Project Management

Introduction to Systems Engineering
I2ISE

Introduction

- Why do we need project management?
- Groups vs. teams
- Team roles and activities
- Maintaining a team – group AC
- Project planning and estimation
- Risk management

Why project management?

- Discussion: Your experiences on project work?
  - What is important for success?
  - What could be possible obstructions?

Project teams,
roles and activities


1

Groups vs teams

- What is the difference between a *group* and a *team*?

GROUP	TEAM
Individual accountability	*Individual* and *mutual* accountability
Meet to share information	Meet to discuss, make decisions, solve problems, planning
Focus on *individual* goals	Focus on *team* goals
Produce *individual* work products	Produce *collective* work products
Define *individual* roles, responsibilities, and tasks	Define individual roles, responsibilities, and tasks *to help team do its work*
Concerned with *individual's* outcome and challenges	Concerned with *team* outcome and challenges
Purpose, goals, approach to work shaped by *manager*	Purpose, goals, approach to work shaped by team leader *with team members*

Nobody is perfect – but a team can be

”A group is a matter of balance. Good team-members has strengths and competencies which cover the needs of the group – without doubling strengths and competencies already present. Strengths possessed by some team-members can compensated weaknesses in others. ***Nobody is perfect – but a team can be.”***

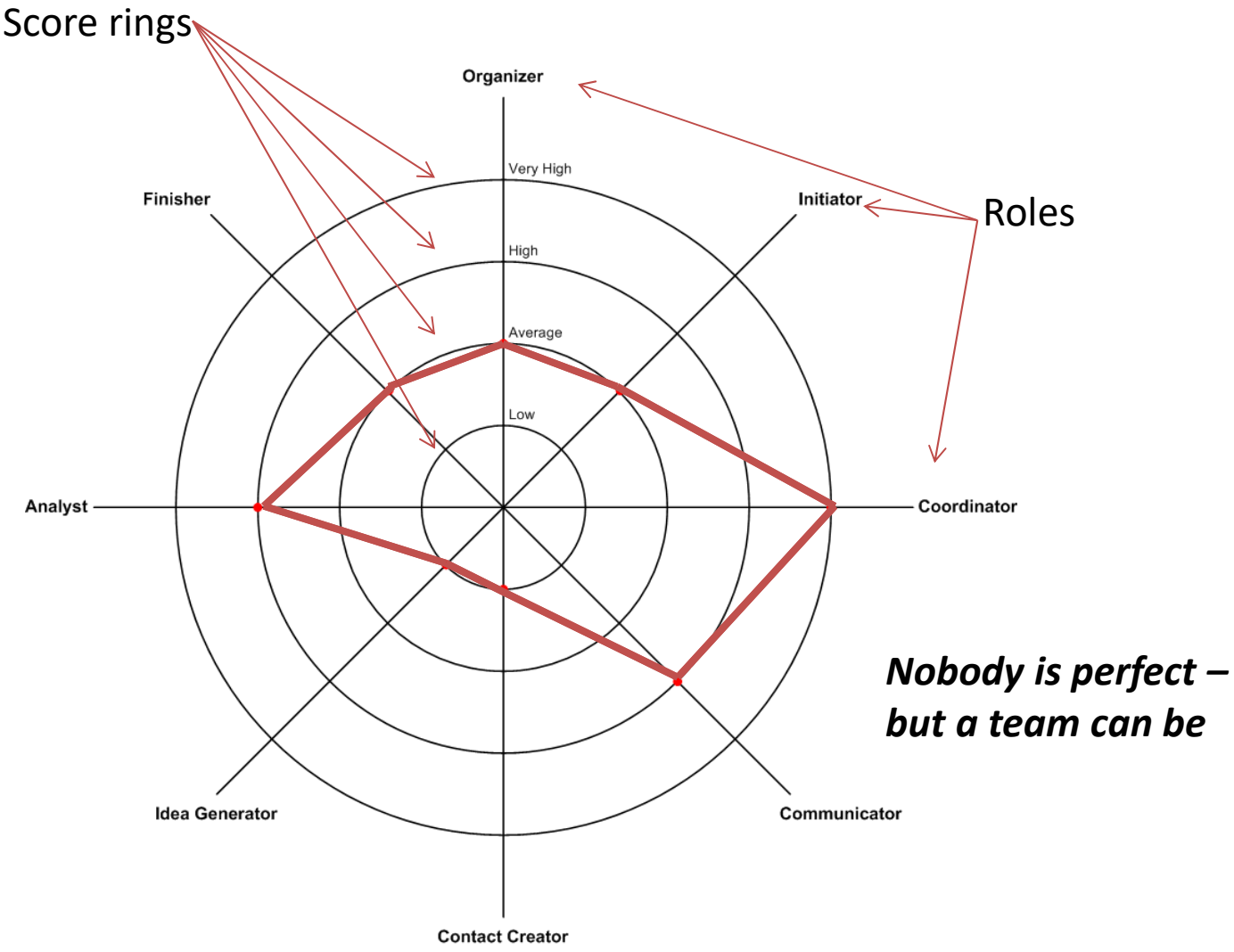
Dr. Meredith Belbin - http://www.belbin.com/

Belbin team roles

Type	Positive qualities	Allowable weaknesses
Organiser	Organizing, disciplined, turns ideas into practical actions. Hard working.	Less flexible Skeptical to unproven ideas
Analyst	Sober, strategic. Sees all options. Judges accurately. High intellect.	Lacks drive and ability to inspire others.
Idea generator	Dominating, high intellect. Creative, imaginative, unorthodox.	Ignores routine questions. Too focused on the special problems.
Finisher	Mindful, anxious. Finds errors and omissions. Delivers on time.	Inclined to worry unduly. Reluctant to delegate.
Coordinator	Stable, dominant. Good chairperson, clarifies goals, promotes decision-making, delegates well.	Can be seen as manipulative. Off loads personal work.
Commu-nicator	Stable. Low dominance. Co-operative, mild, perceptive and diplomatic. Listens, averts friction.	Indecisive in crunch situations.
Contact creator	Stable, dominant, enthusiastic, communicative, develop contacts.	Over-optimistic. Looses interest once initial enthusiasm has passed.
Initiator	Impatient, dominant, challenging, dynamic, thrive on pressure.	Prone to provocation. Offends peoples feelings.

http://www.persontests.dk/personlighedstests/belbin/

Belbin team roles - Belbin chart



Nobody is perfect – but a team can be

Traditional team roles

- Traditionally, in a team there are some well-known *roles:*
  - Project manager
  - Team members
  - Secretary
- All members assume (at least) one role
- With a role comes *tasks* and *responsibilities*

Team roles – project manager

- What is the project manager's tasks?
  - Manage expectations - internally (team) and externally (stakeholders)
  - Seek information – from team and stakeholders
  - Conduct planning - tasks, plans, manning, preferably with the team
  - Keep information level up - internally and externally
  - Display team culture and behaviour
  - Be the team lightning rod / shield
  - Report to steering comittee
  - …

Team roles – the team members

- What requirements are fair to have to team members?
  - There’s no ”I” in ”team”
  - Responsible
  - Tolerant
  - Loyal to decisions
  - Self-reliant and self-driving
  - Honest
  - Display ”due dilligence”

Teams go through *phases*

Forming	team begins to discuss the task(s) and orientate towards a work plan
Storming	conflicts and tensions emerge - different work styles, expectations, ethics, …
Norming	mutual trust and effective ways of working emerge
Performing	effective work patterns are producing the required results

Adizes speech on ”What is a leader?”

Leadership part 1:

http://www.youtube.com/watch?v=47laMl35kOk&feature=related

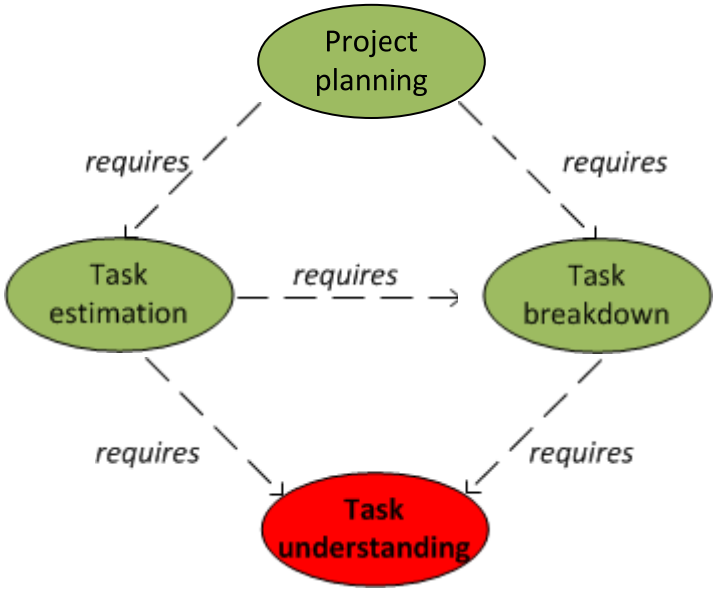
Leadership part 2:

http://www.youtube.com/watch?v=tEIABc1Wbb4&feature=relmfu

Project planning

Project planning

- To have a succesful project, you will need a *plan*



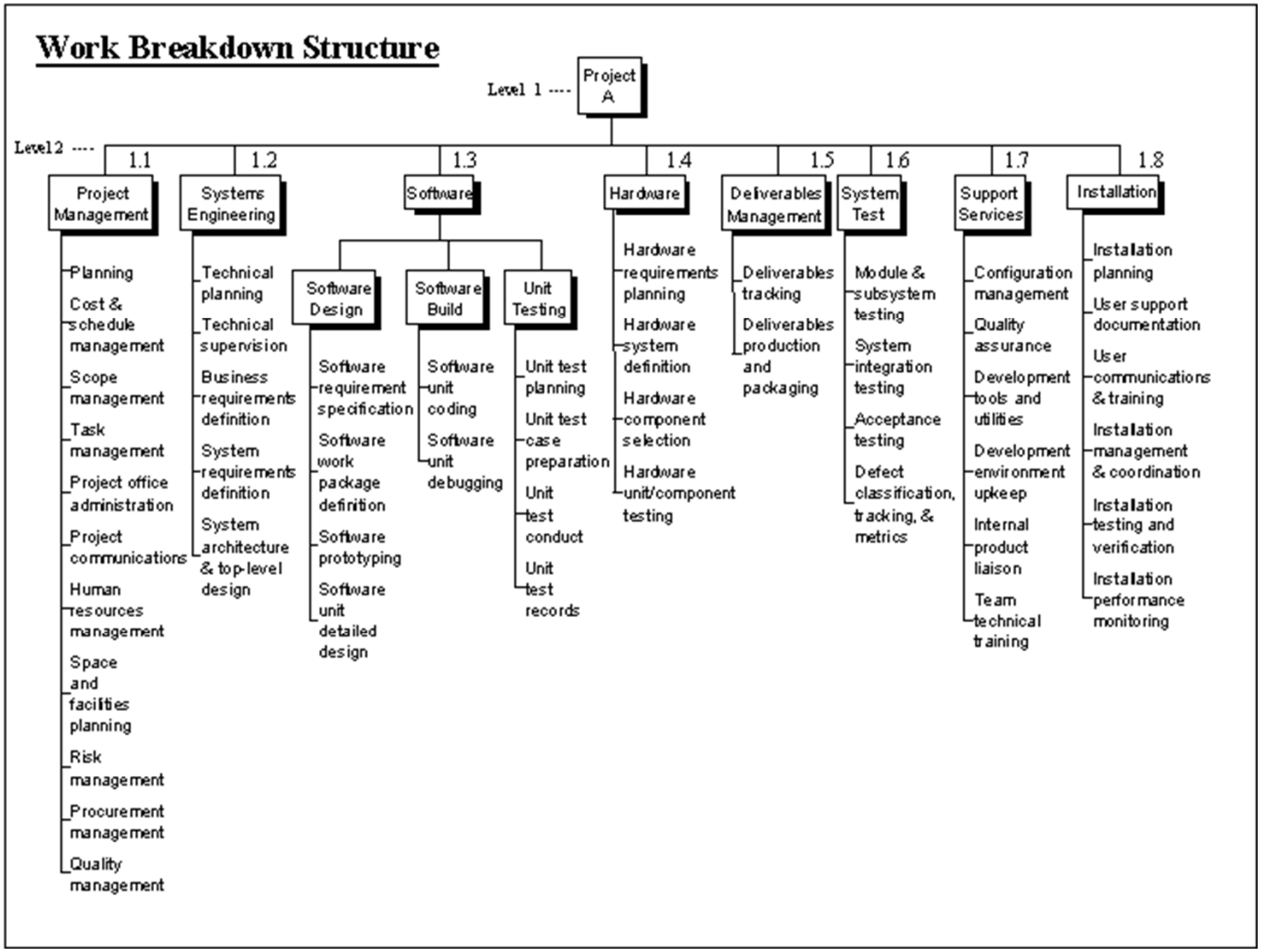
- Thus, to *plan*, we first need to *understand what to plan*!

Planning activities

Project planning is a ***continuous*** activity

- **Initially**
  - Break project down into manageable *work packages*
  - Identify *activities* and *milestones*
  - Make *estimates (Estimated Time to Complete* (ETC))
  - Allocate *resources*
  - Create the plan itself
- **Continuously**
  - Monitor project status and progress
  - Monitor time spent/remaining, compare with milestones
  - Adjust plan/scope of milestones, etc.

Project *Work Breakdown Structure* (WBS)

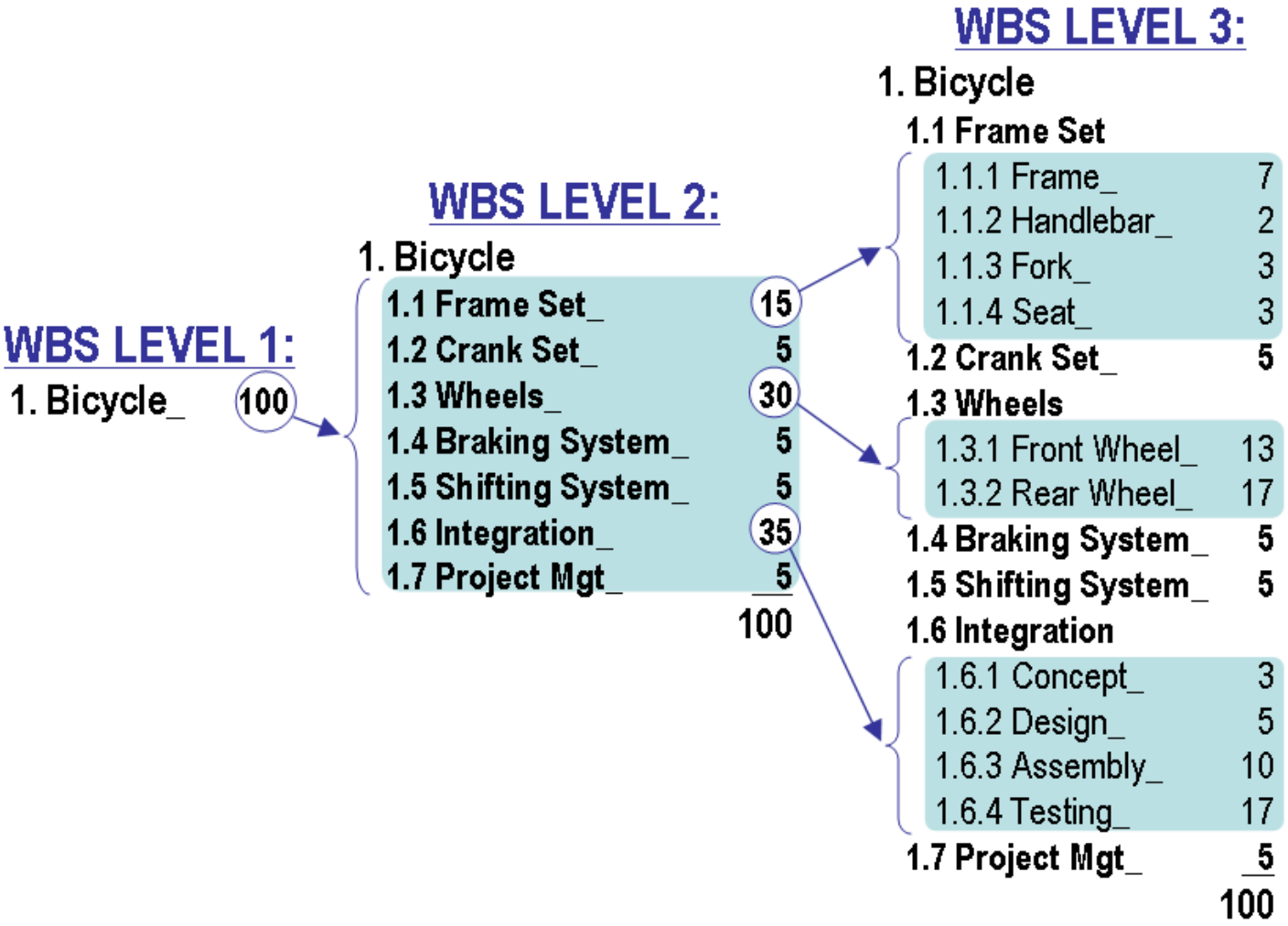


Source: http://itsadeliverything.com/got-a-wbs-for-your-agile-project-sure-of-course

Planning – WBS

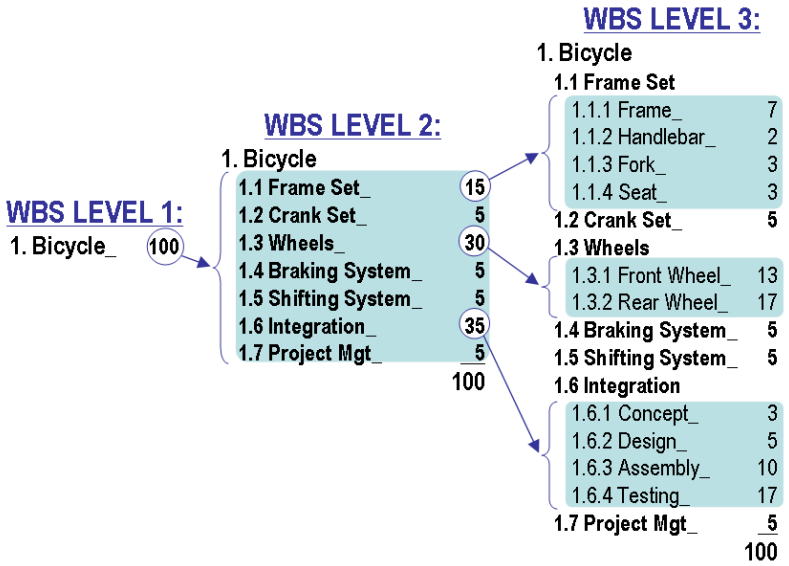
- The work in a project can be broken down in a *Work Breakdown Structure* (WBS)
  - A tree structure containing ever-finer divisions of work
- The WBS leaves should be managable, well-defined, ”estimatable” pieces of work
  - *Terminal elements* or *work packages (WPs)*
- The WBS is the basis of further planning, e.g. time, cost, manpower, dependencies, …

Planning – WBS



WBS design principles

- 100% rule (recursive)
- Plan *outcomes*, not *actions*
  - This does *not* have to be physical products



Example

Introduction to Cartoon Heros (I2ICH1) project:

”Give a description on the three classical cartoon heroes, Superman, Batman, and Spiderman. Compare the three and conclude who would win if they got into a fight”

Example

Exercise 1: A WBS for the project

(Think planning, writing, reviewing, etc.)

”Give a description on the three classical cartoon heroes, Superman, Batman, and Spiderman. Compare the three and conclude who would win if they got into a fight”

I2ICH project: Example WBS

WP	Task Name
1	Plan detailed contents
2	Create document template
3	Write contents
4	Create artwork
5	Review and corret report
6	Finish report
7	Hand in report
8	Project Management

I2ICH project: Example WBS

WP	Task Name
1	**Plan detailed contents**
1.1	Introduction
1.2	**Presentation of characters**
1.2.1	Spiderman section
1.2.2	Superman section
1.2.3	Batman section
1.3	Comparison
1.4	Conclusion
2	**Create document template**
3	**Write contents**
3.1	Introduction
3.2	**Presentation of characters**
3.2.1	Spiderman section
3.2.2	Superman section
3.2.3	Batman section
3.3	Comparison
3.4	Conclusion
4	**Create artwork**
4.1	Front page
4.2	Spiderman
4.3	Superman
4.4	Batman
5	**Review and corret report**
5.1	Review
5.2	Corrections
6	**Finish report**
6.1	Print contents
6.2	Print front page
6.3	Collect front page and contents
6.4	Bind report
7	**Hand in report**
8	**Project Management**

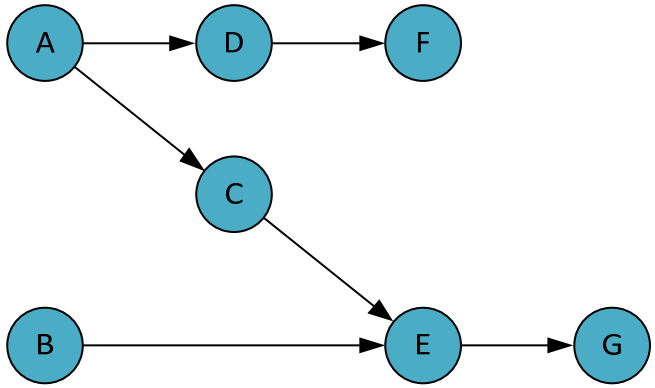
Planning

- Once the project is broken down, you can start to *estimate* and *schedule* your work

- One way to do this:
  - List your WBSs
  - Estimate time to complete (e.g. $\mathrm{ETC} = \frac{P+4*N+O}{6}$)
  - Determine dependencies
    - *”C cannot start before A and B is complete…”*
  - Determine ”critical path”
    - The path which, if delayed, delays the project as a whole

WBS, duration and predecessors

Activity	Predecessor	Time estimates			Expected time
		Opt. (*O*)	Normal (N)	Pess. (*P*)	
A	—	2	4	6	4.00
B	—	3	5	9	5.33
C	*A*	4	5	7	5.17
D	*A*	4	6	10	6.33
E	*B*, *C*	4	5	7	5.17
F	*D*	3	4	8	4.50
G	*E*	3	5	8	5.17



Your turn!

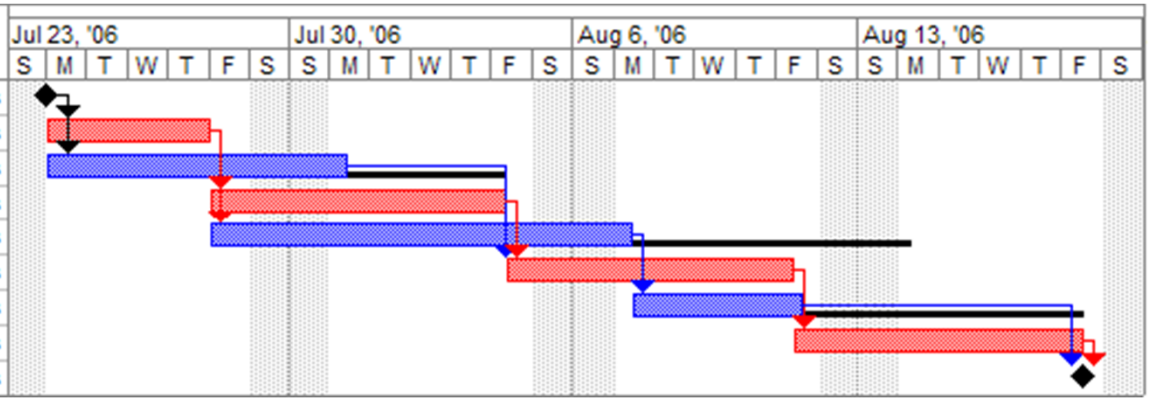
Exercise 2: Give some estimates on durations and determine dependencies for your WBS

”Give a description on the three classical cartoon heroes, Superman, Batman, and Spiderman. Compare the three and conclude who would win if they got into a fight”

Planning – Gantt chart

- With estimates in hand, you can do a *Gantt chart* to show dependencies, duration etc. of tasks
  - Graphical overview
  - Critical paths, milestones, etc.

ID	Task Name	Predecessors	Duration
1	Start		0 days
2	a	1	4 days
3	b	1	5.33 days
4	c	2	5.17 days
5	d	2	6.33 days
6	e	3,4	5.17 days
7	f	5	4.5 days
8	g	6	5.17 days
9	Finish	7,8	0 days

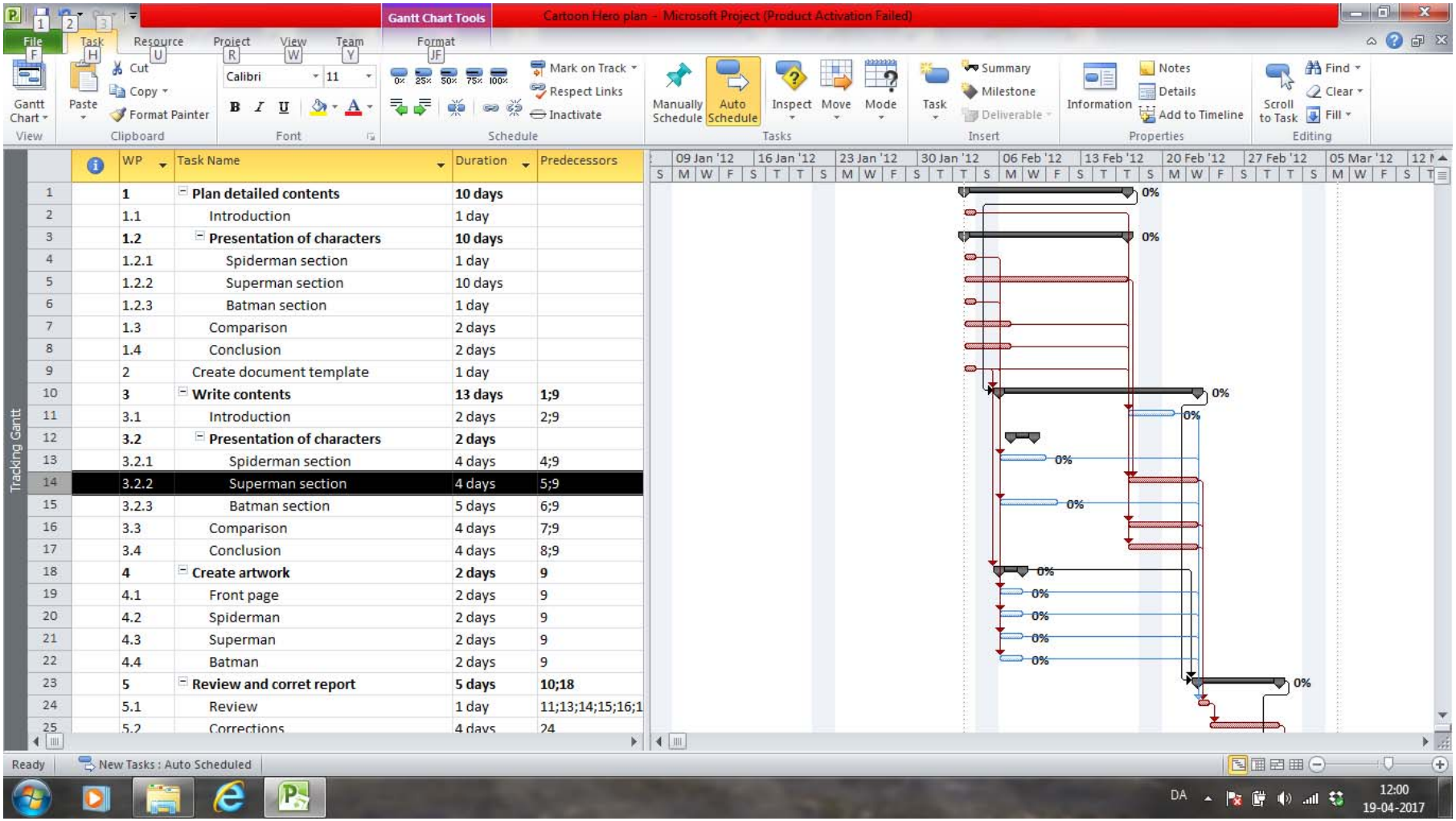


I2ICH project: Gantt chart

Exercise 3: Use the result of Exercise 2 to create a Gantt chart for your project

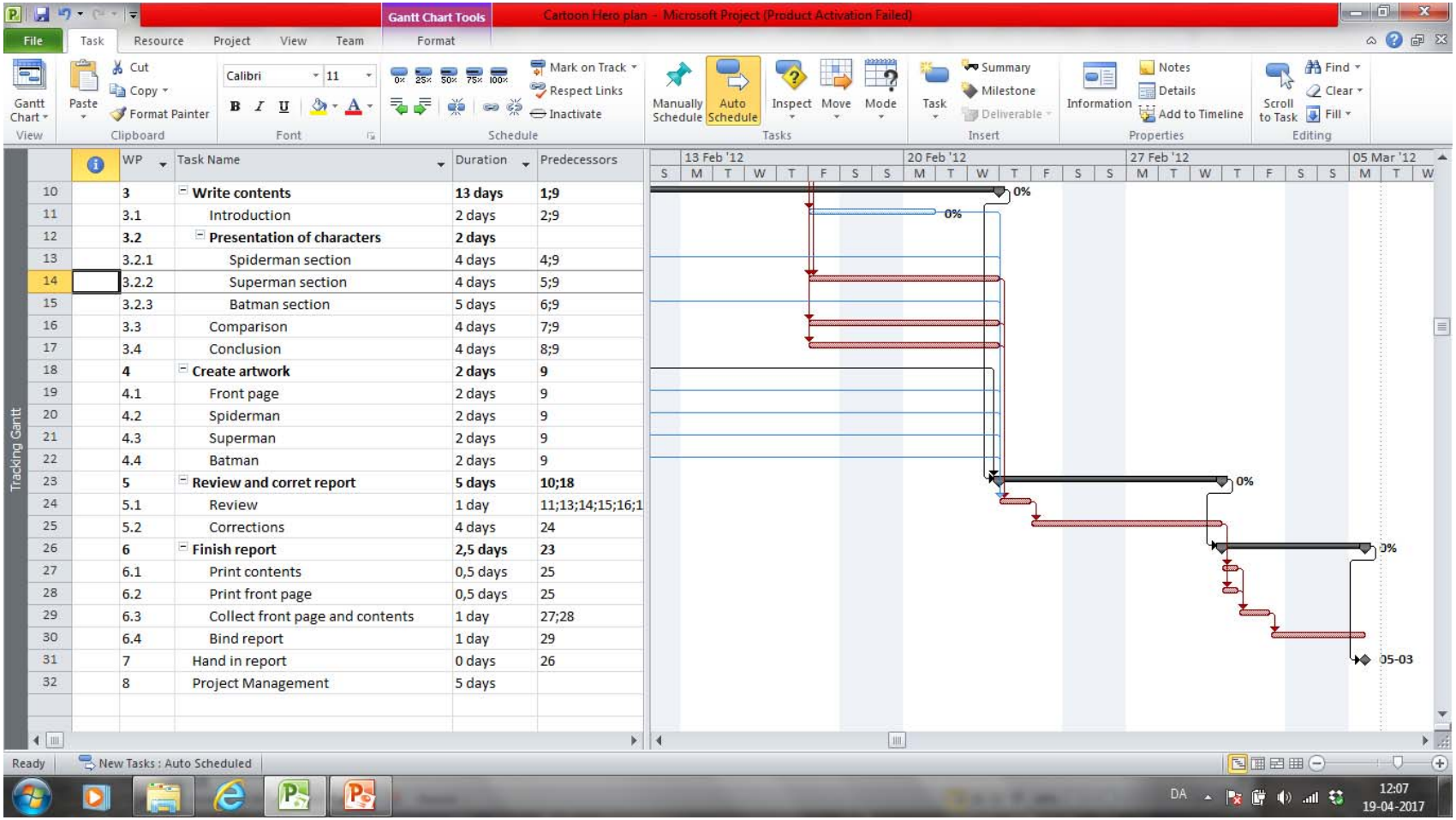
”Give a description on the three classical cartoon heroes, Superman, Batman, and Spiderman. Compare the three and conclude who would win if they got into a fight”

Gantt (1) – MS Project

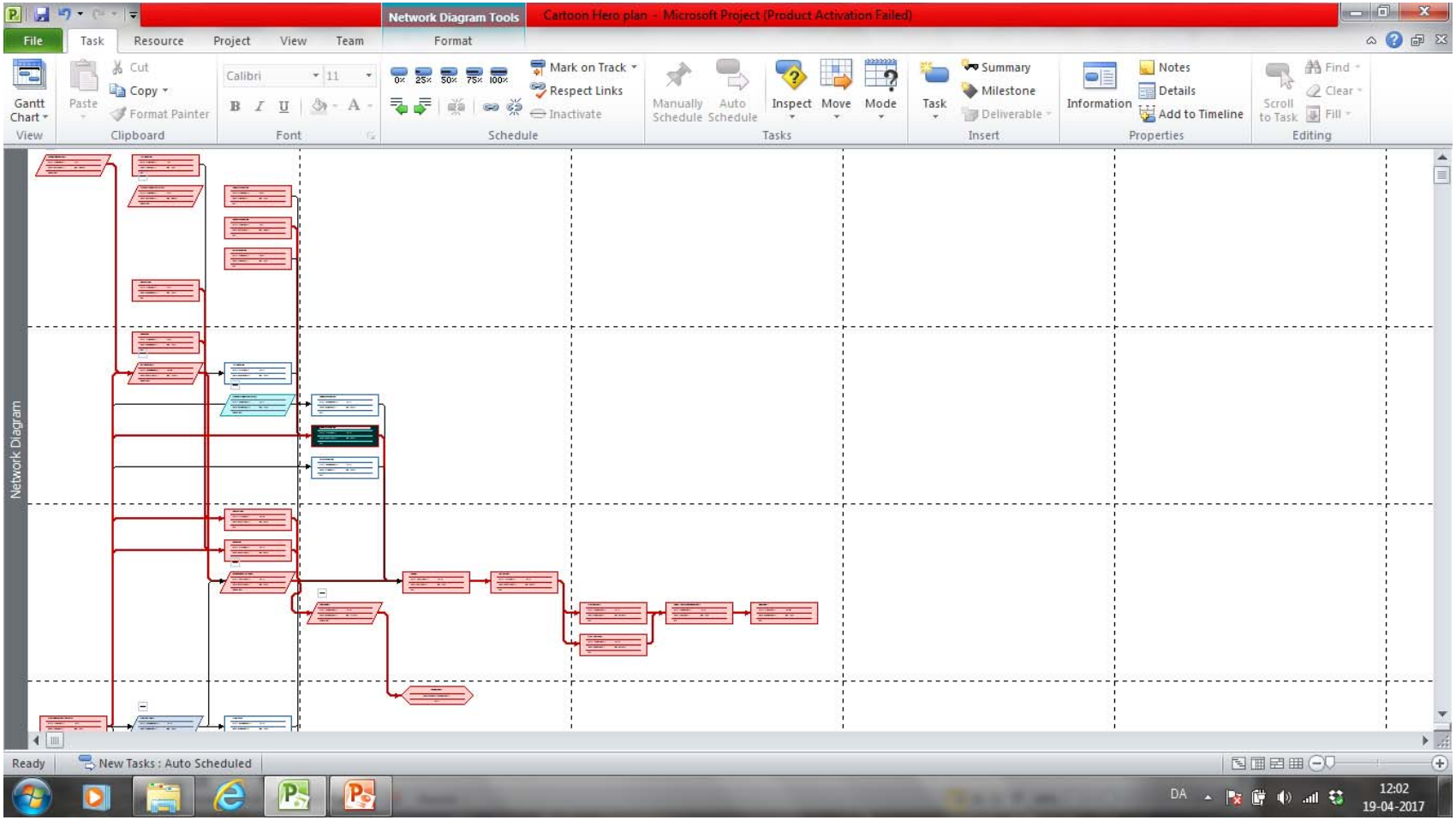


	WP	Task Name	Duration	Predecessors
1	**1**	**Plan detailed contents**	**10 days**	
2	1.1	Introduction	1 day	
3	**1.2**	**Presentation of characters**	**10 days**	
4	1.2.1	Spiderman section	1 day	
5	1.2.2	Superman section	10 days	
6	1.2.3	Batman section	1 day	
7	1.3	Comparison	2 days	
8	1.4	Conclusion	2 days	
9	2	Create document template	1 day	
10	**3**	**Write contents**	**13 days**	**1;9**
11	3.1	Introduction	2 days	2;9
12	**3.2**	**Presentation of characters**	**2 days**	
13	3.2.1	Spiderman section	4 days	4;9
14	3.2.2	Superman section	4 days	5;9
15	3.2.3	Batman section	5 days	6;9
16	3.3	Comparison	4 days	7;9
17	3.4	Conclusion	4 days	8;9
18	**4**	**Create artwork**	**2 days**	**9**
19	4.1	Front page	2 days	9
20	4.2	Spiderman	2 days	9
21	4.3	Superman	2 days	9
22	4.4	Batman	2 days	9
23	**5**	**Review and corret report**	**5 days**	**10;18**
24	5.1	Review	1 day	11;13;14;15;16;1
25	5.2	Corrections	4 days	24

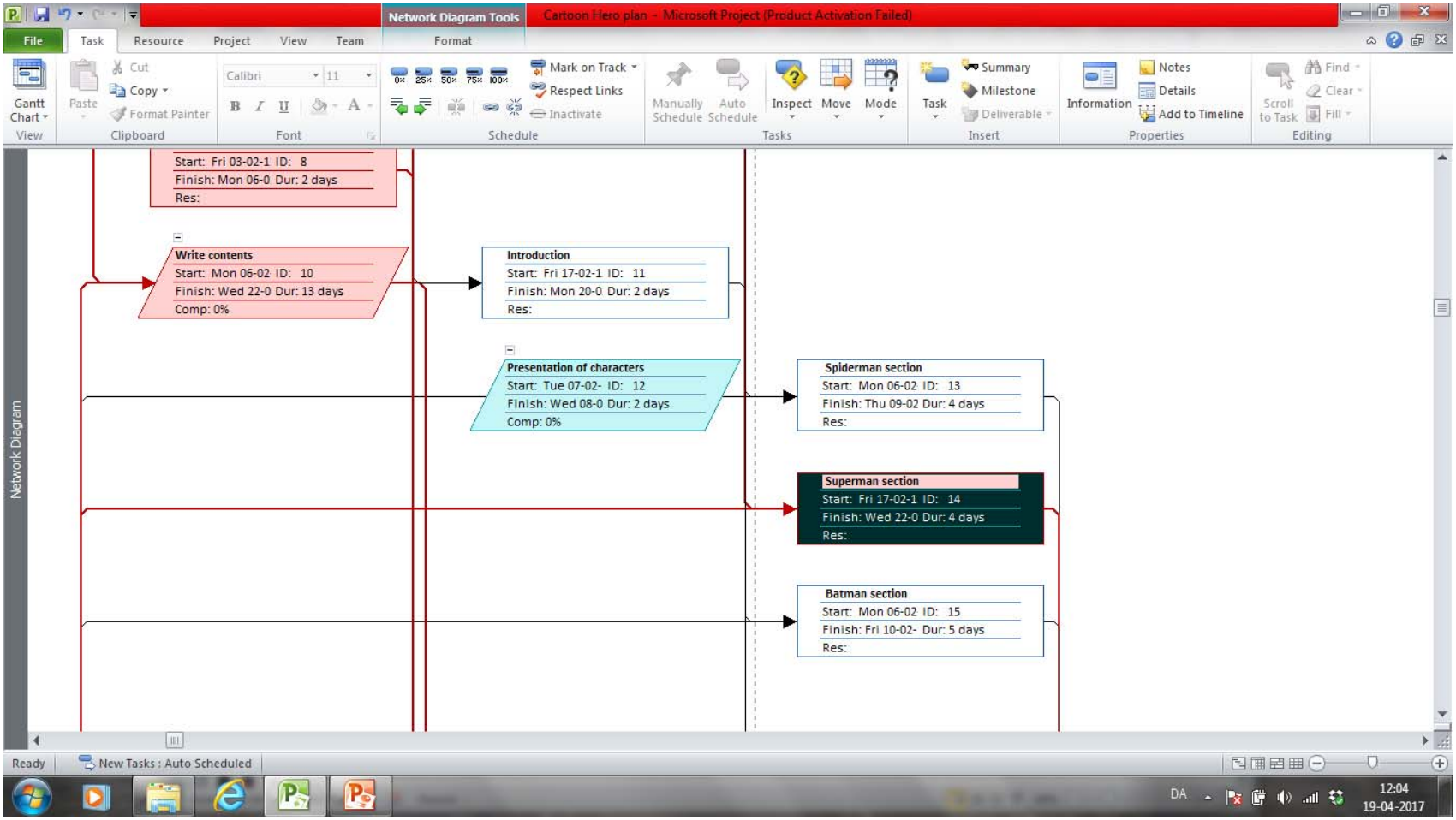
Gantt (2) – MS Project



Network (1) – MS Project



Network (2) – MS Project



Risk Management

- The project plan is objective, but idealized.

No campaign plan survives first contact with the enemy!

Helmuth Karl Bernhard von Moltke
German Field Marshall (1800-1891)

Risk Management

- What can we do to handle risk in the project?

- Risks cannot be avoided, but some can be foreseen and planned for.

- Simple, effective risk mitigation tool:
  1. *Envision* the risk items
  2. *Evaluate* the risk items (probability × consequence)
  3. Make *risk mitigation* / *contingency plan* for each risk item

Identification of risks

- Project impact
  - Schedule, resources, people skills, estimates, tools
    - E.g. Loss of team member, problem with tool, missing important competences
- Product impact
  - Requirements, quality, performance, purchased components, technology
    - E.g. Poor requirements, low performance, mature technology
- Business impact
  - Organization, competitor, cost, world economic
    - E.g. New competing product, too expensive, change of organization

Risk Matrix

Risk Matrix		Probability of risk item		
		High	Medium	Low
Consequence of risk item	High	A	A	B
	Medium	A	B	C
	Low	B	C	C

Risk Management

Description	Prob. 1-5	Conseq. 1-5	Impact 1-25	Risk Mitigation Plan
Members leave team	2	3	6	Mandatory monthly knowledge sharing via team meetings
Subsuppliers delayed	2	5	10	Formal agreement with reimpursement plan
Requirement changes	5	3	15	Frequent demonstrations of product to customer
…	…	…	…	…
…	…	…	…	…

- Risk Impact = Probability x Consequence (Highest)
- Extensions:
  - Identify cause
  - Separate *risk mitigation* from *contingency planning*

I2ICH project: Risk Matrix

Exercise 4: Create a risk matrix for your project

(Identify and evaluate risk items, like exceeding budget or plan)

”Give a description on the three classical cartoon heroes, Superman, Batman, and Spiderman. Compare the three and conclude who would win if they got into a fight”