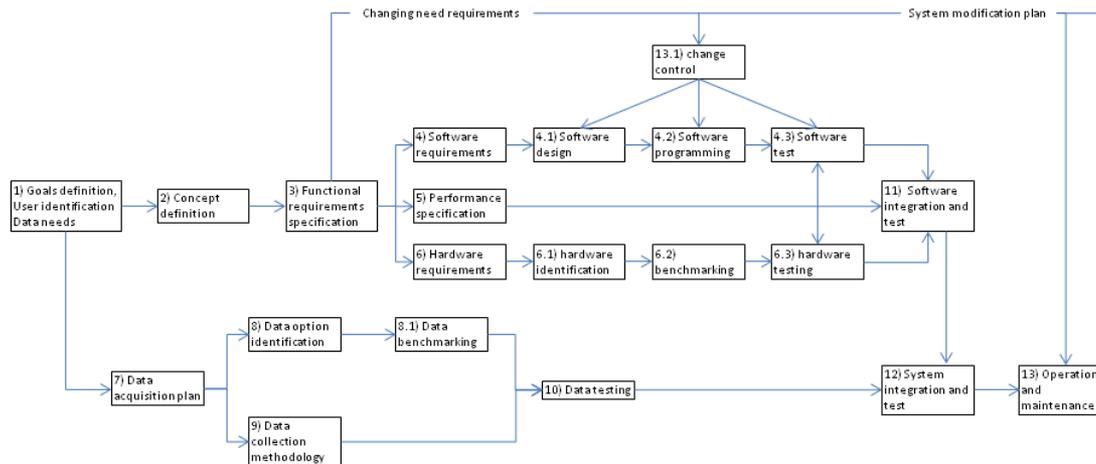
The Calkins methodology begins with the definition of objectives and requirements.

The methodology then divides into two paths:
1. pursues issues of data,
2. pursues the issue of acquiring hardware and software.

By dividing the methodology in such a way, a stronger emphasis is placed on the data requirements and needs.

The Calkins methodology encourages the testing evaluation in every step of the process

Developing GIS - Marble and Wilcox
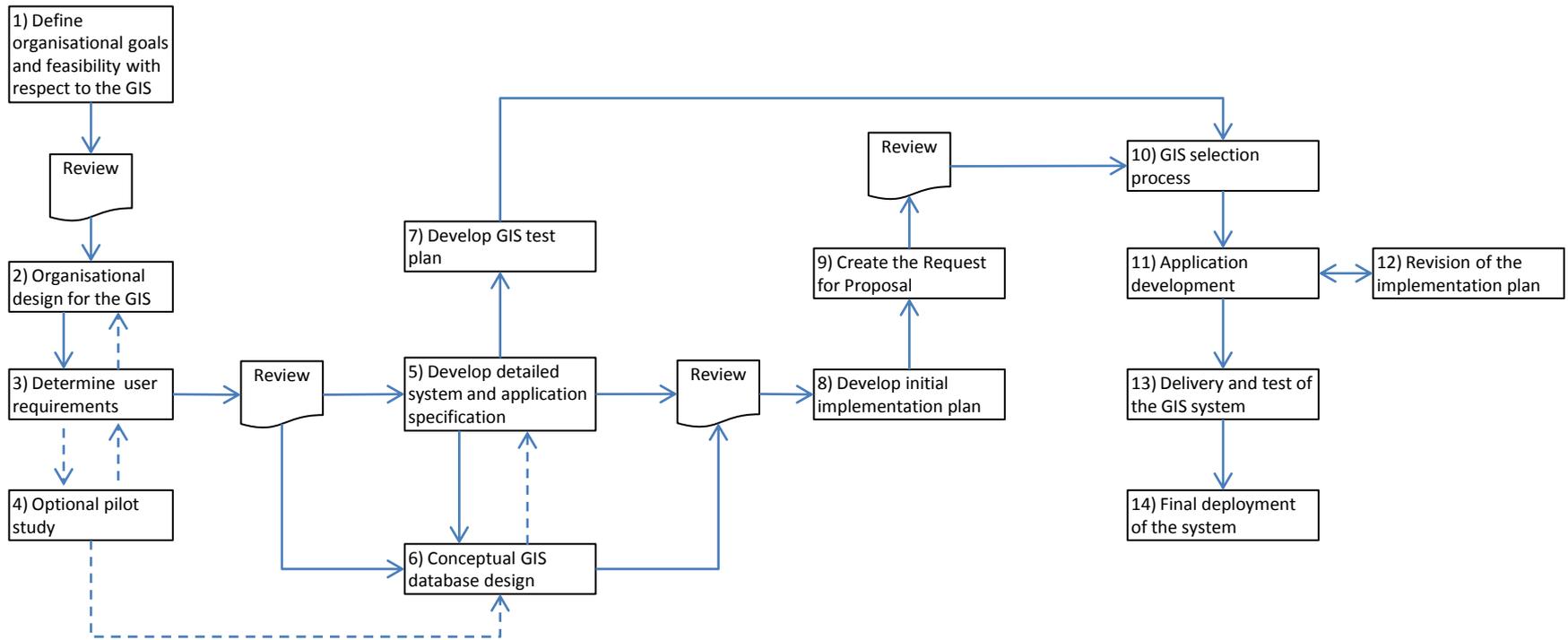
Developing GIS - Marble and Wilcox
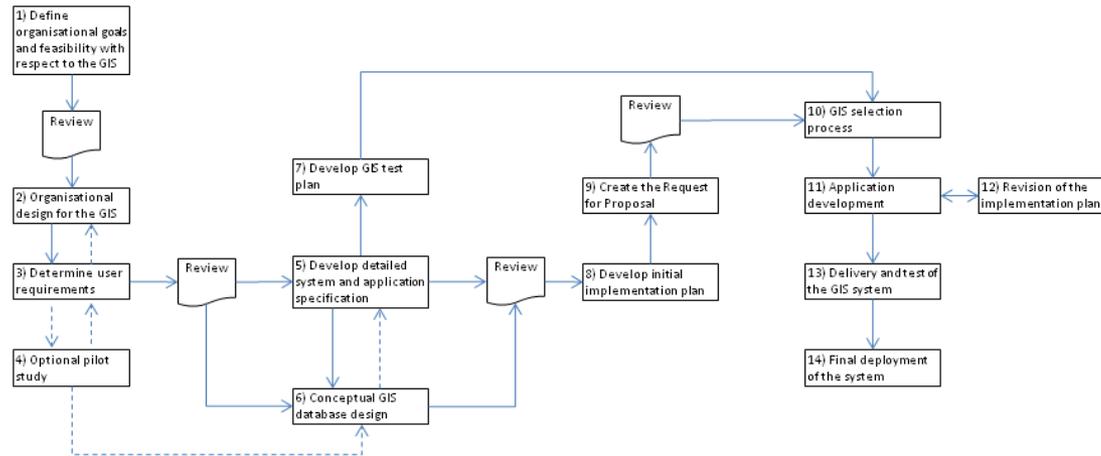
- Marble and Wilcox developed a methodology that combines the Calkins methodology with concepts from software engineering.
- In this diagram, a step for optional pilot studies is shown. The pilot study step consists of a reduced version of the entire methodology, where a physical product is generated, usually consisting of a simplified database and some commercial GIS software package acquired for evaluation purposes.
- The report are the Blueprint documents already described by Tomlinson
- The Marble and Wilcox methodology lacks an explicit education process.

Developing GIS - GeoCRAFT


```
1) Project idea  →  2) Project          3) Set goal and
                     formulation            cost estimation
                     and plan

4) Present       →  5) Functional    →  6) Feasibility   →  7) Set goal and
   system study       requirements         analysis            cost estimation

8) Create the    →  9) System        →  10) Risk         →  11) Set goal
   RFP                selection            analysis             and cost
                                                               estimation

12) Executive    →  13)              →  14) prototype    →  15) Set goal
    project            Development                               and cost
                                                                estimation

16) Conversion   →  17) pilot        →  18) Full
                                         implementation
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Developing GIS - GeoCRAFT
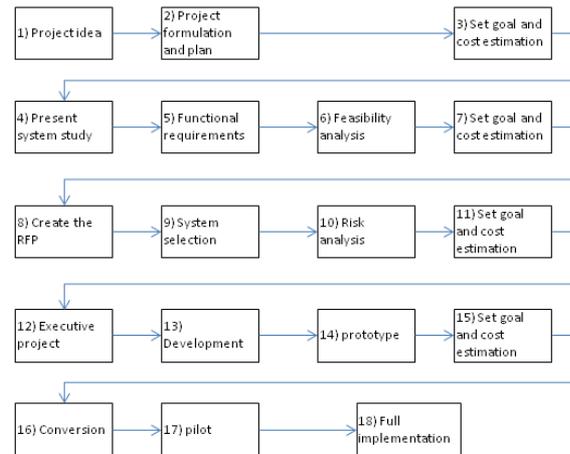
Three aspects of this planning process merit special attention.

1. **Setting goals and estimating costs.** Each stage of the project lifecycle process involves setting clear goals for the next step and estimating the cost of reaching those goals

2. **The functional requirements study**. The FRS is devoted to what information is required for a project, how it is to be used, and what final products will be produced by the project.

3. **The creation of a prototype**. Prototypes are a critical step because they allow the system to be tested and calibrated to see whether it meets expectations and goals

Developing GIS - Somers

| | Decide | Design | Develop | Deploy |

Planning
- Scope
- Resources
- General Plan

Requirement analysis
- User needs
- Data handling

Design
- Geodatabase
- System architecture
- Organisation & management

Acquisition & development
- Geodatabase
- System architecture
- Personal

Operation & maintenance
- Documentation
- User education

From Somers 2001. GIS Implementation and Management
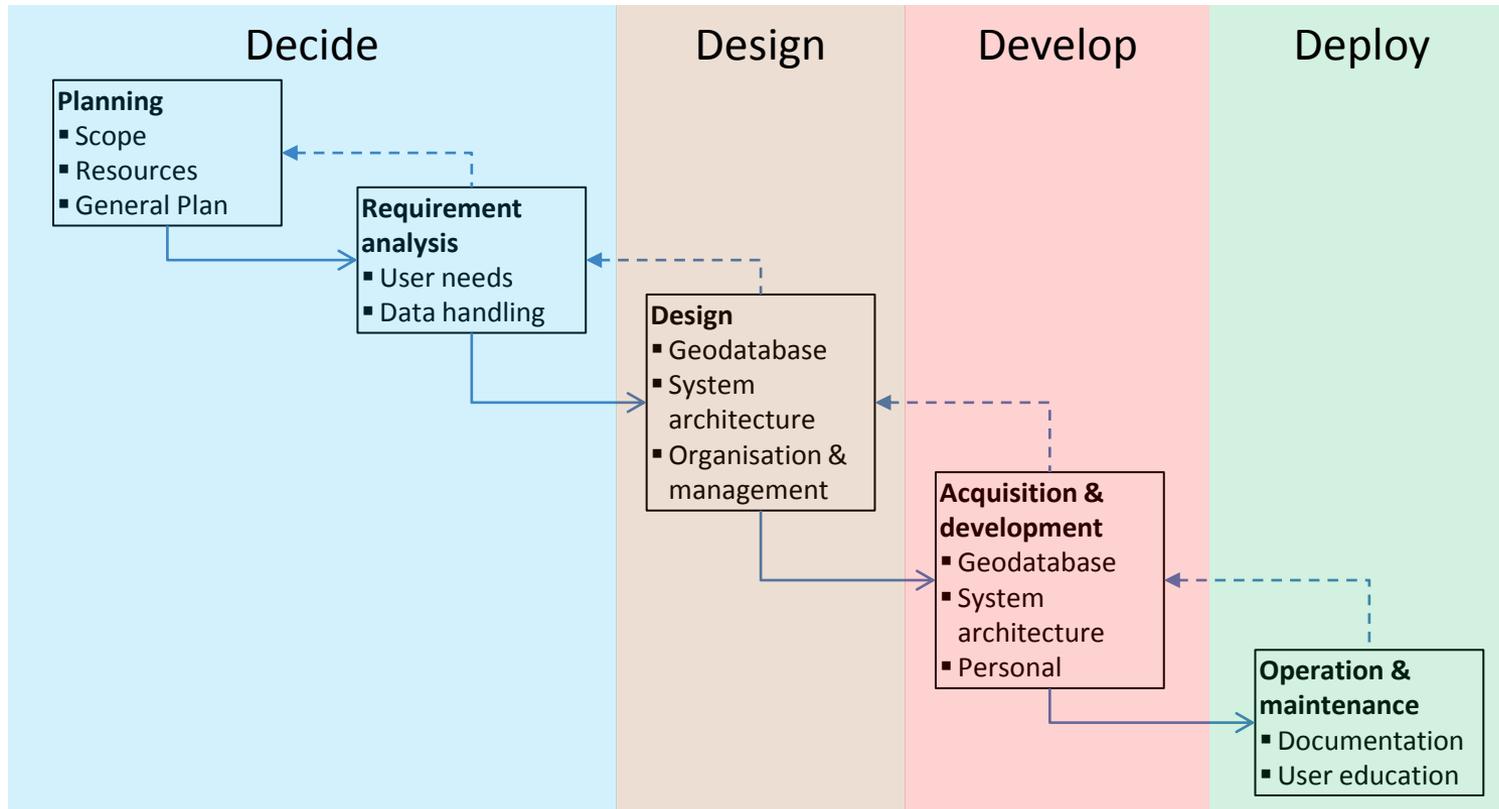
Developing GIS - Somers

The process involves five basic phases:

1. **Planning**. Defining the scope of the GIS and developing a general plan;
2. **Analysis**. Determining users' specific GIS requirements;
3. **Design**. Integrating all requirements and developing GIS specifications;
4. **Acquisition and development**. Acquiring software, hardware, and data, and putting them together in a system tailored to the organization;
5. **operations and maintenance**. Using the GIS and maintaining the system

The process includes feedback loops from each step indicating that information gained in one task may require reexamining a previous task

Developing GIS - Agile
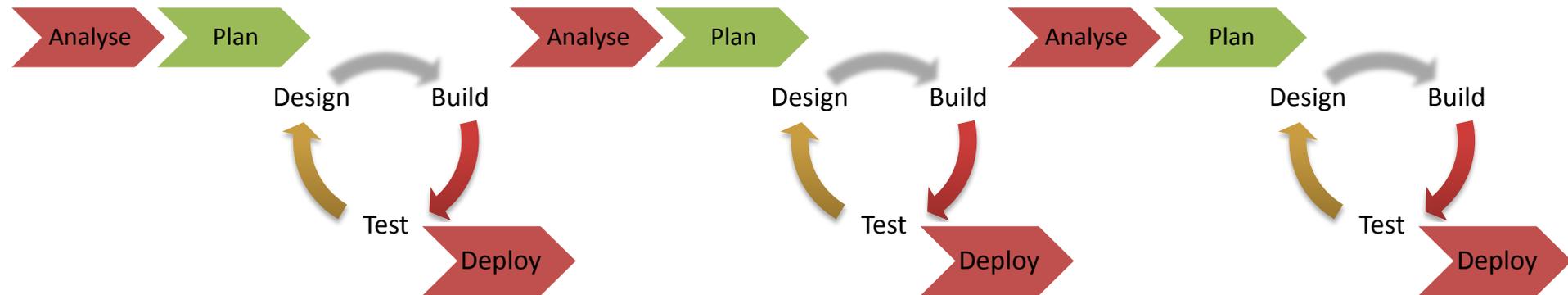
The iterative and incremental SW development methodologies key features are:
- Incremental prototyping
- Develop high-risk and high-value elements early
- Re-use existing components
- Use of time-saving development tools
- Strong emphasis on user participation

Developing GIS

Stage 1

1) Describe feature, client, client needs
2) Describe and evaluate data needs
3) Describe and evaluate feature needs
4) Inventory existing data sources
5) Inventory existing features

Data specification
6) Describe input datasets
7) Describe information delivery
8) Describe input features

9) Elaborate system specifications

Present situation
10) Hardware
11) Software
12) Data handling
13) Organizational struture
14) Policies
15) User attitudes

Stage 2
16) Elaborate resources and constraints
17) Describe alternative information system

Stage 3

Technical requirements
18) Hardware
19) Software
20) Data handling
26) Elaborate technical feasibility

Organisational requirements
21) Organizational struture
22) Policies
26) Elaborate organisational plan

Implementation requirements
23) Describe method for implementation
24) User education
27) Elaborate implementation plan

Stage 4
28) Benefit cost impact   Final evaluation

Changing need requirements — System modification plan

13.1) change control

1) Goals definition, User identification Data needs
2) Concept definition
3) Functional requirements specification
4) Software requirements
4.1) Software design
4.2) Software programming
4.3) Software test
5) Performance specification
6) Hardware requirements
6.1) hardware identification
6.2) benchmarking
6.3) hardware testing
11) Software integration and test

7) Data acquisition plan
8) Data option identification
8.1) Data benchmarking
9) Data collection methodology
10) Data testing
12) System integration and test
13) Operation and maintenance

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1) Define organisational goals and feasibility with respect to the GIS
Review
2) Organisational design for the GIS
3) Determine user requirements
Review
4) Optional pilot study
5) Develop detailed system and application specification
Review
6) Conceptual GIS database design
7) Develop GIS test plan
Review
8) Develop initial implementation plan
9) Create the Request for Proposal
10) GIS selection process
11) Application development
12) Revision of the implementation plan
13) Delivery and test of the GIS system
14) Final deployment of the system

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1) Project idea
2) Project formulation and plan
3) Set goal and cost estimation
4) Present system study
5) Functional requirements
6) Feasibility analysis
7) Set goal and cost estimation
8) Create the RFP
9) System selection
10) Risk analysis
11) Set goal and cost estimation
12) Executive project
13) Development
14) prototype
15) Set goal and cost estimation
16) Conversion
17) pilot
18) Full implementation

Planning
• Scope
• Resources
• General Plan

Requirement analysis
• User needs
• Data handling

Design
• Geodatabase
• System architecture
• Organisation & management

Acquisition & development
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Operation & maintenance
• Documentation
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Analyse   Plan   Design   Build   Test   Deploy