

Human-Computer Interaction

BMEVITMMA11

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- Németh Géza
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[http://smartlab.tmit.bme.hu/
education-hci](http://smartlab.tmit.bme.hu/education-hci)

Timing

- Each Monday: lecture, every 2nd Thursday: practice

<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>	<i>Saturday</i>	
3-Sep-2018	Task definition		6-Sep-2018			1st class
10-Sep-2018						
17-Sep-2018			20-Sep-2018			Sport's Day
24-Sep-2018						
1-Oct-2018			4-Oct-2018			
2-Oct-2018					13-Oct-2018	Replacement for 22
15-Oct-2018			18-Oct-2018			1st presentation and evaluation
22-Oct-2018						Holiday
29-Oct-2018			1-Nov-2018			Holiday
5-Nov-2018						
12-Nov-2018			15-Nov-2018			
19-Nov-2018						
26-Nov-2018			29-Nov-2018			Reporting
3-Dec-2018						Reporting
						4

Requirements

- No mid-term tests
- Exam
- Practical exercises (70% required)
- Material on Lectures (and practice)
- Recommended exam grade

Practical exercises

- Task for 4 persons / group
- September 4. : definition of tasks
 - Design and/or evaluation and/or implementation of Smart city related user interfaces/interactions
 - ... OWN IDEA!
- Demonstration on last class(es)
- Written report + subtasks
- Recommended grade: 50% correct answer on Kahoot and good performance on tasks
- 15 October: 1st presentation,
- 29 November and 3 December: final presentation

Assessment

- Task 1 4x5 points = 20 points
- Task 2 10+10+20 points = 40 points
- All sub-points should reach 40 % (2/5 points, 4/10 points, 8/20 points)
 - 0-39% solution failed
 - 40-54%: just acceptable solution,
 - 55-69%: normal, no extra
 - 70-84%: nice solution
 - 86-100%: high quality, could be an example

Deadlines

Deadline	Task	Format	Quantity	Upload
2018. September 10. 8:00	0 – Team forming	txt	Sample document filled	Upload
2018. September 24. 8:00	1/a – Interview	pdf	Script 2.o.	Upload
		mp3	Sound material min 5, max 15 min. 128kbit/sec	Upload
		pdf	Assesment 1.p.	Upload
2018. October 8. 8:00	1/b – Storyboard	pdf	Drawings 4x2 piece A4 page 8.pages.	Upload
		pdf	Assesment 1.p.	Upload
2018. October 15. 8:00	1/c – Presentation	ppt v. pdf	min 5, max 10 slides	Upload
2018. October 24. 8:00	1/d - Paper prototype	pdf	Drawings 2.p.	Upload
		pdf	Assesment 1.p.	Upload
2018. November 19. 8:00	2/a – Assessment	pdf	Assessment strategy 1.p.	Upload
		pdf	Assessment plan 2.pages	Upload
		pdf	Assessment report 1.p.	Upload
		pdf	Assessment 1.p.	Upload
2018. December 3. 8:00	2/b – Presentation	ppt v. pdf	min 8, max 15 slides,	Upload
		url	video about the interfacel min 1 minute, max 3 minutes, YouTube link	Upload
2018. December 10. 8:00	2/c – Task documentation	pdf	Documentation 10.pages	Upload
		zip	Final program, sources, etc.	Upload

Late upload

- If there is some sense: (no delay for ppt)
 - 1 day: -1 point
 - 2 days: -2 points
 - 3 days : -3 points
 - 4 days : -4 points (failed for 5 point task)
 - 5 days : -5 points
 - Over 6 days: not acceptable

Signature

- All sub-tasks are at least 40% (and the average is also at least 40%)

Recommended grade

- In-term Kahoot tests are at least 50 %, and based on the performance during the semester:
 - 0-54%: no recommended grade
 - 55-69%: +1 for the exam, if at least 2 is reached.
 - 70-84%: 4
 - 86-100%:5
- Kahoot: on all lectures, about the material of the previous class or practice or the material presented on the given class.

Project ideas

- Team forming: 4 persons
 - Who are the members, everybody should work, tasks may be divided, but everybody should know everything!!!!
- Task: desing and implementation of user interface for a small touchscreen (max. 10 inch) controlled device
- Deadline: Sept 10. 8:00

Platform

- Application for a small screen device
 - max. 10”
 - May be unique device: smart watch, smart glass, smart chair, self-driving car
- OS: Win 8, 8.1, 10, iOS, android,...
- The user interface may be connected to a project lab, **BUT! You cannot sell the same thing twice, and should not depend on it!!**

1. Upload

2018. September 24. 8:00	1/a - Interview	pdf	Script 2.p.
		mp3	Audio material min 5, max 15 minutes 128kbit/sec
		pdf	Assesment 1.p.
2018. October 8. 8:00	1/b - Storyboard	pdf	Drawings 4x2 piece A4 8.pages.
		pdf	Assesment 1.p.
2018. October 15. 8:00	1/c – Presentation	ppt v. pdf	min 5, max 10 slides
2018. October 24. 8:00	1/d - Paper prototype	pdf	Drawings 2.pages
		pdf	Assesment 1.p.

2. Upload

2018. November 19. 8:00	2/a – Assessment	pdf	Assessment strategy 1.p.
		pdf	Assessment plan 2.p.
		pdf	Assessment Report 1.p.
		pdf	Assessment 1.p.
2018. December 3. 8:00	2/b – Presentation	ppt v. pdf	min 8, max 15 slides,
		url	video using the interface min. 1 minute, max 3 minutes YouTube link
2018. December 10. 8:00	2/c - Task documentation	pdf	Documentation 10.pages
		zip	Final program, sources, etc.

HCI

- Human Factors
- Human–computer interaction

Why do we need it?

- Economics
- Security

Examples

- Laptop



- Three Mile Island



What will be covered?

- Graphics
- Audio / speech
- Non-conventional
- Web
- Mobile (small display)

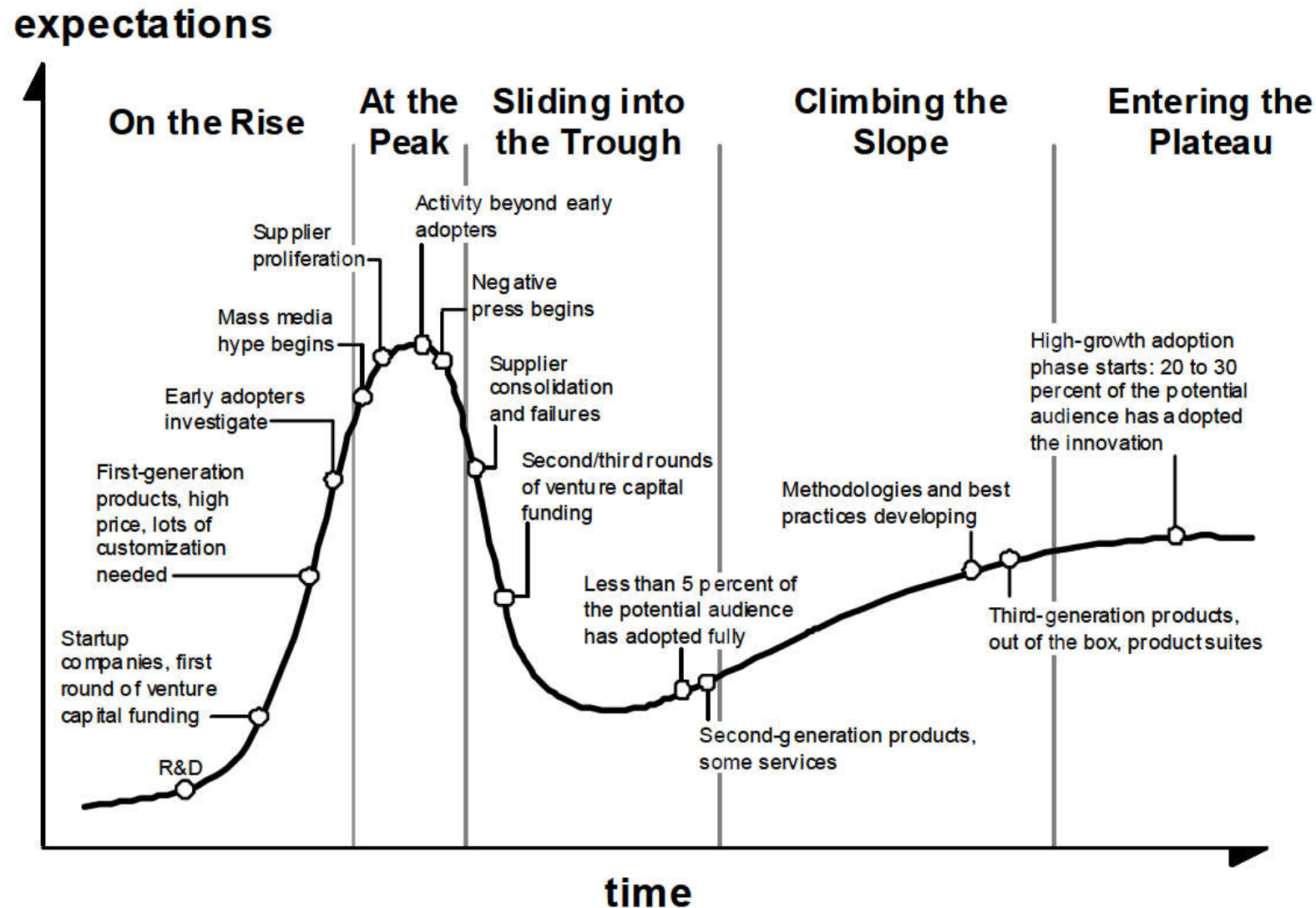
History

- Beginnings

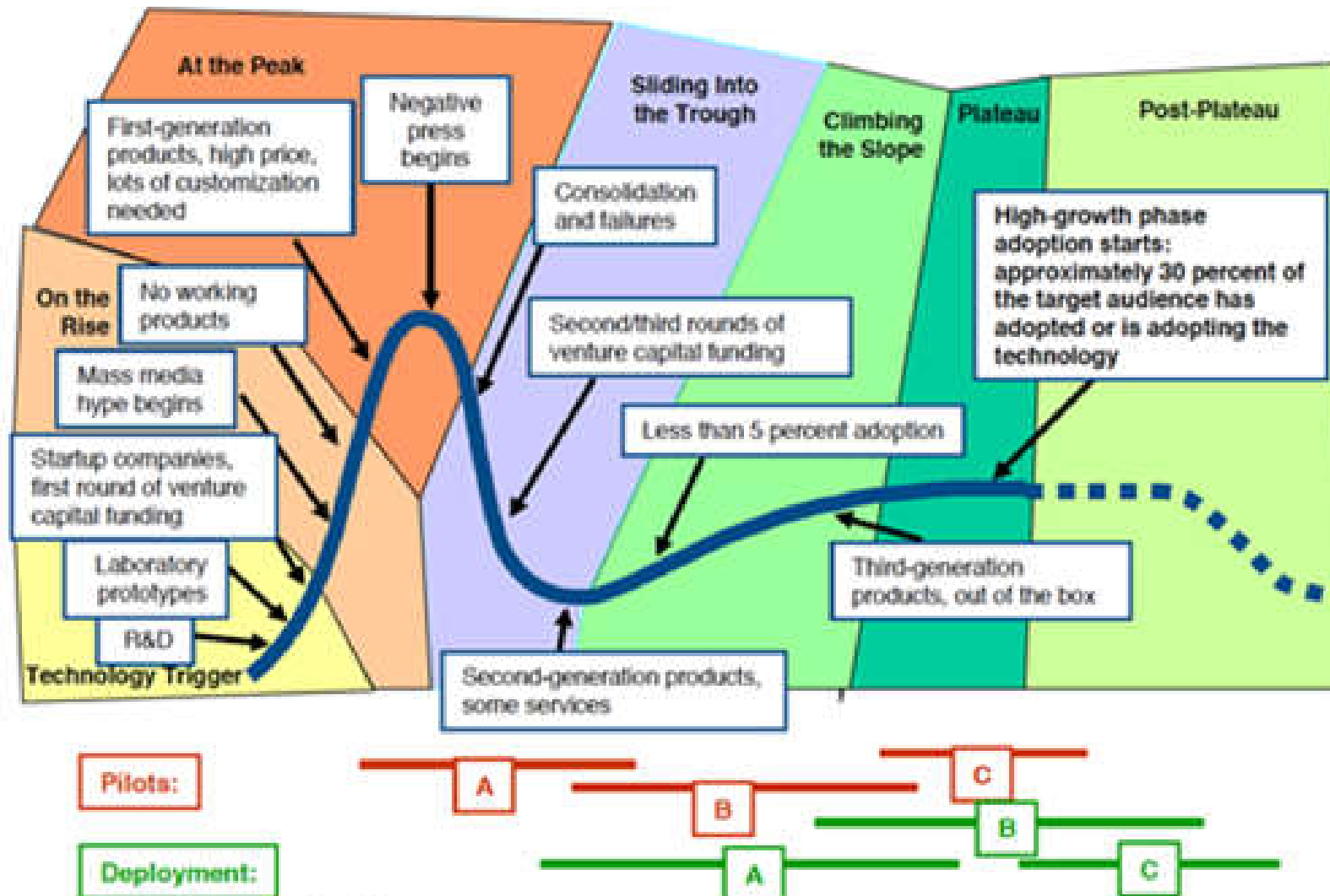
History

- Current

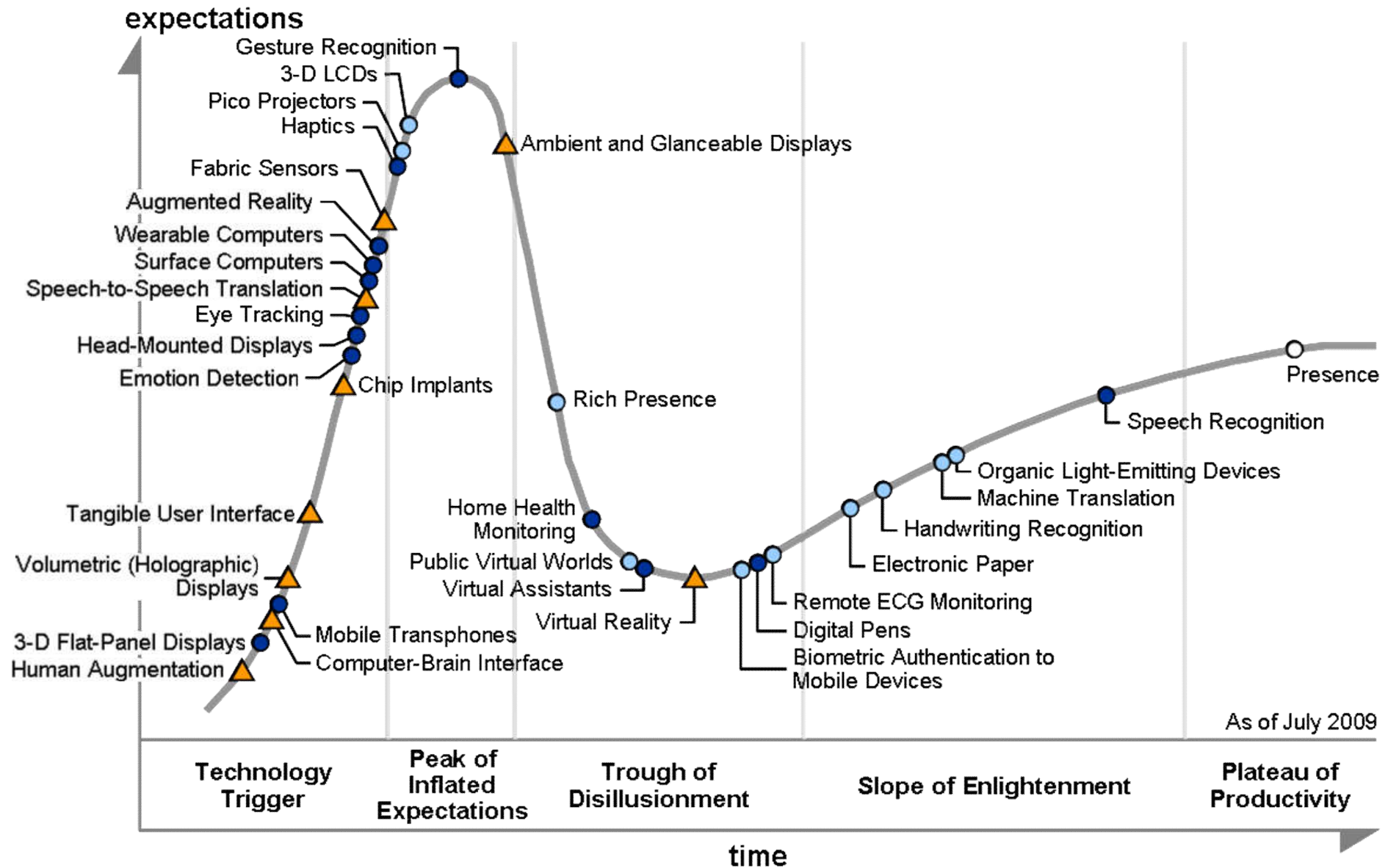
Gartner Hype Cycle

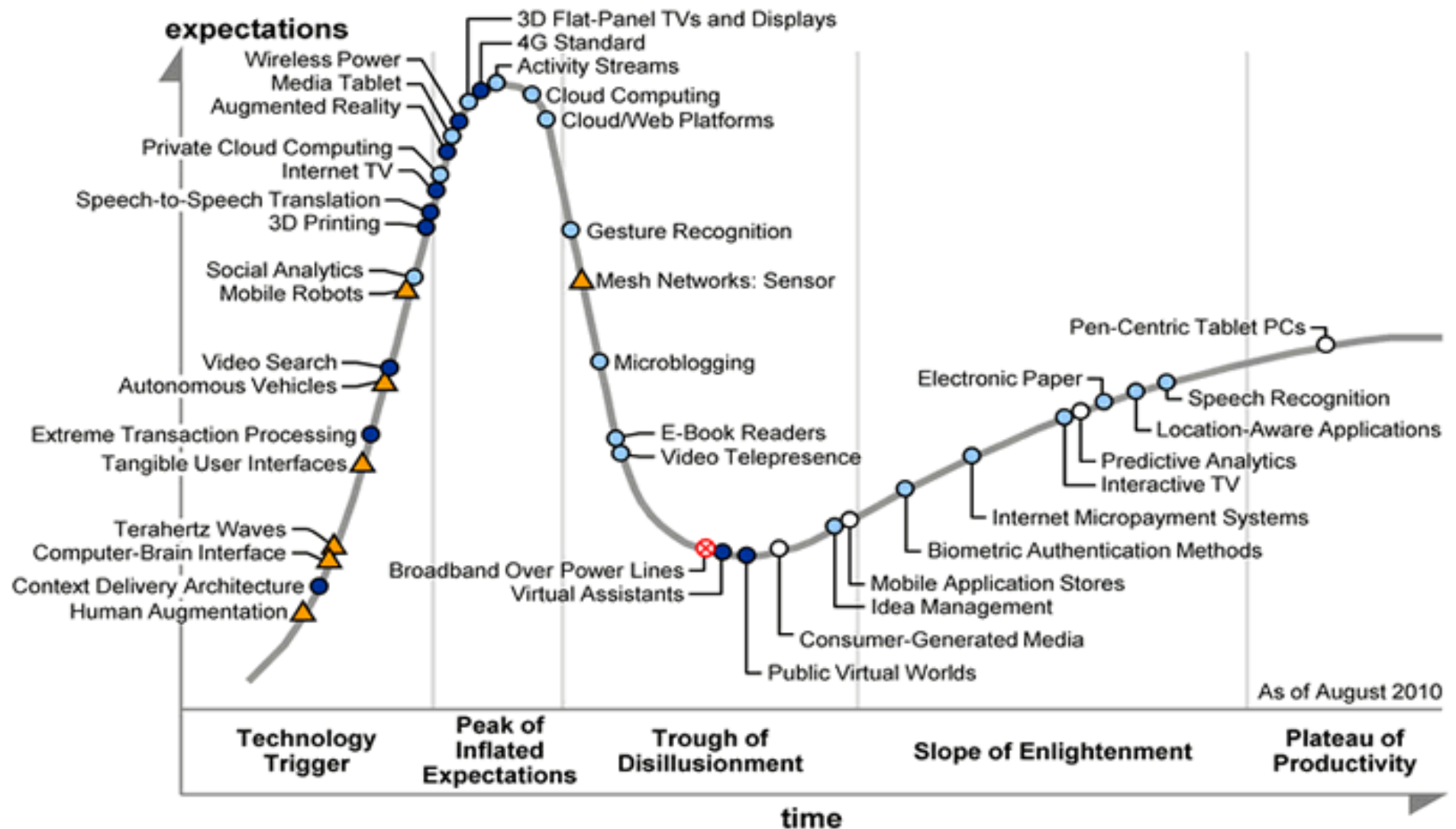


Gartner Hype Cycle



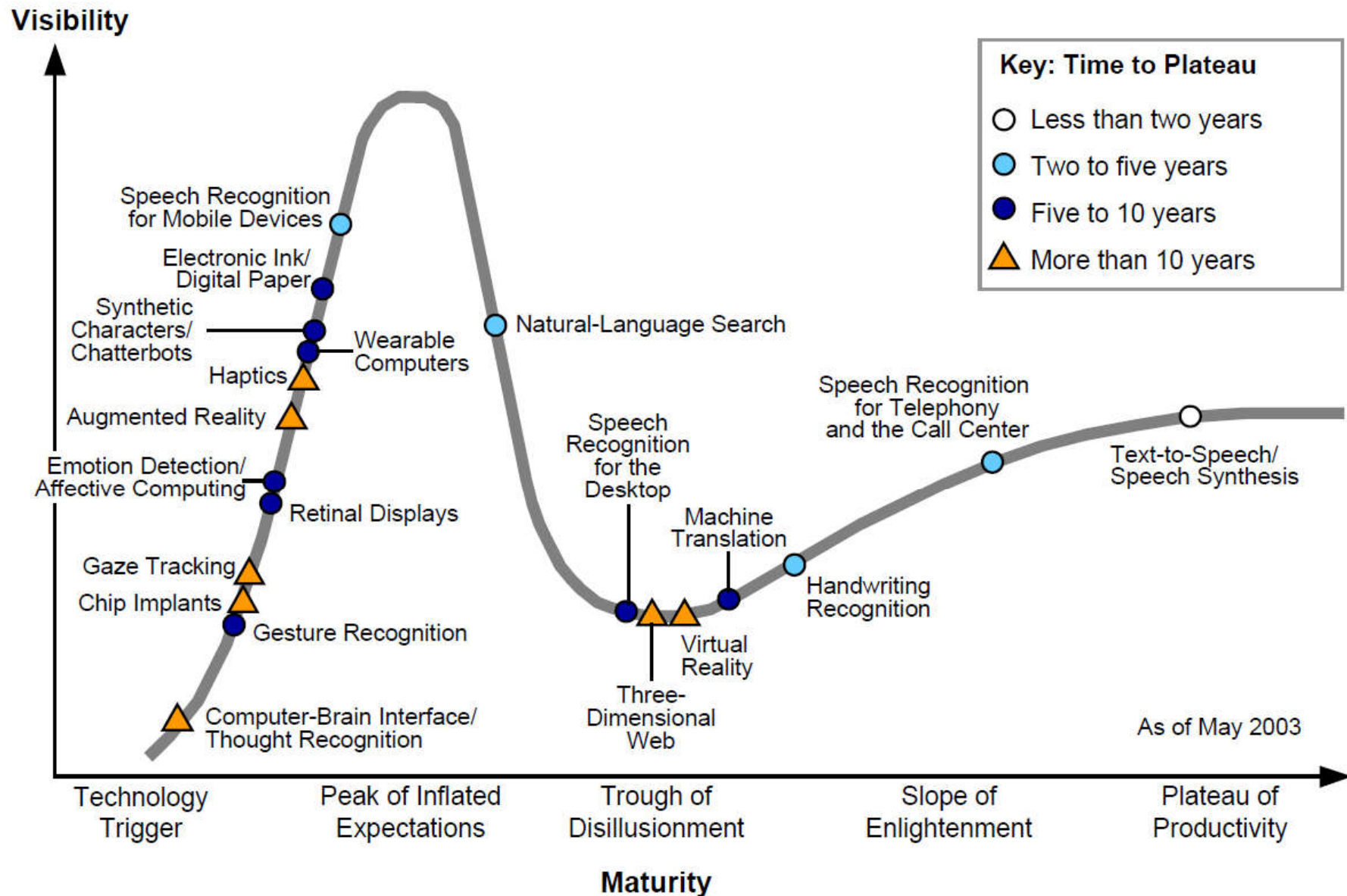
Source: Gartner Research (May 2003)





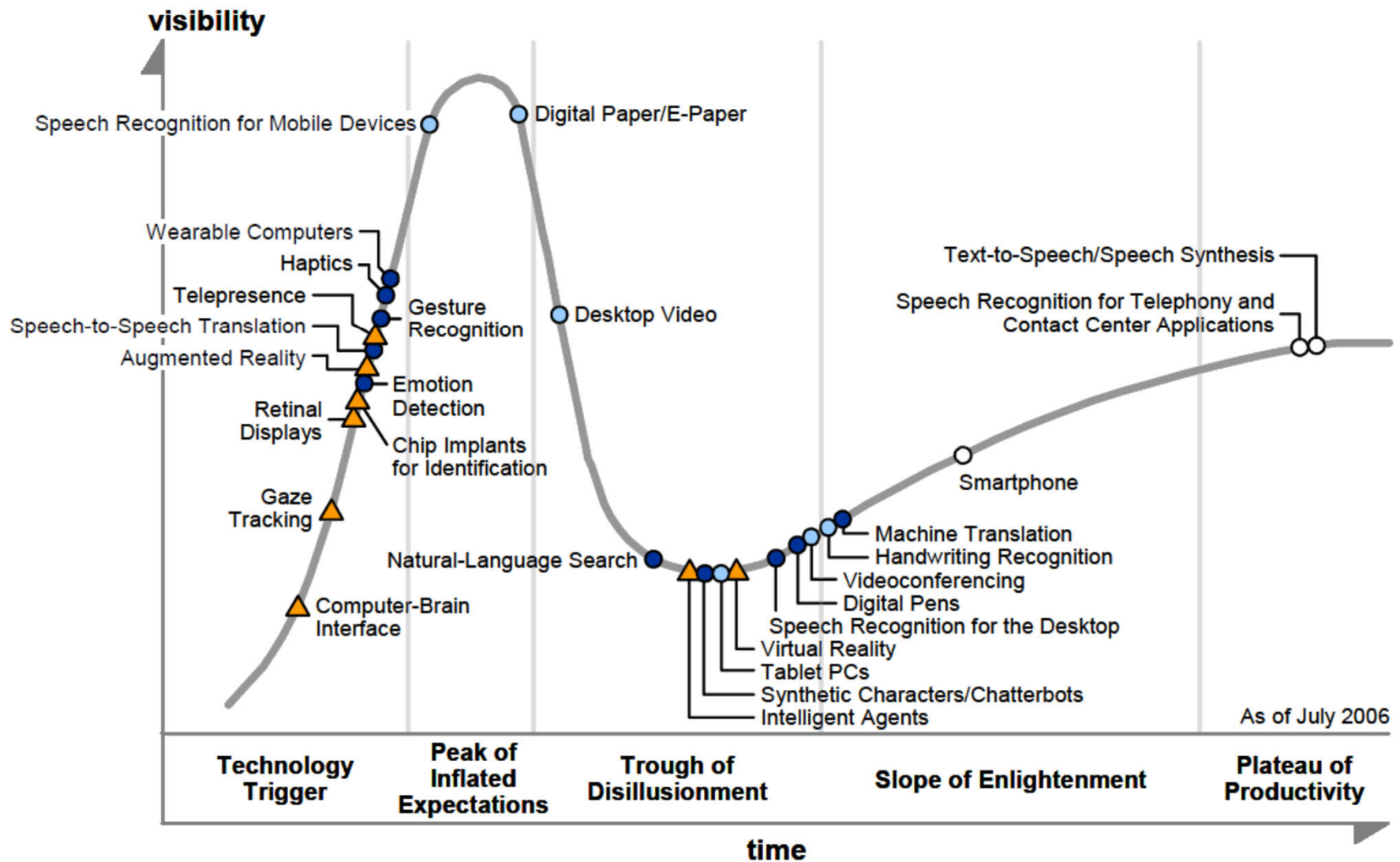
Years to mainstream adoption:

○ less than 2 years ● 2 to 5 years ● 5 to 10 years ▲ more than 10 years ⊗ obsolete before plateau



Source: Gartner Research (May 2003)

Figure 1. Hype Cycle for Human-Computer Interaction, 2003



Years to mainstream adoption:

○ less than 2 years

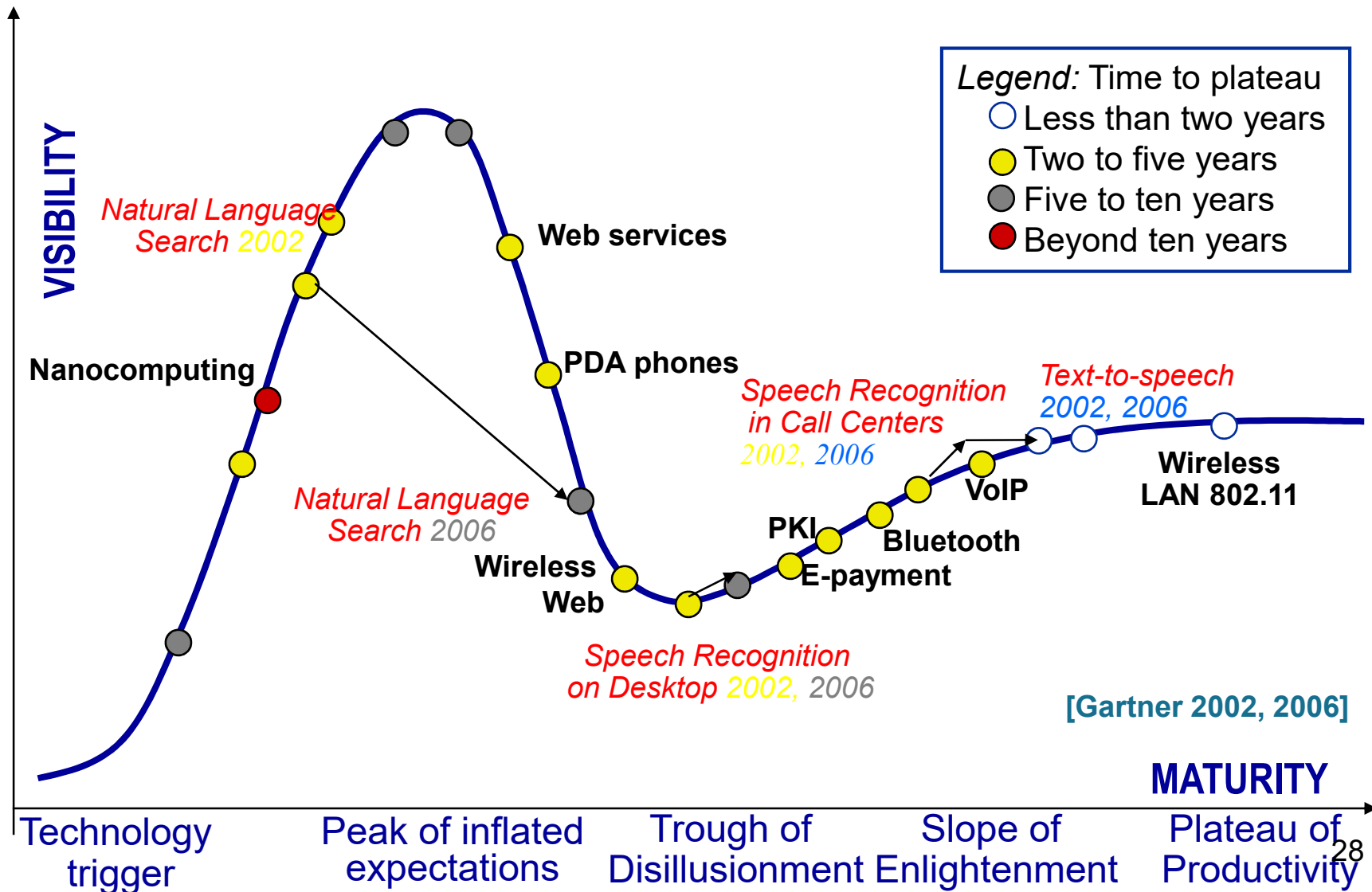
● 2 to 5 years

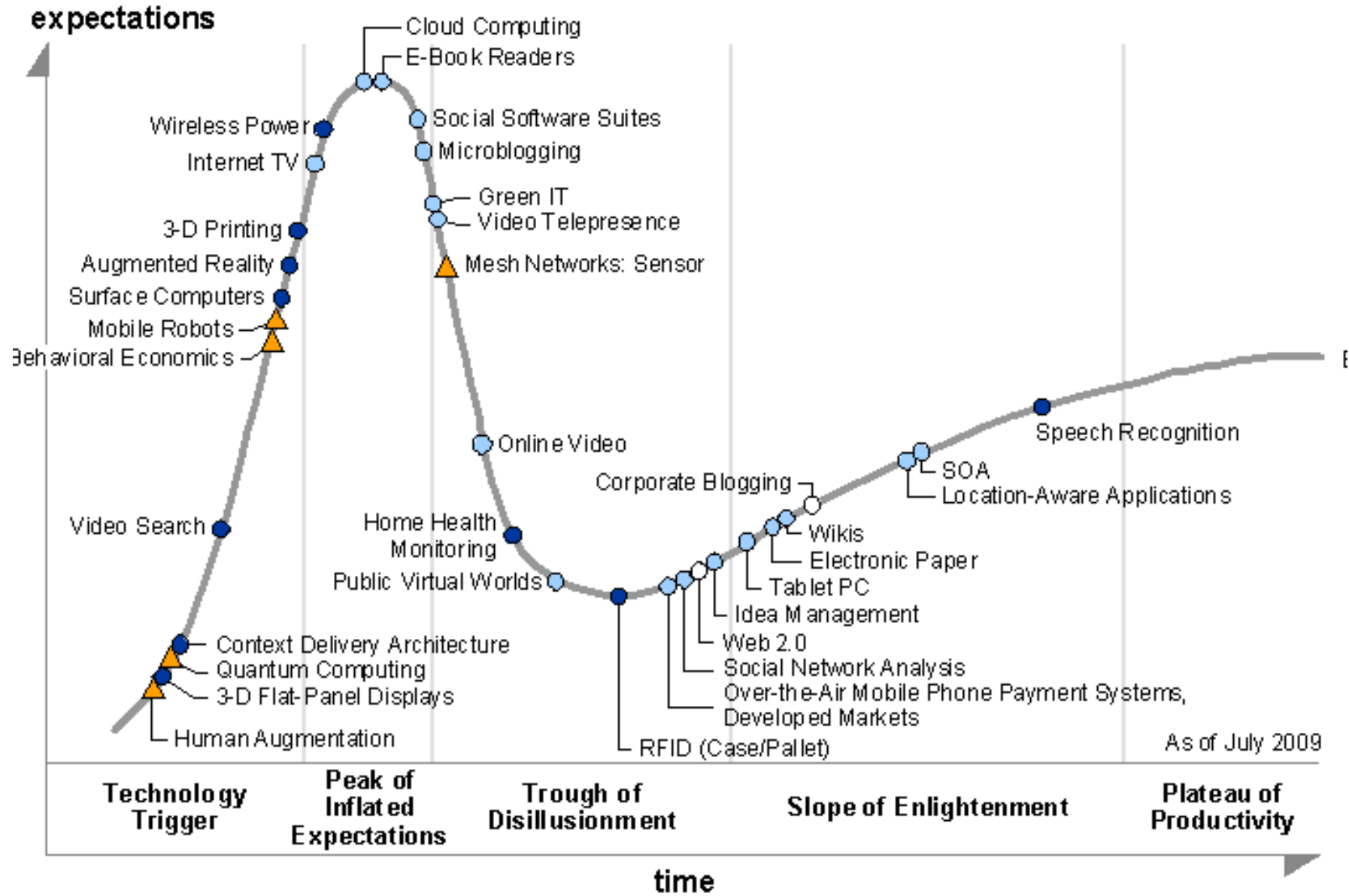
● 5 to 10 years

▲ more than 10 years

⊗ obsolete

⊗ before plateau





Years to mainstream adoption:

○ less than 2 years

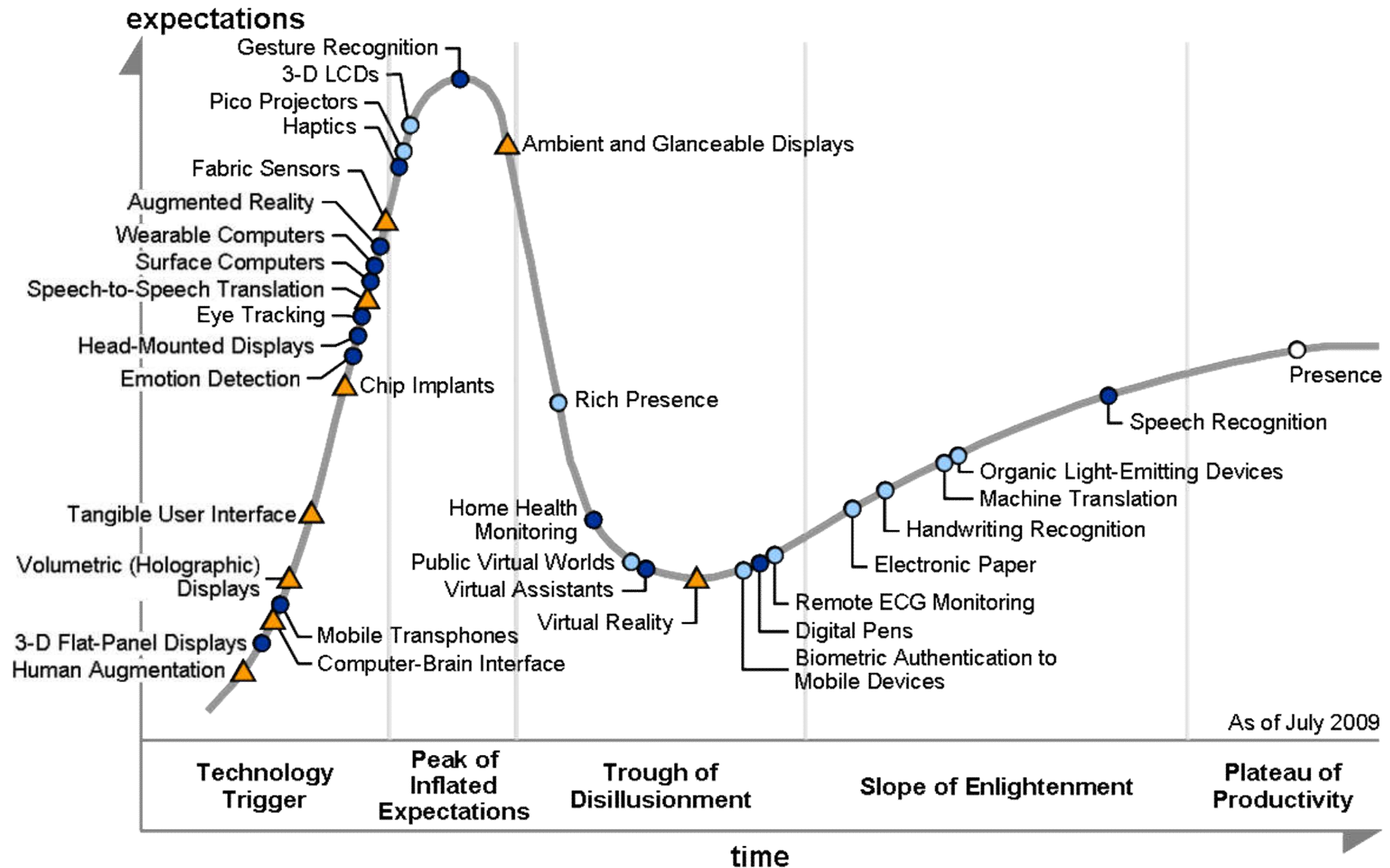
● 2 to 5 years

● 5 to 10 years

▲ more than 10 years

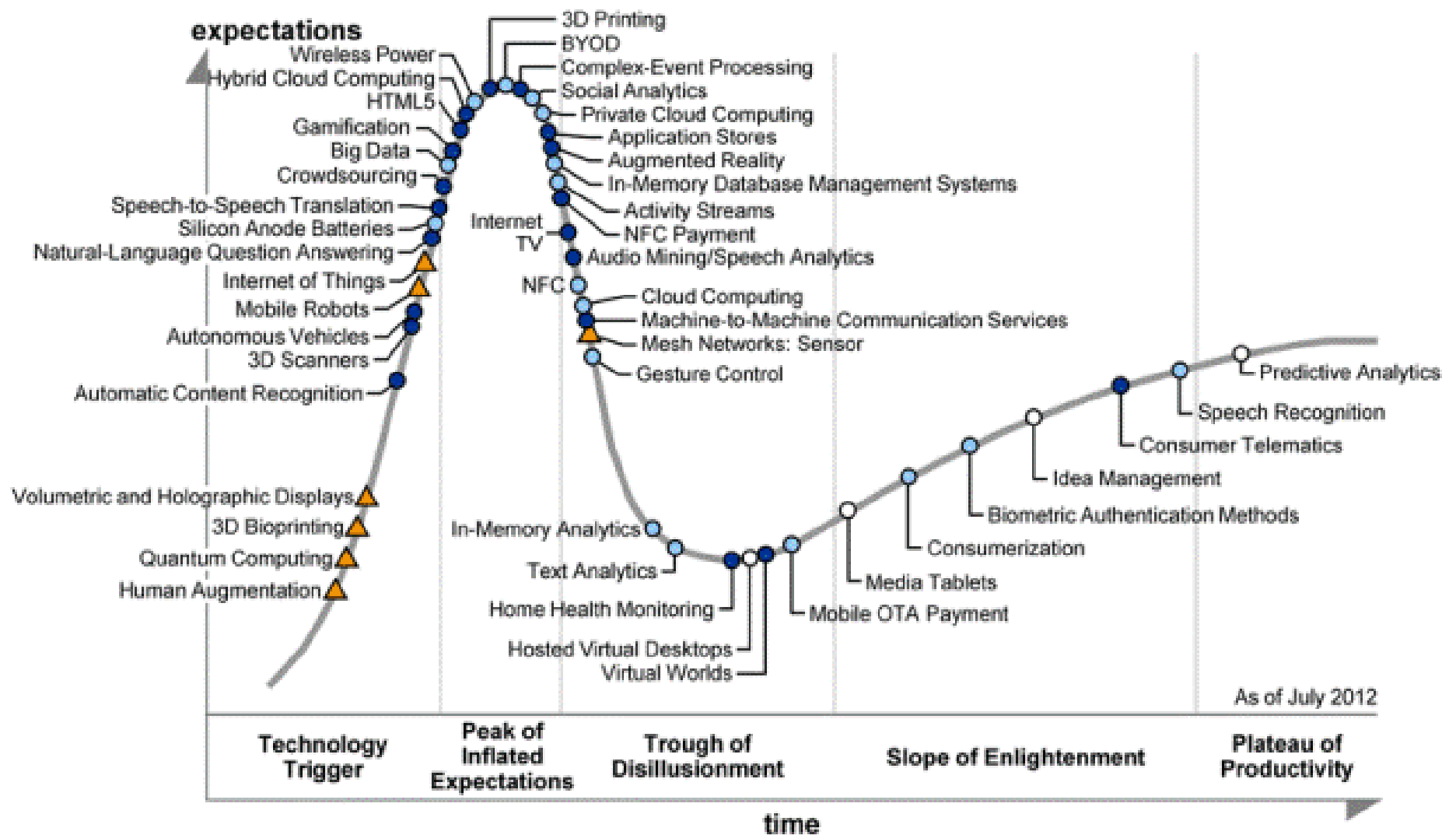
⊗ obsolete

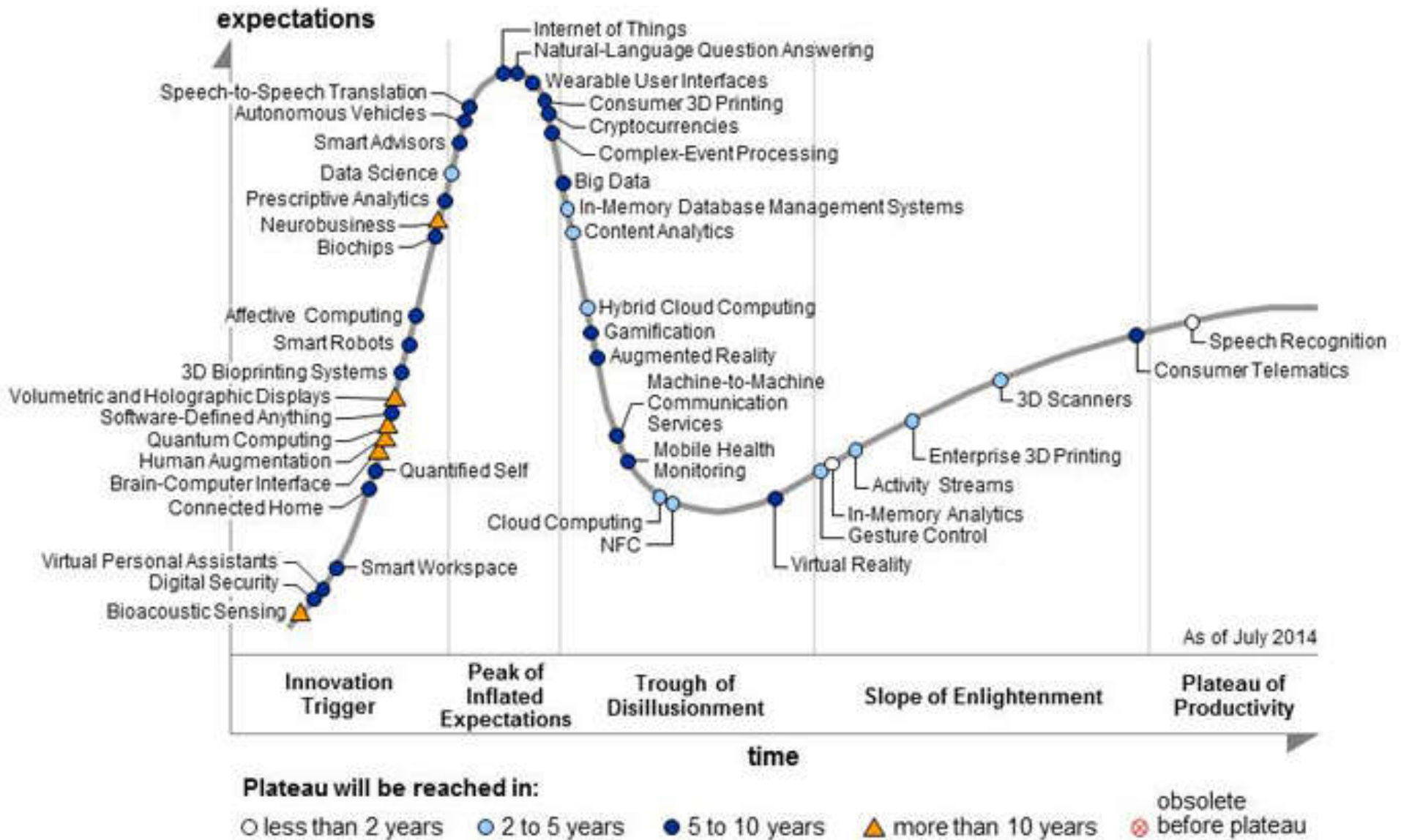
⊗ before plateau

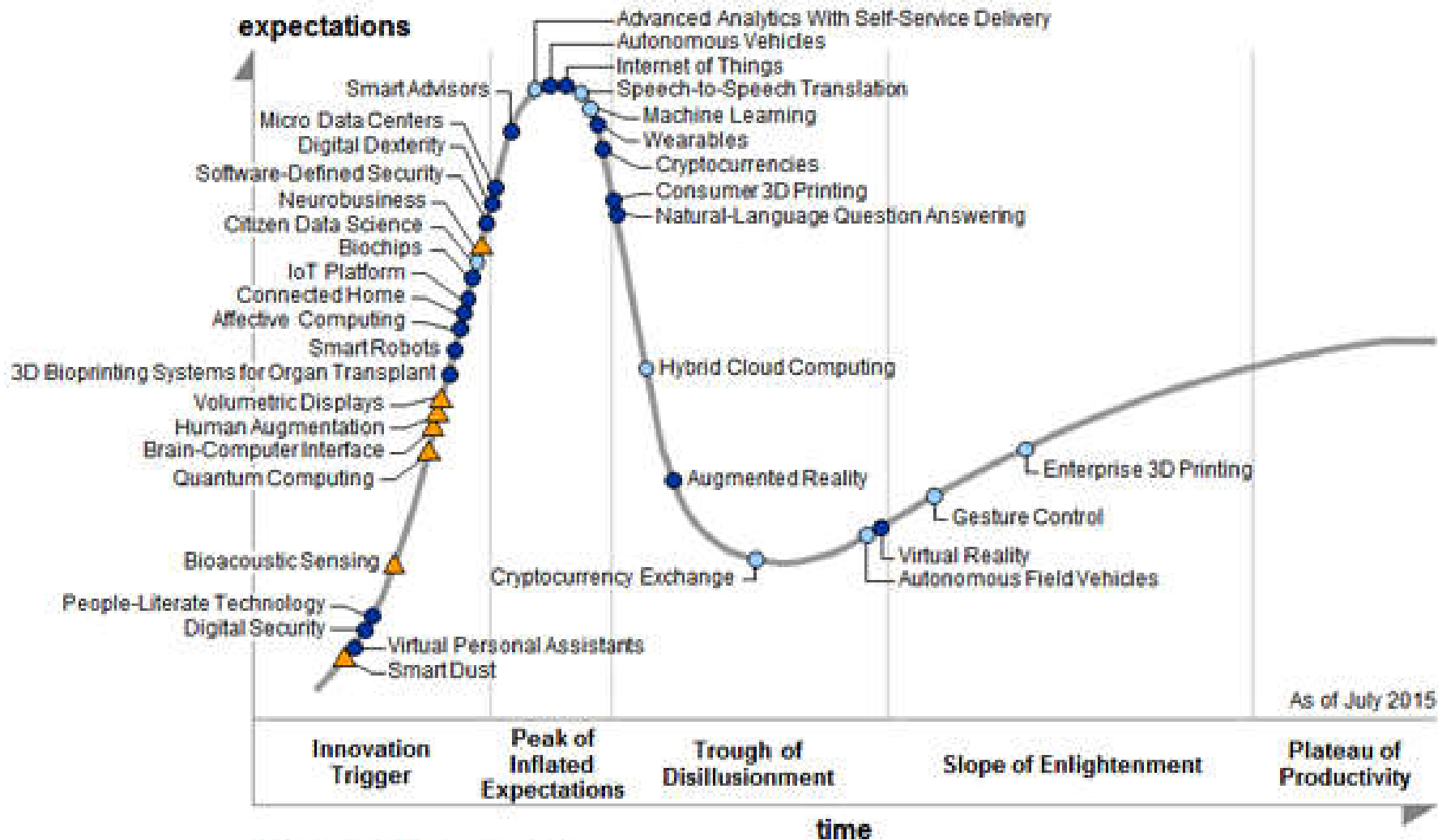


Years to mainstream adoption:

- less than 2 years
- 2 to 5 years
- 5 to 10 years
- ▲ more than 10 years
- ⊗ obsolete before plateau







Plateau will be reached in:

○ less than 2 years

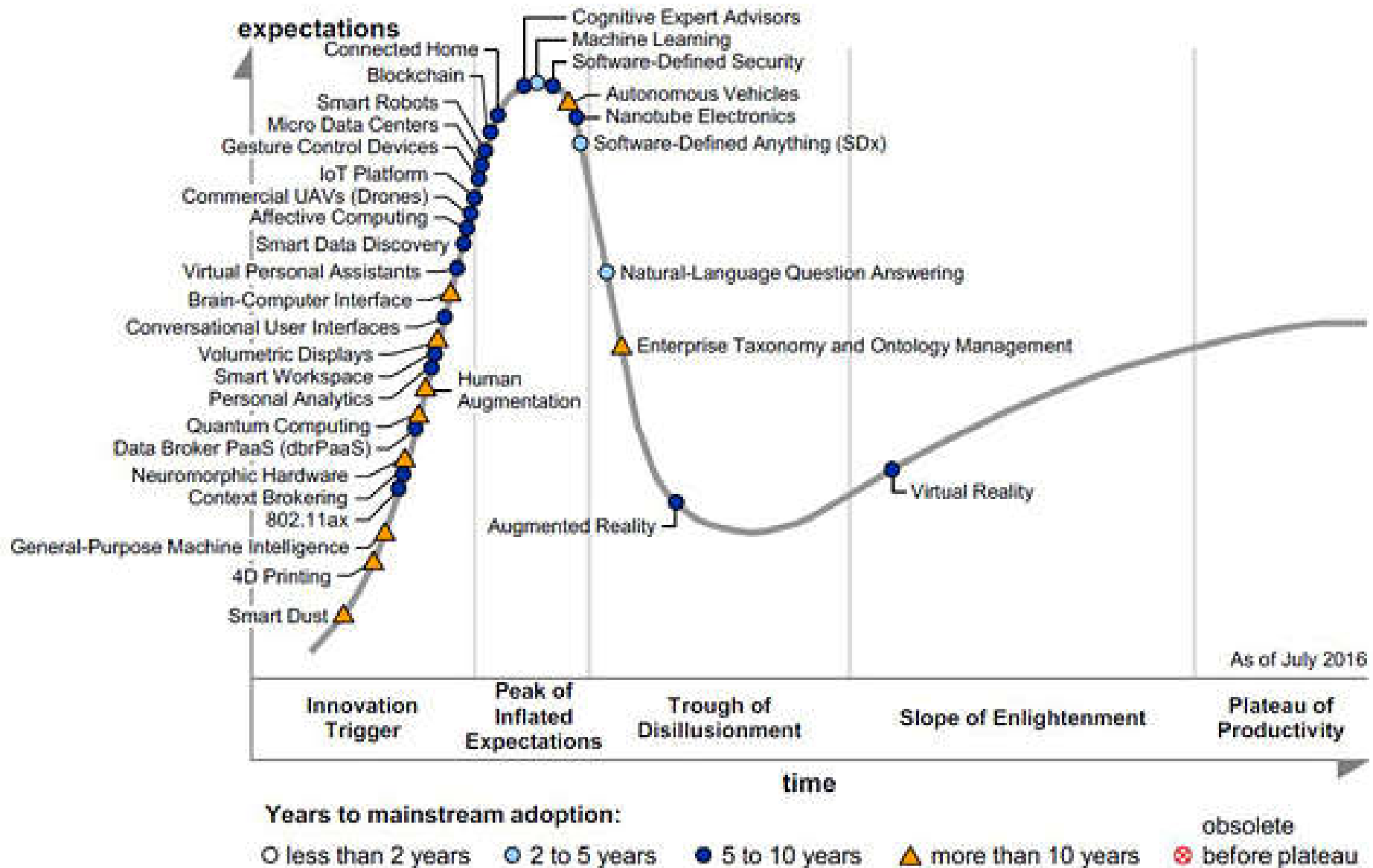
● 2 to 5 years

● 5 to 10 years

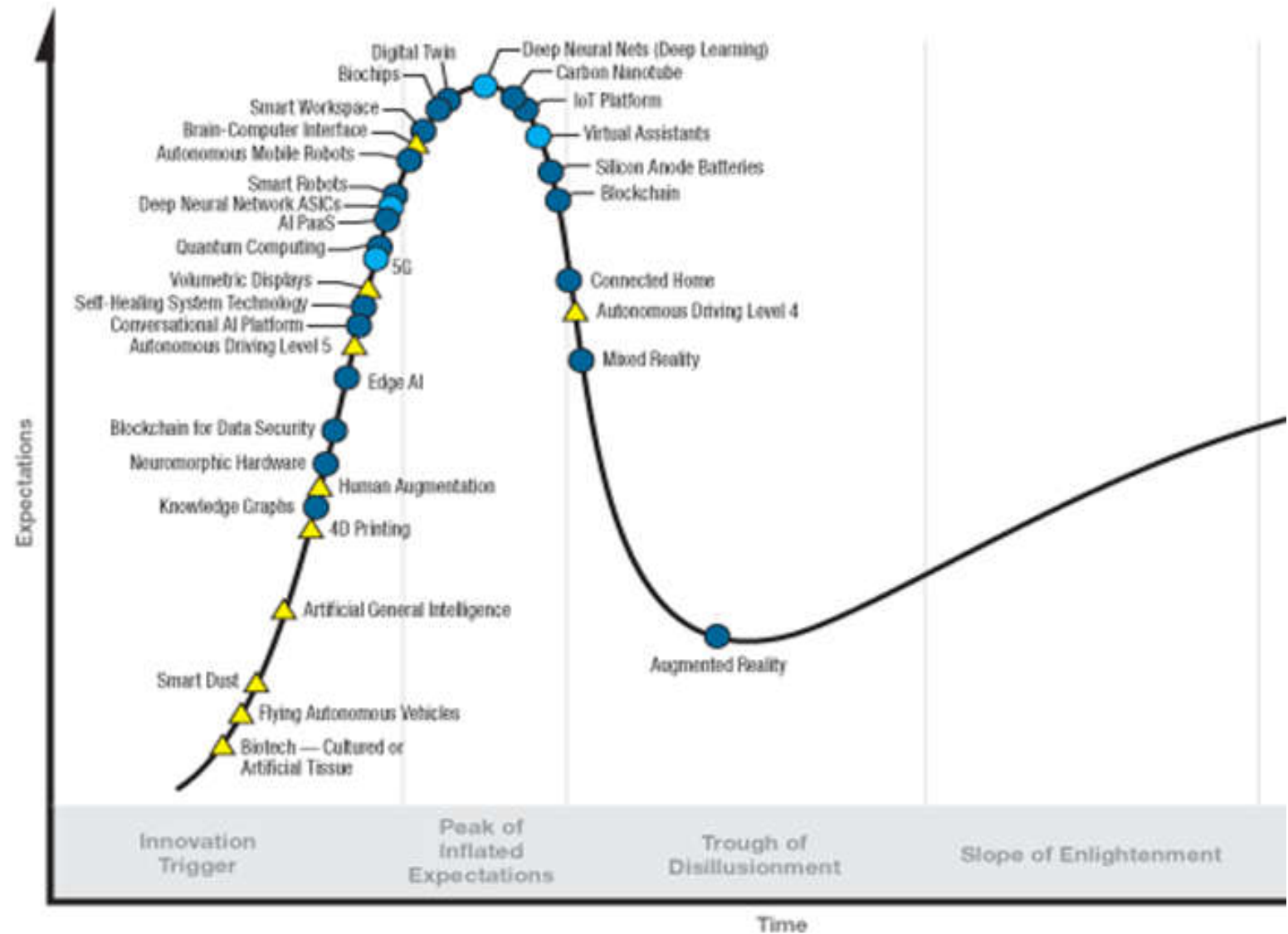
▲ more than 10 years

○ obsolete

⊗ before plateau



Hype Cycle for Emerging Technologies, 2018



Source: Gartner August 2018

Standardisation

- *European directive No. 90/270/EEC (1990)*
- *• Health and Safety (Display Screen Equipment)*
- *Regulations 1992 (HSE, UK)*
- *• 50/1999. EüM rendelet*
- *• General standards for quality assurance*
- – ISO 8402 (Quality Management and Quality Assurance - Vocabulary (Glossary))
- – ISO 9000 series
- • ISO 90003:2004 (Guidelines for the application of ISO 9001:2000 to computer software)
- • Product oriented approach to software quality
- – In details
- • Ergonomics of human-system interaction (ISO 9241)
- • Ergonomic principles related to mental workload (ISO 10075)
- • Software ergonomics for multimedia user interfaces (ISO 14915)
- – Software Quality Characteristics (ISO 9126)
- – Software engineering -- Product evaluation (ISO 14598)
- • Process based approach to software quality
- – Systems and software engineering -- Software life cycle processes (ISO 12207)
- – Life Cycle Management — System Life Cycle Processes (ISO 15288)
- – Human-centred lifecycle process descriptions (ISO 18529)
- – **Human-centred design processes for interactive systems (ISO 13407, ISO 9241-210:2010))**
- – Systems and software engineering -- Measurement process (ISO 15939)
- – Information technology -- Process assessment (ISO 15504)

In Hungary: 50/1999. EüM rendelet

(based on Council Directive 90/270/EEC of 29 May 1990)

A szoftver tervezése, kiválasztása, bevezetése és módosítása, a képernyős munkafeladatok megtervezése során a munkáltató az alábbi elveket vegye figyelembe:

- a) a szoftver feleljen meg a feladatnak,*
- b) a szoftver minden betűt a magyar helyesírásnak megfelelő formában jelenítsen meg a képernyőn és a nyomtatásban,*
- c) a szoftver legyen könnyen használható és szükség esetén a számítógép-kezelő ismeret- és tapasztalatszintjéhez igazítható, rendelkezzen magyar nyelvű súgóval, semmilyen a munkavállaló teljesítményére vonatkozó mennyiségi vagy minőségi ellenőrzési lehetőséget nem szabad igénybe venni a dolgozók tudomása nélkül,*
- d) a rendszerek a képernyő előtt dolgozóhoz alkalmazkodó formátumban és ütemben jelezzék ki az információkat,*
- e) alkalmazni kell a szoftver-ergonómia elveit, különösen az ember által végzett adatbeviteli és adatfeldolgozási feladatokban,*
- f) a rendszerek biztosítsanak visszajelzést a munkavállalóknak a teljesítményükről.*

Human perception

- Five classical sensory organs: vision, hearing, taste, smell and touch
- In reality we have far more senses:
 - Pain
 - Cold, heat
 - Position of our body
 - Balance
 - State of our muscles, ...
 - Blood pressure
 - Unconscious information for our nervous system

Distribution of information

- Most of the information from the outside world arrives through vision (83%), hearing (11%).
- Much less by smell (3,5%), touch (1,5%) and taste (1%).

Channel capacity of our sensory organs

Vision	$7 \cdot 10^8$ bit/s
Hearing	$3-8 \cdot 10^5$ bit/s
Touch, pressure	$2 \cdot 10^5$ bit/s
Cold, heat	$2 \cdot 10^3$ bit/s
Smell	50 bit/s
Taste	10 bit/s
Pain	100 bit/s
Speech	22-55 bit/s
Reading	18-45 bit/s

Memory

- Coding
 - Sensory storage 1- some sec
- Storage
 - STM-LTM
- Recall

Memory

- *Short-term memory:*
 - *Working memory*
- *Long-term memory:*
 - *Implicit memory:* procedural, ability
 - *Explicit memory:* episodic and semantic

STM

- 7 ± 2 theorem (Miller's law)
- 20 sec
- conscious
- selective

- grouping

LTM

- Practically unlimited
- Unconscious
- Fast
- Automatic
- Two search types, if underdefined:
 - Based on similarity
 - Frequent errors